

## APHID PARASITOIDS (HYMENOPTERA: BRACONIDAE: APHIDIINAE) OF KASHMIR, INDIA: A CHECKLIST

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**ABSTRACT.** A checklist of aphidiine parasitoids (Hymenoptera: Braconidae: Aphidiinae) associated with various aphid species occurring in Kashmir was compiled. The paper deals with 61 species belonging to 15 genera, occurring in diverse areas and localities of Kashmir valley. The database pertaining to aphidid-fauna has been updated not only in the light of recent systematic and nomenclatural changes but also host names, host plants etc. Aphid parasitoids are natural enemies of aphids and form one of the potential biological control measures. Systematic study on parasitoids will form a baseline data in devising management strategies for controlling aphids.

**Key words:** Aphid, Parasitoid, Host, Pest, Kashmir.

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**RESUMEN.** Se publica una lista de especies de parasitoides afidiinos (Hymenoptera: Braconidae: Aphidiinae) asociados con varias especies de áfidos en Kashmir, India. El trabajo menciona a 61 especies de 15 géneros que se distribuyen en diversas localidades y áreas del valle de Kashmir. La base de datos sobre fauna de áfidos ha sido actualizada con cambios recientes de sistemática, nomenclatura, nombres de hospederos y plantas hospedadas. Los parasitoides de áfidos son enemigos naturales de áfidos y pueden ser considerados como potenciales agentes de control biológico. El estudio sistemático de estos parasitoides, ayudará en la implementación de estrategias de manejo para controlar a los áfidos.

**Palabras clave:** áfidos, parasitoide, hospedero, plaga, Kashmir

### INTRODUCTION

Aphids have been considered as economically important agricultural pests. These tiny insects, like other insects have their natural enemies as parasitoid wasps belonging to subfamily Aphidiinae within the family Braconidae. Members of this subfamily can be distinguished structurally by their medium body size usually about 1.5-3.5 mm

long; females with short ovipositor; metasomal tergum weakly sclerotized; antenna short with 10 to 28 segments; ovipositor sheath or hypopygium in females often modified; a single, large median cell in the fore wing in most species; smooth scutellar sulcus present; cross vein cu-a absent in the hind wing and occipital carina present (at least laterally) (Stary 1970; Achterberg 1997). Most of the species of Aphidiinae are being used against aphid pests in various parts of the world. Aphid pest problems are known worldwide (Stary and Ghosh 1983). This is complicated by many well known reasons, viz., their biological peculiarities along with intensification of agriculture and introduction of new plant varieties, along with extensive, injudicious and indiscriminate use of agricultural chemicals.

The first work on Aphid parasitoids was done in 1818 by Nees Esenback; Haliday (1836) was the first who proposed the generic classification of Aphidiids. Marshall (1896) published first monographs on European Aphidiids fauna. Stary & Bhagat (1978) reported species of aphid parasitoids from Kashmir. Takada & Rishi (1980) reported 15 species of Aphidiinae from Kashmir, India, with description of three new species.

Approximately 400 species placed under 60 genera of subfamily Aphidiinae have been described (Stary 1988; Dolphin & Quicke 2001). The members of this subfamily are known to occur in all the major habitats of the world. This subfamily was traditionally represented by four tribes, viz., Ephedrini, Praini, Aphidiini and Trioxini (Mackauer 1968; Belshaw & Quicke 1997) but molecular phylogenetic analysis have proved to be inconclusive, indicating the presence of three viz., Ephedrini, Praini and Aphidiini (Smith *et al.* 1999; Sanchis *et al.*, 2000) or five viz., Ephedrini, Praini, Monoclonini, Trioxini and Aphidiini (Sanchis *et al.* 2000) tribes. To facilitate research on aphid parasitoids in Kashmir, this checklist was created.

## MATERIAL AND METHODS

Host data were recorded for each species in Kashmir valley. Host data were generally presented with in order of the host aphid (Homoptera; Aphididae) on the host plant, when host plant is available, followed by the reference citing that association.

## RESULTS

### Checklist

The Kashmir Aphidiinae (Hymenoptera: Braconidae) is presently represented by 61 species belonging to 16 genera. The details of which are as follows:

#### I. Genus *Adialytus* Foerster

*Adialytus* Foerster, 1862: 249, 250. Type species: *Adialytus tenuis* Foerster.

1. *Adialytus ambiguus* (Haliday)

*Aphidius (Aphidius) ambiguus* Haliday, 1834: 104-105.

*Lysiphlebus (Adialytus) arvicola* Stary, 1961.

