
Insect prey of Syrphidae (Diptera) from India and Neighbouring Countries: a Review and Bibliography

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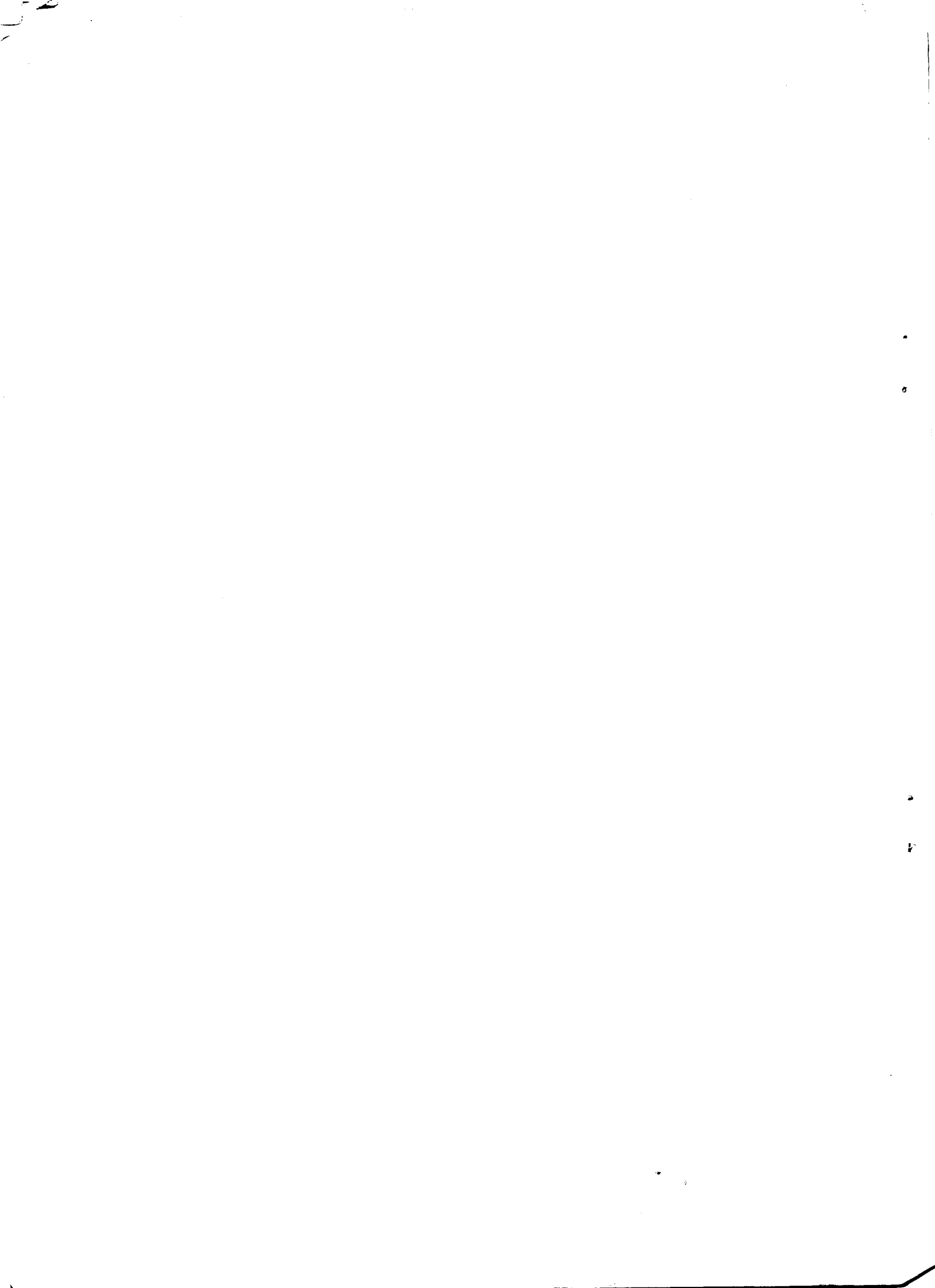
Abstract. A comprehensive list of the insect prey of 47 species of Syrphidae from India and neighbouring countries is presented, including a total of 542 individual records. The introduction includes a detailed summary, with references, of different insect groups known to be preyed upon by syrphids from all over the world, this being the first time that such a summation has been attempted for the Syrphidae. Pertinent information on predacious syrphids, their role as biocontrol agents, and a short historical account of Indian work on their biology and ecology is provided. The syrphid-prey list details recorded information on the 47 species of syrphids for whom prey have been recorded. This includes the author's own rearings and other unpublished data from the CIBC Indian Station, which together total 46 new prey records. Incorrect prey data and doubtful predator identifications are indicated or corrected. The prey-syrphid index gives the syrphid species recorded as preying upon the 77 prey species listed. The list of references constitutes a bibliography of all papers citing prey information on Indian syrphids, as well as those providing data on different prey groups of world Syrphidae.

