

PARASITOIDS AND PREDATORS OF APHIDS (HOMOPTERA : APHIDIDAE) FROM INDIA - VI. NEW RECORDS OF SEVEN ARACHNIDS, ONE DIPTERAN AND ONE NEUROPTERAN PREDATORS FROM HIMACHAL PRADESH, INDIA

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This paper reports 2 aphidids as parasitoids, 13 spiders, 12 coccinellids, 8 syrphids and 1 chrysopid as predators of aphids from Himachal Pradesh, Northwest India. 7 species of spiders, 1 species of syrphid and the species of chrysopid are new records for India. Apart from the above the aphids are recorded as new hosts for the parasitoids and predators.

(Key words: Parasitoids and predators of aphids)

This paper reports the parasitoids and predators of aphids of Himachal Pradesh collected during the period 1979-81. Out of the 34 recorded species of predatory components, 21 are insects and 13 are spiders. Insect predators are comprised of 12 coleopterans, 8 dipterans and 1 neuropteran species. Similar studies for aphid parasitoids revealed the occurrence of 2 belonging to the family Aphididae.

Aphid predators include 9 species as new records for India, Besides, host re-

ords for each of the predators and parasitoid species are new for India.

New records for Predators have been denoted by (*) mark.

Examples of the natural enemies, except the parasitoid No. 2 (Presently with Dr. Shuja Uddin) as well as the aphid hosts are in the collection of Entomology Laboratory, Department of Zoology, Calcutta University.

A. PARASITOIDS:

Family : Aphididae

Host record for each of the parasitoids mentioned below are further additions to the list of host spectrum of Indian Aphididae provided by Agarwala *et al.* (1981 a, b), (Saha *et al.* 1982).

Parasitoids	Aphid host	Host plants	Locality	Date
1. <i>Aphidius smithi</i> Sharma and Subba Rao	<i>Amphorophora</i> <i>ampullata bengalensis</i> Hrl & Basu	Indet fern	Katrain (c 1464 m)	31.viii.80
2. <i>Lysaphidus qadrii</i> Shuja Uddin	<i>Myzus ornatus</i> Laing	Indet plant	Simla (c 2000 m)	11.xi.80

B. PREDATORS

Order : ARANEIDA

Agarwala *et al.* (1981a), Battu and Singh (1975), Raychaudhuri *et al.* (1978, 1979) so far recorded 23 species of spiders as the natural enemies of all aphid species from India.

Parasitoids	Aphid hosts	Host plants	Locality	Date
Family : Araneidae				
1. <i>Araneus</i> ap.	<i>Capitophorus formosartemisae</i> (Tak.)	<i>Artemisia</i> sp.	Katrain (c 1464 m)	7.v.80
2* <i>Neoscona rumpfi</i> (Thorell)	<i>Myzus dycei</i> Carver	<i>Urtica purviflora</i>	Solan (c 1450 m)	14.x.79
3. <i>Neoscona</i> spp.	<i>Chaitophorus kapuri</i> Hrl	<i>Populus</i> sp.	Manali (c 2050 m)	24.vi.81
	<i>Liosomaphis himalayensis</i> Basu	<i>Berberis</i> sp.	do	21.vi.81
	<i>Metopolophium phaseoli</i> (Chakrabarti, Ghosh and Raychaudhuri)	<i>Spiraea canescens</i>	do	21.vi.81
	<i>Neomegouropsis dooarsis</i> (Ghosh and Raychaudhuri)	Indet Leguminosae	Mashobra (c 2149 m)	10.xi.80
Family : Clubionidae				
4. <i>Clubiona</i> sp.	<i>Aphis gossypii</i> complex	Indet plant	Manali (c 2050 n)	28.x.79
	<i>Macrosiphoniella sanborni</i> (Gillette)	<i>Chrysanthemum</i> sp.	Solan (c 1450 m)	16.vi.79
Family : Dictynidae				
5. <i>Dictyna</i> sp.	<i>Chaetosiphon (Pentatrachopus) tetraerhodum</i> (Walker)	<i>Rosa</i> sp.	Jakhu (c 2455 m)	21.x.79
Family : Tetragnathidae				
6.* <i>Eucta javana</i> Thorell	<i>Aphis spiraeicola</i> Patch	<i>Solanum nigrum</i>	Solan (c 1450 m)	18.vi.79
Family : Theridiidae				
7. <i>Theridion</i> sp.	<i>Globulicaudaphis pakistanica</i> HRL	<i>Quercus</i> sp.	Mashobra (c 2149 m)	10.xi.80
	<i>Nippolachnus piri</i> Mats.	<i>Quercus</i> sp.	Simla (c 2000 m)	27.vi.81
Family : Thomisidae				
8. <i>Misumena</i> sp.	<i>Macrosiphum rosae</i> (Lin.)	<i>Rosa</i> sp.	do	19.vi.79