Host. *Macrosiphum* sp. on *Rosa* sp. (Bhagat & Ahmad 1991); *Sipha maydis* (Passerini) on *Cynodon dactylon* (Shuja-Uddin 1978a).

2. *Adialytus salicaphis* (Fitch)

*Trioxys salicaphis* Fitch, 1855: 841.

*Trioxys populaphis* Fitch, 1855: 841.

*Lipolexis salicaphis* Ashmead, 1889: 671.

*Aphidius (Diaeretus) laticephalus* Telenga, 1953: 172-173.

Host. *Chaitophorus* sp. on *Salix caprea* (Shuja-Uddin 1978a).

## II. Genus *Aphidius* Nees

*Aphidius* Nees, 1819: 302. Type species: *Aphidius avenae* Haliday .

*Theracmion* Holmgren, 1872: 99. Type species: *Theracmion arcticus* Holmgren.

*Aphidius* Nees, 1819, subg. *Lysaphidus* Smith, 1944: 72. Type species: *Aphidius (Lysaphidus) adelocarinus* Smith.

*Aphidius* Nees, 1819, subg. *Euaphidius* Mackauer, 1961a: 110. Type species: *Aphidius pterocommae* Ashmead.

3. *Aphidius absinthii* Marshall

*Aphidius absinthii* Marshall, 1896: 605-606.

? *Aphidius cardui* Marschal var. *artemisiae* Ivanov, 1927: 429.

Host. *Macrosiphoniella* sp. on *Chrysanthemum* sp. (Bhagat & Ahmad 1991).

4. *Aphidius areolatus* Ashmead

*Aphidius areolatus* Ashmead, 1906: 189-190.

Host. Without host records (Rishi & Bhagat 1980).

5. *Aphidius cingulatus* Ruthe

*Aphidius cingulatus* Ruthe, 1859: 315.

*Aphidius cingulatus* Takada, 1968: 95.

Host. *Pterocomma populeum* (Kaltenbach) on *Populus tremuloides* (Takada & Rishi 1980);

6. *Aphidius colemani* Viereck

*Aphidius colemani* Viereck, 1912: 141.

Host. *Aphis nerii* Boyer de Fonscolombe on *Calotropis* sp. (Takada & Rishi 1980);

7. *Aphidius erysimi* (Stary)

*Lysaphidus erysimi* Stary, 1960d: 361-363.

Host. Unknown (Rishi 1976).

8. *Aphidius hortensis* Marshall

*Aphidius hortensis* Marshall, 1896: 590-591.

*Aphidius (Aphidius) berberidis* Smith, 1944: 54-55.

Host. *Liosomaphis himalayensis* Basu on *Berberis pseudambulata* (Takada Rishi 1980);

9. *Aphidius matricariae* Haliday

*Aphidius* (*Aphidius*) *matricariae* Haliday, 1834: 103.

*Aphidius* (*Aphidius*) *cirsii* Haliday, 1834: 101.

*Aphidius* (*Aphidius*) *arundinis* Haliday, 1834: 106.

*Aphidius phorodontis* Ashmead, 1889: 662.

*Aphidius polygonia* Marshall, 1896: 602-603.

*Aphidius polygonia* Marshall, 1896: 607.

*Aphidius affinis* Quilis, 1931: 48-50.

*Aphidius arundinis* Haliday var. *obscuriformi* Quilis, 1931: 50-51.

*Aphidius renominatus* Hincks, 1943: 44.

*Aphidius nigriteleus* Smith, 1944: 61-62.

Host. *Aphis craccivora* Koch on *Solanum nigrum* (Bhagat & Ahmad 1991); *A. fabae* Scopoli on *Rumex nepalensis* (Bhagat & Ahmad 1991); *A. solanella* (Stary & Ghosh 1983); *Brachycaudus cardui* (Linnaeus) on *Carduus delbergii* (Raychaudhuri *et al.* 1982); *B. helichrysi* (Kaltenbach) on *Ageratum conyzoides* (Bhagat & Ahmad 1991) *Prunus* sp. (Stary & Ghosh 1975) *Brachycaudus* sp. (Stary & Bhagat 1978) on *Carduus* sp. (Raychaudhuri *et al.* 1982); *Brevicoryne brassicae* (Linnaeus) on *Brassica* sp. (Stary & Ghosh 1975); *C. hippophaeus indicus* on *Polygonum chinense* (Stary & Ghosh 1978); *Diphorodon cannabis* (Borner) on *Cannabis sativa* (Raychaudhuri *et al.* 1982); *Diphorodon* sp. on *Cannabis sativa* (Raychaudhuri *et al.* 1982); *Lipaphis erysimi* on *Brassica napus* (Stary & Ghosh 1978); *Myzus cerasi* (Fabricius) on *Phlox dummondii* (Bhagat & Ahmad 1991); *Descorina sofia* (Takada & Rishi 1980); *M. umifoliae* (Shinji) on *Rubia cardifolia* (Bhagat & Ahmad 1991) *Myzus* sp. on Rubiaceae plants (Stary & Ghosh 1978); *Phorodon cannabis* (Stary & Bhagat 1978; Stary & Ghosh 1983) on *Cannabis sativa* (Takada & Rishi 1980), *Phorodon* sp. (Stary & Bhagat 1978); *Shinjia pteridifoliae* (Shinji) on *Pteridium* sp. (Stary & Ghosh 1979).

