

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, Monoctonini, 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 gracilicorne* David, Rajasing and Narayanan on *Rosa webbiana* (Takada & Rishi 1980); *Hyalopterus 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* Rutherford.

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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