Predators	Aphid hosts	Host plants	Locality	Date
9.* <i>Misumenops khandalaensis</i> Tikadar	<i>Macrosiphum indicum</i> Basu	Indet grass	Banikhet (c 1610 m)	1.xi.80
10.* <i>Oxyptila</i> sp.	<i>Myzus ornatus</i> Laing	Indet plant	Dalhousie (c 2036 m)	10.vi.81
11.* <i>Philodromus decoratus</i> Tikadar	<i>Brevicoryne brassicae</i> (Lin.)	<i>Raphanus sativus</i>	Fagu (c 2510 m)	23.x.79
12.* <i>Xysticus minutus</i> Tikadar	<i>Myzus mumecola</i> (Mats.)	Indet plant	Kufri (c 2633 m)	11.iv.80
13.* <i>Xysticus</i> sp.	<i>Eutrichosiphum</i> (<i>Neoparatrichosiphum</i>) <i>khasyanum</i> (Ghosh and Raychaudhuri)	<i>Quercus</i> sp.	Dharmasa'la (c 1435 m)	17.vi.81
	<i>Myzus ornatus</i> Laing	Indet plant	Dalhousie (c 2036 m)	10.vi.81

Order : COLEOPTERA

Family : Coccinellidae

1. <i>Adonia variegata</i> (Goeze)	<i>Aphis spiraeicola</i> Patch	Indet plant	Joginder- nagar (c 1296 m)	7.xi.80
Predatory stage— grub and adult	do	do	Kasauli (c 1927 m)	30.iii.80
	do	<i>Rumex nepalensis</i>	Simla (c 2000 m)	3.iv.80
	<i>Brevicoryne brassicae</i> (Lin.)	<i>Raphanus sativus</i>	Fagu (c 2510 m)	23.x.79
	do	<i>Brassica</i> sp.	Solan (c 1495 m)	15.x.79
	<i>Dactynotus sonchi</i> (Lin.)	<i>Sonchus</i> sp.	do	16.vi.79
	<i>Hyperomyzus cardue- llinus</i> (Theobald)	do	do	16.vi.79
	<i>Liosomaphis hima- layensis</i> Basu	<i>Berberis</i> sp.	Simla (c 2000 m)	1.iv.80
	<i>Macrosiphum rosae</i> (Lin.)	<i>Rosa</i> sp.	Solan (c 1495 m)	15.x.79
	<i>Myzus ornatus</i> Laing	<i>Salvia</i> sp.	Chail (c 2250 m)	5.xi.79