10. *Aphidius salignae* Watanabe

*Aphidius salignae* Watanabe, 1939: 13-14.

Host. *Tuberolachnus salignus* (Gmelin) (Bhagat & Ahmad 1991).

11. *Aphidius setiger* Mackauer

*Aphidius setiger* Mackauer, 1961b: 273-275.

Host. Without host records (Rishi & Bhagat 1980).

12. *Aphidius smithi* Sharma and Subba Rao

*Aphidius* (*Aphidius*) *smithi* Sharma and Subba Rao, 1959: 183-187.

Host. *Acyrtosiphon pisum* (Harris) (Rao *et al.* 1969, 1970, 1971; Singh *et al.* 1979) on *Lathyrus odoretus* (Takada & Rishi 1980).

13. *Aphidius transcaspicus* Telenga

*Aphidius transcaspicus* Telenga, 1958: 55-56.

Host. *Aphis* sp. on *Prunus domestica* (Bhagat & Ahmad 1991).

14. *Aphidius uzbekistanicus* Luzhetzki

*Aphidius uzbekistanicus* Luzhetzki, 1960: 122-123.

Host. *Acyrtosiphon* sp. on *Bothriochloa* sp. (Das & Chakrabarti 1989); *Schzaphis* sp. on Grass (Das & Chakrabarti 1989); *Macrosiphum miscanthi* (Das & Chakrabarti 1989) on Grass (Saha *et al.* 1982), *Sitobion* sp. on *Avena sativa* (Das & Chakrabarti 1989), Grass (Shuja-Uddin 1975b; Stary & Bhagat 1978), *Penisetum falccidum* (Das & Chakrabarti 1989).

15. *Aphidius* sp.

Host. *Brachycaudus helichrysi* (Raychaudhuri *et al.* 1979); *Chaetosiphon gracilicornis* David, Rajasing and Narayanan on *Rosa webbiana* (Takada & Rishi 1980); *Hyalopteris pruni* on *Prunus cerasus*; *Lachnus tropicalis* (Van der Goot) (Raychaudhuri *et al.* 1979); *Macrosiphoniella sanborni* (Dharmadhikari & Ramaseshiah 1970) on *Chrysanthemum* sp. (Bhagat & Ahmad 1991); *Sitobion* sp. on *Avena sativa*, *Triticum aestivum*, *Penisetum falccidum* (Raychaudhuri *et al.* 1982).

### III. Genus *Areopraon* Mackauer

*Areopraon* Mackauer, 1959a: 849-850. Type species: *Praon lepelleyi* Waterston

16. *Areopraon lepelleyi* (Waterston)

*Praon lepelleyi* Waterston, 1926: 237.

Host. *Eriosoma ulmi* (Linnaeus) on *Ulmus laevigata* (Bhagat 1982a); *Eriosoma* sp. (Rishi & Bhagat 1980); *Schizoneurella indica* Hille Ris Lambers on *Ulmus wallichiana* (Bhagat 1982a).

17. *Areopraon* sp.

Host. *Eriosoma* sp. (Rishi 1976).

### IV. Genus *Betuloxys* Mackauer

*Betuloxys* Mackauer, 1960b: 136. Type species: *Trioxys compressicornis* Ruthe

18. *Betuloxys hortorum* (Stary)

*Trioxys (Betuloxys) hortorum* Stary, 1960c: 365-367.

*Trioxys (Betuloxys) affinis* Mackauer, 1960a: 96-98.

Host. Unidentified Aphids (Rishi 1976)

19. *Betuloxys intermedius* (Shuja-Uddin)

*Trioxys (Betuloxys) intermedius* Shuja-Uddin, 1975a: 415-420.

Host. *Capitophorus* sp. on *Centaurea iberica* (Shuja-Uddin 1975a).