Predators	Aphid hosts	Host plants	Locality	Date
2. <i>Coccinella Septempunctata</i> Linnaeus	<i>Aphis ruborum longisetosus</i> Baus	<i>Rubus ellipticus</i>	Solan (c 1450 m)	25.iii.80
Predatory stage—grub and adult	<i>Cavariella aegopodii</i> (Scopoli)	<i>Salix</i> sp.	Kasauli (c 1927 m)	30.iii.80
	do	Indet plant	Simla (c 2000 m)	1.iv.80
	<i>Chaetosiphon (Chaetosiphon) gracilicornis</i> David, Rajasingh and Narayanan	<i>Rosa</i> sp.	Kharighat (c 1596 m)	27.iii.80
	<i>Liosomaphis atra</i> HRL	<i>Valeriana wallichii</i>	Simla (c 2000 m)	2.iv.80
	<i>Macrosiphum rosaeiformis</i> Das	<i>Rosa</i> sp.	Kharighat (c 1596 m)	28.iii.80
	<i>Matsumuraja capitophoroides</i> HRL	<i>Rosa</i> sp.	Simla (c 2000 m)	1.iv.80
	<i>Myzus cymbalariae</i> Stroyan	Indet plant	do	1.iv.80
	<i>Myzus dycei</i> Carver	<i>Urtica</i> sp.	Kasauli (c 1927 m)	30.iii.80
	<i>Myzus mumecola</i> (Mats.)	Indet plant	Kufri (c 2633 m)	11.iv.80
	<i>Myzus ornatus</i> Laing	<i>Salvia</i> sp.	Chail (c 2250 m)	5.xi.79
	do	Indet plant	Simla (c 2000 m)	1.iv.80
	<i>Nippolachnus</i> sp.	<i>Quercus</i> sp.	Kufri (c 2633 m)	24.x.79
	<i>Tricaudatus polygoni</i> (Narz.)	<i>Spiraea cantonensis</i>	Kasauli (c 1927 m)	30.iii.80
3. <i>Coelophora sexareata</i> Mulsant	<i>Indoidiopterus geranii</i> (Chowdhuri, Basu, Chakrabarti and Raychaudhuri)	Indet plant	Barog (c 1531 m)	27.iii.80
Predatory stage-adult	<i>Macrosiphum miscanthi</i> Tak.	Indet plant	do	27.iii.80

Predators	Aphid hosts	Host plants	Locality	Date
4. <i>Cryptogonus</i> sp.	<i>Aphis spiraecola</i> Patch	<i>Ipomea</i> sp.	Solan (c 1495 m)	15.x.79
Predatory stage adult	<i>Capitophorus formo- sartemisiae</i> Tak.	<i>Artemisia</i> sp.	Chamba (c 726 m)	3.xi.80
	<i>Impatiens</i> sp. <i>impatiensae</i> <i>dalhousiensis</i> Verma	<i>Impatiens</i> sp.	Dalhousie (c 2036 m)	31.x.80
	<i>Pleotrichophorus</i> <i>glandulosus</i> (Kltb.)	<i>Artemisia</i> sp.	Chamba (c 726 m)	3.xi.80
	<i>Myzus persicae</i> (Sulzer)	<i>Ipomea</i> sp.	Solan (c 1495 m)	15.x.79
5. <i>Exochomus</i> <i>uropygialis</i> Mulsant	<i>Myzus ornatus</i> Laing	Indet plant	Simla (c 2000 m)	1.iv.80
Predatory stage adult				
6. <i>Leis? dimidiata</i> (Fabricius)	<i>Myzus ornatus</i> Laing.	<i>Salvia</i> sp.	Chail (c 2250 m)	5.xi.79
Predatory stage adult				
7. <i>Menochilus</i> <i>sexmaculata</i> (Fabricius)	<i>Cavariella simlaensis</i> Chowdhuri, Basu and Raychaudhuri	Indet plant	Kufri (c 2633 m)	11.iv.80
Predatory stage- grub and adult	<i>Coloradoa rufomacu- lata</i> (Wilson)	<i>Chrysanthemum</i> sp.	Solan (c 1450 m)	15.x.79
	<i>Hyadaphis coriandri</i> Das	Indet plant	do	31.iii.80
	<i>Liosomaphis atra</i> HRL	<i>Berberis</i> sp.	do	26.iii.80
8. <i>Oenopia kirby</i> Mulsant	<i>Aphis spiraecola</i> Patch	<i>Solanum nigrum</i>	Palampur (c 1260 m)	6.xi.80
Predatory stage- grub and adult	<i>Aphis paraverbasci</i> Chakrabarti	Indet plant	do	6.xi.80
9. <i>Oenopia luteopustu- lata</i> Mulsant	<i>Myzus persicae</i> (Sulzer)	<i>Zinnia elegans</i>	Simla (c 2000 m)	22.x.79
Predatory stage- grub and adult				