### V. Genus *Binodoxys* Mackauer

*Trioxys* Haliday, 1833, subg. *Binodoxys* Mackauer, 1960b: 141. Type species: *Aphidius (Trioxys) angelicae* Haliday

20. *Binodoxys acalephae* (Marshall)

*Aphidius acalephae* Marshall, 1896: 608-609.

*Trioxys (Trioxys) urticae* Mackauer, 1959b: 171-173.

Host. *Aphis craccivora* on *Vicia faba*; *Phorodon* sp. (Stary & Bhagat 1978);

21. *Binodoxys basicurvus* (Shuja-Uddin)

*Trioxys (Binodoxys) basicurvus* Shuja-Uddin, 1973: 9-11.

Host. *Aphis gossypii* on *Rubus* sp. (Shuja-Uddin 1973).

22. *Binodoxys centaureae* (Haliday)

*Aphidius* (*Binodoxys*) *centaureae* Haliday, 1833: 490.

*Binodoxys uroleucon* Takada and Rishi, 1980: 234-240.

Host. *Macrosiphoniella* sp. (Stary & Bhagat 1978); *Uroleucon* sp. on *Chrysanthimum molifolium* (Takada & Rishi 1980).

23. *Binodoxys indicus* (Subba Rao and Sharma)

*Trioxys* (*Trioxys*) *indicus* Subba Rao and Sharma, 1958: 199-201.

Host. *A. craccivora* (Stary & Bhagat 1978) on *Ageratum conyzoides* (Singh *et al.* 1979), Leguminosae plants (Stary & Ghosh 1975); *A. solanella* on *Maesa* sp. (Stary & Ghosh 1975); *A. gossypii* (Stary & Bhagat 1978); *A. ruborum longisetosus* on *Rubus* sp. (Stary & Ghosh 1975); *A. spiraecola* on *Spiraea* sp. (Stary & Ghosh 1975) *Aulacorthum* sp. (Stary & Ghosh 1983); *Brachycaudus helichrysi* on *Gynura crepidiodes* (Stary & Ghosh 1978), *T. citricidus* (Kirkaldy) (Rishi & Bhagat 1980; Stary & Ghosh 1983) on *Citrus* sp., *Zanthoxylum* sp. (Stary & Ghosh 1975); unidentified Aphids (Stary & Ghosh 1983).

24. *Binodoxys jaii* (Bhagat)

*Trioxys* (*Binodoxys*) *jaii* Bhagat, 1982c: 321-324.

Host. *Shivaphis celti* Das on *Celtis australis* (Bhagat 1982c).

25. *Binodoxys kashmirensis* Takada and Rishi

*Binodoxys kashmirensis* Takada and Rishi, 1980: 234-240.

Host. *Microlophium* sp. on *Rosa bruianna* (Takada & Rishi 1980).

26. *Binodoxys longispinus* (Shuja-Uddin)

*Trioxys* (*Binodoxys*) *longispinus* Shuja-Uddin, 1983: 36-38.

Host. *Aphis farinosa* Gmelin on *Salix caprea* (Shuja-Uddin 1983).

27. *Binodoxys rubicola* (Shuja-Uddin)

*Trioxys* (*Binodoxys*) *rubicola* Shuja-Uddin, 1973: 9-14.

Host. *Aphis gossypii* on *Rubus* sp. (Shuja-Uddin 1973).

28. *Binodoxys uroleucon* Takada and Rishi

*Binodoxys uroleucon* Takada and Rishi, 1980: 234-240.

Host. *Uroleucon* sp. on *Chrysanthemum morifolium* (Takada & Rishi 1980).

## VI. Genus *Diaeretiella* Stary

*Diaeretiella* Stary, 1960a: 242-243. Type species: *Aphidius rapae* M'Intosh

29. *Diaeretiella rapae* (M'Intosh)

? *Aphidius vulgaris* Bouche, 1834: 161-162.

*Aphidius rapae* M'Intosh, 1855: 194.

*Aphidius* (*Trionyx*) *rapae* Curtis, 1860: 73-74.

*Diaeretus chenopodii* Foerster, 1867: 125.

*Trioxys piceus* Cresson, 1880: 260.

*Lipolexis chenopodiaphidis* Ashmead, 1889: 671.

*Aphidius brassicae* Marshal, 1896: 597-598.

*Diaeretus californicus* Baker, 1909: 25.

*Diaeretus nipponensis* Viereck, 1911: 182.

*Diaeretus obsoletus* Kurdjumov, 1913: 41.

*Diaeretus napus* Quilis, 1931: 71-72.

*Diaeretus croaticus* Quilis, 1934: 8-9.

*Diaeretus plesiorapae* Blanchard, 1940: 45-48.

*Diaeretus aphidum* Mukerji and Chatterjee, 1950: 4-6.

Host. *Aphis craccivora* (Atwal *et al.* 1969) on *Solanum tuberosum* (Bhagat & Ahmad 1991); *Brevicoryne brassicae* (Rao *et al.* 1970) on Brassicaceae plant (Bhagat & Ahmad 1991), *Brassica* sp. (Stary & Ghosh 1975), *Descorina sofia* (Takada & Rishi 1980), *Lipaphis erysimi* (Rao *et al.* 1969) on *Brassica campestris* (Bhagat & Ahmad 1991); unidentified aphids (Bhagat & Ahmad 1991).

## VII. Genus *Ephedrus* Haliday

*Ephedrus* Haliday, 1833: 261, 485. Type species: *Bracon plagiator* Nees.

*Elassus* Wesmael 1835: 248. Type species: *Aphidius parvicornis* Nees.

*Ephedrus* Haliday subg. *Ephedrus* s. str., Stary 1958: 66-67. Type species: *Ephedrus* (*Ephedrus*) *plagiator* (Nees).

*Ephedrus* Haliday subg. *Lysephedrus* Stary, 1958: 64. Type species: *Ephedrus* (*Lysephedrus*) *validus* (Haliday).

30. *Ephedrus dioscoreae* Bhagat

*Ephedrus dioscoreae* Bhagat, 1982b: 113-117.

Host. *Aphis* sp. on *Dioscorea deltoidea* (Bhagat 1982b).

31. *Ephedrus laevicollis* (Thomson)

*Aphidius* (*Elassus*) *laevicollis* Thomson, 1895: 2332.

*Ephedrus levicollis* Dalla Torre, 1898: 16. (Misspelled).

*Ephedrus minor* Stelfox, 1944: 235-236.

Host. *Cavariella* sp. on *Salix alba* (Takada & Rishi 1980).

32. *Ephedrus niger* Gautier, Bonnamour and Gaumont

*Ephedrus niger* Gautier, Bonnamour and Gaumont, 1929: 200-201.

*Ephedrus* (*Ephedrus*) *campestris* Stary, 1962: 87-91.

Host. *Macrosiphoniella sanborni* (Shuja-Uddin 1978b) on *Chrysanthemum* sp. (Ghosh & Agarwala 1982); *Uroleucon* sp. on *C. morifolium* (Takada & Rishi 1980); unidentified aphids (Rishi 1976).

33. *Ephedrus persicae* Froggatt

*Ephedrus persicae* Froggatt, 1904: 611-612.

*Ephedrus nevadensis* Baker, 1909: 23.

*Ephedrus nitidus* Gahan, 1917: 195.

*Ephedrus vidali* Quilis, 1931: 72-74.

*Ephedrus pulchellus* Stelfox, 1941: 133-139.

*Ephedrus interstitialis* Watanabe, 1941: 139-140.

*Ephedrus impressus* Granger, 1949: 412.

*Ephedrus* (*Ephedrus*) *holmani* Stary, 1958: 63.

*Ephedrus* (*Ephedrus*) *palaestinensis* Mackauer, 1959b: 867-868.

Host. *Aphis craccivora* (Stary & Bhagat 1978); unidentified aphids (Rishi 1976).

34. *Ephedrus plagiator* (Nees)

*Bracon plagiator* Nees, 1811: 17.

*Aphidius parvicornis* Nees, 1834: 16.

*Ephedrus japonicus* Ashmead, 1906: 187.

Host. *Prociphilus* sp. on *Lonicera quinquelocularis* (Bhagat 1982a); *Tetraneura* sp. on *Ailantus altissima* (Bhagat 1982a).

35. *Ephedrus srinagarensis* Stary and Bhagat

*Ephedrus srinagarensis* Stary and Bhagat, 1978: 388-390.

Host. *Myzus* sp. on *Lonicera quinquelocularis* (Stary & Bhagat 1978); *Prociphilus* sp. on *Lonicera quinquelocularis* (Bhagat 1982a).

36. *Ephedrus urticae* Bhagat

*Ephedrus urticae* Bhagat, 1982b: 113-117.

Host. *Microlophium carnosum* (Buckton) on *Urtica dioica* (Bhagat 1982b).

37. *Ephedrus* sp.

Unidentified aphids (Rishi 1976).

#### **VIII. Genus *Kashmiria* Stary and Bhagat**

*Kashmiria* Stary and Bhagat, 1978: 387-393. Type species: *Kashmiria aphidis* Stary and Bhagat.