Predators	Aphid hosts	Host plants	Locality	Date
10. <i>Oenopia sauzei</i> Mulsant	<i>Aphis kurosawai</i> Tak.	<i>Artemisia</i> sp.	Chamba (c 726 m)	2.xi.80
Predatory stage- adult	<i>Capitophorus</i> <i>formosartemisiae</i> (Tak.)	do	do	4.xi.80
	<i>Cavariella aegopodii</i> (Scopoli)	<i>Rubus ellipticus</i>	Kulu (c 1200 m)	7.iv.80
	<i>Liosomaphis atra</i> HRL	<i>Berberis</i> sp.	Solan (c 1450 m)	26.iii.80
	<i>Melanaphis donacis</i> (Passerini)	Indet grass	Chamba (c 726 m)	4.xi.80
11. <i>Pulus pyrochellus</i> (Mulsant)	<i>Capitophorus formo-</i> <i>sartimisiae</i> (Tak.)	<i>Artemisia</i> sp.	do	4.xi.80
Predatory stage-adult				
12. <i>Scymnus</i> sp.	<i>Cavariella aegopodii</i> (Scopoli)	<i>Salix</i> sp.	Kasauli (c 1927 m)	30.iii.80
predatory stage-adult				
Order: DIPTERA				
Family: Syrphidae				

Agarwala *et al.* (1981 a), Agarwala *et al.*, (1982) have listed the host range, distribution of 31 syrphid species from India. *Syrphus vitripennis* Meigen is being reported here as a new aphidophagous insect from India.

1. <i>Betasyrphus</i> <i>serauius</i> (Weidmann)	<i>Aphis verbasci</i> Schränk	<i>Verbascum</i> <i>thapsus</i>	Solan (c 1450 m)	15.xi.79
	<i>Doraphis populi</i> (Maskell)	<i>Populus</i> sp.	Manali (c 2050 m)	24.vi.81
	<i>Myzakkata verbasci</i> (Chowdhuri, Basu, Chakrabarti and Raychaudhuri)	<i>Rubia cardi-</i> <i>folia</i>	Dharmasala (c 1435 m)	do
	<i>Myzus dycei</i> Carver	<i>Urtica</i> sp.	Jakhu (c 2455 m)	12.xi.80
2. <i>Episyrphus balteatus</i> (de Geer)	<i>Indoidiopterus</i> <i>geranii</i> (Chowdhuri, Basu, Chakrabarti and Raychaudhuri)	Indet plant	Barog (c 1531 m)	27.iii.80
	<i>Macrosiphum miscanthi</i> Tak.	Indet plant	do	do
3. <i>Ischiodon</i> <i>scutellaris</i> (Fabricius)	<i>Aphis punicae</i> Passerini	Indet plant	Solan (c 1450 m)	26.iii.80
	<i>Metapolophium rubi</i> (Narz.)	<i>Rubus ellipticus</i>	do	do

Predators	Aphid hosts	Host plants	Locality	Date
4. <i>Metasyrphus confrater</i> (Wiedman)	<i>Dactynotus simlaensis</i> (Chakrabarti, Ghosh and Raychaudhuri)	Indet plant	do	26.iii.80
5. <i>Paragus tibialis</i> (Fallen)	<i>Brachycaudus (Thuleaphis) rumexi colens</i> (Patch)	Indet plant	Manali (c 2050 m)	24.vi.81
	<i>Metopolophium phaseoli</i> (Chakrabarti, Ghosh and Raychaudhuri)	<i>Stephania harnandifolia</i>	Chamba (c 726 m)	13.vi.81
6. <i>Scaeva selenitica</i> (Meigen)	<i>Metopolophium rubi</i> (Narz.)	<i>Rubus ellipticus</i>	Solan (c 1450 m)	26.iii.80
7.* <i>Syrphus vitripennis</i> Meigen	<i>Myzus dycei</i> Carver	<i>Urtica</i> sp.	Jakhu (c 2455 m)	12.xi.80
8. <i>Xanthogramma</i> sp.	<i>Metopolophium rubi</i> (Narz.)	<i>Rubus ellipticus</i>	Solan (c 1450 m)	26.iii.80

Order: NEUROPTERA

Family: Chrysopidae

The species is known to feed on 8 species of aphids in Taiwan (Tao and Chiu, 1971). Earlier Atwal and Sethi, (1963), Behura (1963, 1965), Ghosh *et al.* (1981), Rahman (1940) and Rao (1969) reported this genus from India as aphidophagous.