38. *Kashmiria aphidis* Stary and Bhagat

*Kashmiria aphidis* Stary and Bhagat, 1978: 387-393.

Host. *Myzus* sp. on *Lonicera quinquelocularis* (Stary & Bhagat 1978); *Prociphilus* sp. on *Lonicera quinquelocularis* (Bhagat 1982a).

#### **IX. Genus *Lipolexis* Foerster**

*Lipolexis* Foerster, 1862: 249. Type species: *Lipolexis gracilis* Foerster.

*Gynocryptus* Quilis, 1931: 27-28. Type species: *Gynocryptus pieltaini* Quilis.

39. *Lipolexis gracilis* Foerster

*Lipolexis gracilis* Foerster, 1862: 249.

*Gynocryptus pieltaini* Quilis, 1931: 27-28.

*Aphidius palpator* Gautier and Bonnamour, 1931: 166-167.

*Lipolexis chinensis* Chen, 1980a: 169-172.

Host. *Aphis craccivora* on *Solanum nigrum*, *Robinia pseudoaccia* (Bhagat & Ahmad 1991); *Liosomaphis himalayensis* on *Berberis pseudambulata* (Takada & Rishi 1980); *Therioaphis trifolii* (Monell) (Stary & Ghosh 1983).

40. *Lipolexis oregmae* (Gahan)

*Diaeretus oregmae* Gahan, 1932: 736-757.

*Lipolexis oregmae* (Gahan), Stary, 1960b: 109-111.

*Lipolexis scutellaris* Mackauer, 1962: 37-45.

*Lipolexis oregmae* (Gahan), Miller *et al.* 2002: 83-107.

Host. *A. craccivora* (Stary & Bhagat 1978; Stary & Ghosh 1983) on *Benincasa hispida*, *Cosmos* sp. *Hibiscus rosasinensis*, *Eupatorium* sp. (Stary & Ghosh 1975); *A. ruborum longisetosus* on *Rubus ellipticus* (Stary & Ghosh 1975); *Aphis* sp. (Stary & Ghosh 1983); *Zanthoxylum* sp. (Stary & Ghosh 1975), *Coffea arabica* (Subhrani *et al.* 2006); *T. odinae* (van der Goot) (Stary & Ghosh 1983) on *Erodia trifolia* and *Viburnum foetidum* (Stary & Ghosh 1979); *Tuberolachnus salignus* on *Salix* sp. (Stary & Ghosh 1975).

#### **X. Genus *Lysiphlebus* Foerster**

*Lysiphlebus* Foerster, 1862: 249, 250. Type species: *Aphidius* (= *Bracon*) *dissolutus* (Nees).

*Aphidaria* Provancher, 1888: 396. Type species: *Aphidaria basilaris* Provancher

41. *Lysiphlebus confusus* Tremblay and Eady

*Lysaphidus confusus* Tremblay and Eady, 1978: 180-184.

Host. *Myzus dycei* on *Urtica* sp. (Saha *et al.* 1982); unidentified aphid (Rishi 1976).

#### **XI. Genus *Monoctonus* Haliday**

*Aphidius* Nees, 1819, subg. *Monoctonus* Haliday, 1833: 261, 487. Type species:

*Aphidius* (*Monoctonus*) *caricis* Haliday.

*Aphidileo* Rondani, 1848: 14. Type species: *Aphidius resolutus* Nees.

*Monoctonus* Haliday, 1833. subg. *Falciconus* Mackauer, 1959c: 180. Type species:

*Aphidius pseudoplatani* Marshall.

*Harkeria* Cameron, 1900: 537. Type species: *Harkeria rufa* Cameron.

*Monoctonus* Haliday, 1833. subg. *Monoctonus* s. str., Stary, 1959: 241-242. Type species: *Aphidius* (*Monoctonus*) *caricis* Haliday.

*Monoctonus* Haliday, 1833. subg. *Paramonctonus* Stary, 1959: 238-239. Type species: *Monoctonus* (*Paramonctonus*) *angustivalvus* Stary.

42. *Monoctonus* sp.

Host. *Liosomaphis* sp. (Stary & Ghosh 1983); *Macrosiphoniella oblonga* (Mordvilko) on *Artemisia vestite* (Rishi 1976), Unidentified aphids (Takada & Rishi 1980).

#### **XII. Genus *Pauesia* Quilis**

*Pauesia* Quilis, 1931: 67-69. Type species: *Pauesia albuferensis* Quilis.

*Aphidius* Nees, 1819, subg. *Paraphidius* Stary, 1958: 56, 91. Type species: *Aphidius californicus* Ashmead.

43. *Pauesia gulmargensis* Bhagat

*Pauesia* (*Paraphidius*) *gulmargensis* Bhagat, 1981b: 197-199.

Host. *Cinara* sp. on *Abies pindrow* (Bhagat 1981b).

44. *Pauesia hazratbalensis* Bhagat

*Pauesia* (*Kashmirpauesia*) *azratbalensis* Bhagat, 1981b: 197-199.

Host. *Lochnus* sp. on *Biota orientalis* (Bhagat 1981b).

45. *Pauesia himalayensis* Bhagat

*Pauesia* (*Paraphidius*) *himalayensis* Bhagat, 1981b: 197-199.

Host. *Lachnus tropicalis* on *Pinus excelsa* (Bhagat 1981b).

46. *Pauesia pini* (Haliday)

*Aphidius* (*Aphidius*) *pini* Haliday, 1834: 96.

*Aphidius lachnivorus* Ashmead, 1906: 189.

Host. *Cinara lachnistrostris* Hille Ris Lambers on *Pinus excelsa* and *P. wallichiana*;  
*Cinara* sp. on *Pinus* sp. (Bhagat 1981b).

### **XIII. Genus *Praon* Haliday**

*Aphidius* Nees, 1819, subg. *Praon* Haliday, 1833: 483. Type species: *Bracon exolentus* Nees.

*Bracon* Nees, 1811, subg. *Achoristus* Ratzeburg, 1852: 31-32. Type species: *Bracon* (*Achoristus*)

*aphidiiformis* Ratzeburg.

*Aphidaria* Provancher, 1886: 151. Type species: *Aphidaria simulans* Provancher.

*Parapraon* Stary, 1983: 206. Type species: *Praon gallicum* (Stary).

47. *Praon abjectum* Haliday

*Aphidius* (*Praon*) *abjectum* Haliday, 1833: 485.

*Bracon* (*Achoristus*) *aphidiiformis* Ratzeburg, 1852: 11.

Host. *Rhopalosiphum nymphaeae* (Stary & Bhagat 1978).

48. *Praon dorsale* (Haliday)

*Aphidius* (*Praon*) *dorsale* Haliday, 1833: 484.

*Blacus discolor* Nees, 1834: 192-193.

*Praon collaris* Foerster, 1867: 124.

*Praon longicorne* Marshall, 1896: 536-537.

Host. *Acyrtosiphon gossypii* Mordvilko (Subba Rao & Sharma 1960a; Mackauer 1968).

49. *Praon kashmirensis* Bhagat

*Praon kashmirensis* Bhagat, 1982b: 113-117.

Host. *Chaitophorus pakistanicus* on *Salix* sp. (Bhagat 1982b).

50. *Praon stagona* Takada and Rishi

*Praon stagona* Takada and Rishi, 1980: 234-240.

Host. *Stagona* sp. on *Lonicera quinquelocularis* (Takada & Rishi 1980).

51. *Praon volucre* (Haliday)

*Aphidius* (*Praon*) *volucre* Haliday, 1833: 484.

Host. *Lipaphis erysimi* (Stary & Ghosh 1983); *Myzus* sp. (Stary & Bhagat 1978).

52. *Praon* sp.

Host. *Macrosiphoniella* sp. (Stary & Bhagat 1978); unidentified Aphids (Rishi 1976).

#### XIV. Genus *Toxares* Haliday

*Aphidius* Nees, 1819, subg. *Trionyx* Haliday, 1833: 261, 487. Type species: *Aphidius* (*Trionyx*) *deltiger* Haliday.

*Toxares* Haliday in Westwood, 1840: 65. Type species: *Aphidius* (*Trionyx*) *deltiger* Haliday.

53. *Toxares deltiger* (Haliday)

*Aphidius* (*Trionyx*) *deltiger* Haliday, 1833: 461, 487.

*Toxares deltiger* Haliday in Westwood, 1840: 65.

*Ephedrus flaveolus* Gyorfi, 1958: 131.

Host. *Metopolophium euryae* (Takahashi) on *Euryae acuminata* (Stary and Bhagat 1978); unidentified aphids (Rishi 1976; Rishi & Bhagat 1980; Stary & Ghosh 1983).

54. *Toxares macrosiphophagum* Shuja-Uddin

*Toxares macrosiphophagum* Shuja-Uddin, 1974: 269-272.