1.* <i>Chrysopa septempunctata</i> Wesmæl	<i>Aphis gossypii</i> complex	Indet plant	Dharmasala (c 1435 m)	17.vi.81
	<i>Myzus ornatus</i> Laing	Indet plant	Dalhousie (c 2036 m)	10.vi.81

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ptera : Aphididae) from India-V. *Entomon*, 6 (3), 233—238.

AGARWALA BASANT, K., D. RAYCHAUDHURI & D. N. RAYCHAUDHURI (1981 b) A conspectus of Aphidiid (Hymenoptera : Aphidiidae) parasites of aphids (Homoptera : Aphididae) in India. *Akitu*, n. s. 39, 1—16.

AGARWALA, BASANT K., LASKA, PAVEL & D. N. RAYCHAUDHURI (1982) Prey records of aphidophagous syrphids from India (Diptera : Syrphidae). *Acta Ent.* (in press).

REFERENCES

- AGARWALA, BASANT K., D. GHOSH, S. K. DAS, S. C. PODDAR & D. N. RAYCHAUDHURI (1981a) Parasites and predators of ophids (Homo-
- ATWAL, A. S. & S. L. Sethi (1963) Predation by *Coccinella septempunctata* L. on the cabbage aphid, *Lipaphis erysimi* (Kalt.) in India. *J. Ecol.*, 32, 481—488.

- BATTU, G. S. & BALRAJ SING (1975) A note on spiders predating on the insect pests of cotton. *Sci. Cult.* 41 (5), 212—214.
- BEHURA, B. K. (1963) Aphids of India : A survey of published information. Proc. First Summer School of Zoolog (Simla 1961). pp. 25—78.
- BEHURA, B. K. (1965) Supplement to "aphids of India - a survey of published information"-1. *J. Utkal Univ. (Sc.)*, Bhubaneswar, 3 (1), 40—65.
- GHOSH, D., S. C. PODDAR & D. N. RAYCHAUDHURI (1981) Natural enemy complex of *Aphis craccivora* Koch and *Lipaphis erysimi* (Kalt.) in and around Calcutta. *Sci. Cult.*, 47 (2), 58—60.
- RAHMAN, K. A. (1940) Important insect predators of India. *Proc. Ind. Acad Sci. Bangalore*, 12B (3), 67—74.
- RAO, V. P. (1969) Survey for natural enemies of aphids in India. Final technical report. *Comm. Inst. Biol. Control., Indian Station, Bangalore, India*. pp. 1—93.
- RAYCHAUDHURI, D. N., S. DUTTA, BASANT K. AGARWALA, D. RAYCHAUDHURI & S. K. RAHA (1978) Some parasites and predators of aphids from northeast India and Bhutan, *Entomon*, 3 (1), 91—94.
- RAYCHAUDHURI, D. N., S. DUTTA, B. K. AGARWALA, S. K. RAHA & D. RAYCHAUDHURI (1979) Some parasites and predators of aphids in northeast India and Bhutan-II. *Entomon*, 4 (2), 164—166.
- SAHA, J. L., S. C. PODDAR, S. K. DAS, B. K. AGARWALA & D. RAYCHAUDHURI (1982) Studies on the aphid parasites (Hymenoptera : Aphidiidae) from Himachal Pradesh, India *Akitu* (accepted).
- TAO, CHIA-CHU & SHUI-CHENCHIU (1971) Biological control of citrus vegetables and tobacco aphids. *Taiwan Agr. Res. Inst., Spec. publ.*, 10, pp. 1—110.