Host. *Aphis citricola*; *A. solanella*; *Brachycaudus helichrysi*; *Brachycaudus* sp.; *Capitophorus hippophaes indicus*; *Hyperomyzus* sp.; *Lachnus tropicalis* (Stary & Ghosh 1983); *Macrosiphoniella sanborni* on *Chrysanthemum* sp. (Shuja-Uddin 1974); *Macrosiphoniella* sp.; *Metopolophium euryae*; *Myzus obtusirostris*; *M. ornatus*; *M. persicae*; *Rhopalosiphum nymphaeae*; *Schizaphis rotundiventris*; unidentified aphids (Stary & Ghosh 1983).

55. *Toxares shigai* Takada

*Toxares shigai* Takada, 1965: 17-18.

Host. *Aphis farinosa* on *Salix alba* (Takada & Rishi 1980);

56. *Toxares zakai* Shuja-Uddin

*Toxares zakai* Shuja-Uddin, 1974: 272-273.

Host. *Myzus persicae* on *Solanum nigrum* (Shuja-Uddin 1974).

#### XV. Genus *Trioxys* Haliday

*Aphidius* Nees, 1819, subg. *Trioxys* Haliday, 1833: 261-488. Type species: *Aphidius cirsii* Curtis.

*Misaphidus* Rondani, 1877: 185. Type species: *Misaphidus aphidiperda* Rondani.

*Neuropenes* Provancher, 1886: 151, 153. Type species: *Trioxys compressicornis* Ruthe.

*Trioxys* Haliday, 1833. subg. *Fissicaudus* Stary and Schlinger, 1967: 122. Type species: *Trioxys*

(*Binodoxys*) *confucius* Mackauer.

*Trioxys* Haliday, 1833. subg. *Pectoxys* Mackauer, 1960b: 145-155. Type species: *Trioxys* (*Trioxys*) *macroceratus* Mackauer.

*Trioxys* Haliday, 1833. subg. *Trioxys* s. str. Mackauer, 1959b: 149. Type species: *Aphidius cirsii* Curtis.

57. *Trioxys pallidus* (Haliday)

*Aphidius* (*Trioxys*) *pallidus* Haliday, 1833: 489.

- Aphidius callipteri* Marshall, 1896: 609-610.  
*Trioxys pulcher* Gautier and Bonnamour, 1924: 43-44.  
Host. *Chromaphis juglandicola* (Kaltenbach) on *Juglans regia* (Shuja-Uddin 1982).  
58. *Trioxys rishii* Stary and Bhagat  
*Trioxys (Trioxys) rishii* Stary and Bhagat, 1978: 389-391.  
Host. *Brachycaudus* sp. on *Carduus* sp. (Stary & Bhagat 1978).  
59. *Trioxys rosaecola* Bhagat  
*Trioxys (Trioxys) rosaecola* Bhagat, 1982c: 321-324.  
Host. *Myzaphis rosarum* (Kaltenbach) on *Rosa webbiana* (Bhagat 1982c).  
60. *Trioxys soporensis* Shuja-Uddin  
*Trioxys (Trioxys) soporensis* Shuja-Uddin, 1982: 146-149.  
Host. *Shivaphis* sp. on *Celtis* sp. (Shuja-Uddin 1982).  
61. *Trioxys* sp.  
Host. *Aphis citricola*; *A. craccivora* on *Robinia* sp.; *Aphis* sp. (Stary & Ghosh 1983); *Brachycaudus* sp. (Stary & Bhagat 1978); *Macrosiphoniella spinipes* on *Chrysanthemum* sp. (Stary & Ghosh 1978); *Melanaphis donacis* (Passerini) (Stary & Ghosh 1983); *Mollitrichosiphum tenuicarpus* on Fagaceae Plant (Stary & Ghosh 1978); *Toxoptera aurantii* (Stary & Ghosh 1983); *T. citricidus* (Stary & Ghosh 1983); *Tuberculatus indicus* on *Quercus griffithi* (Stary & Ghosh 1978); unidentified Aphids (Dharmadhikari & Ramaseshiah 1970; Rishi, 1976; Stary & Ghosh 1983).

## CONCLUSIONS

In Kashmir, this subfamily is represented by 61 species belonging to fifteen genera under four tribes viz., tribe Ephedrini with 2 genera viz. *Toxares* & *Ephedrus*; tribe Praini with 2 genera viz., *Areopraon* and *Praon*; tribe Aphidiini with 8 genera viz., *Adialytus*, *Aphidius*, *Diaeretiella*, *Kashmiria*, *Lipolexis*, *Lysiphlebus*, *Monoctonus* and *Pauesia* and tribe Trioxini with 3 genera viz., *Betuloxys*, *Binodoxys*, and *Trioxys*. The genus *Aphidius* is the most diverse being represented by the greatest number of species followed by genus *Binodoxys*.

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