Introduction

Aphids (Homoptera: Aphididae) are a large group (world: 3700+ spp.; Indian subcontinent; 650+ spp.) of considerable economic importance, comprising many species that are some of the most destructive pests of crop plants. Among their more important predators are the lady beetles (Coleoptera: Coccinellidae) and the hover-flies (Diptera: Syrphidae). Although a considerable amount of research has been conducted on the biology and ecology of the coccinellids, the syrphids, as a group, have been somewhat neglected.

The Syrphidae is a very large and diversified family of Diptera with a worldwide distribution. The flies, characterised by the almost universal occurrence of a 'false vein' in the wing, can be recognised in the field by their penchant for hovering over flowers in bright sunshine, their rapidly vibrating wings often producing a loud droning sound. These idiosyncracies have given them their common English names - 'hover-flies', 'flower-flies', 'sun-flies' and 'drone-flies'. Most syrphids are brightly coloured, being effective mimics of bees and wasps (Hymenoptera). Over 5000 species have been described in more than 500 genera from the world (Indian subregion: 71 gen., 312 spp.), but many more doubtless await discovery, especially in the tropics, from where the syrphid fauna is poorly documented in comparison to our knowledge of the family in the temperate regions, particularly in Europe and North America. The last comprehensive monograph on Indian Syrphidae was by Brunetti (1923) and I am now engaged in a study of the taxonomy and natural history of Oriental species.

The food habits of the adult flies are rather uniform, nearly all of them feeding on pollen and nectar, as well as on honeydew produced by several Homoptera. Their larvae, on the other hand, present a variety of food preferences, around one-third of them (subfamily Syrphinae) being predacious, while the rest (sub-families Eristalinae and Microdontinae) are either saprophagous or phytophagous. Larvae of some New World Syrphinae, belonging to the endemic tribe Toxomerini, however, have been reported to feed on pollen grains and saccharine cells in leaf axils of maize, *Zea mays* (Davidson, 1916). Telford (1973) gave other records of American Syrphini developing on plant food. One tribe, the Pipizini, of uncertain subfamilial affinity, but currently included in the Eristalinae, contains species whose larvae are predacious on Homoptera (mainly Aphididae and Adelgidae). The Microdontinae, whose peculiar slug-like larvae are, uniformly, denizens of ant (Hymenoptera: Formicidae) nests, are now recognised as a third subfamily



(Thompson, 1969). The food habits of their larvae are still poorly understood and it is not very clear whether they represent saprophages or are true predators of ant larvae and/or ant guests, including Homoptera (see Wilson, 1971; Thompson, 1972a; Lopez and Bonaric, 1977). However, Van Pelt and Van Pelt (1972) observed a species of *Microdon* feeding, in the larval stage, on ant larvae in the laboratory, in Texas (USA).

An overwhelming majority of the predacious Syrphidae feed on aphids and many lists of their aphid prey are available (e.g., Campbell and Davidson, 1924; *Ninomyia*, 1956, 1957a, 1957b, 1962; Thompson and Simmonds, 1965; Okuno, 1967; Herting and Simmonds, 1972a; Ghosh, 1974). Besides aphids, syrphid larvae are known to feed on Adelgidae (e.g., Clark, 1932; Wilson, 1938), Aleyrodidae (Butler, 1938), Aphrophoridae (Musa, 1975), Cercopidae (Pickles, 1938), Cicadellidae (Metcalf, 1916), Coccoidea (Davidson, 1916), Delphacidae (Loftin and Christenson, 1933), Flatidae (Terry, 1905), Membracidae (Chaverri, 1954), Miridae (Lean, 1926), Phylloxeridae (Siddiqui and Krishnaswamy, 1972), Psyllidae (Cotterell, 1927), Tingidae (Connell and Beacher, 1947), eggs and larvae of Chrysomelidae (Keller, 1917), larvae and pupae of Coccinellidae (Delucchi, 1954), larvae of Derodontidae (Franz, 1958), Muscidae in a torpid state (Metcalf, 1916), other adult Diptera (Verrall, 1901), larvae of Aphelinidae, accidentally, through aphid prey (Rahman and Khan, 1941b), larvae of Tenthredinidae (Gäbler, 1939), larvae of Lepidoptera (Miller, 1918), eggs of Chrysopidae (Bhatia and Shaffi, 1933), Thysanoptera (Davidson, 1916), Acari (McGregor and McDonough, 1917; McMurtry *et al.*, 1970), and, probably, on some other groups as well. See Thompson and Simmonds (1965) and Herting and Simmonds (1971, 1972a, 1972b, 1972c, 1973) for additional records of the above prey groups in the literature. The adult flies, themselves of some economic value, are considered second only in importance to the bees (Apidae) as pollinators of cultivated and wild plants (see Knuth, 1906; Rahman, 1942; Oldroyd, 1964; Ghose, 1966; Pandey and Yadava, 1970; Free, 1970; Faegri and van der Pijl, 1971; Holloway, 1976; Williams, 1977).

Though larvae of the aphidophagous species of Syrphidae reduce natural populations of aphids (see Hagen and van den Bosch, 1968), no instance of a successful biological control through the employment of a syrphid alone has been reported so far. However, biological control of the sugarcane froghopper, *Aeneolamia varia saccharina* (Distant) (= *Tomaspis varia* F., *T. saccharina* Dist.) (Homoptera: Cercopidae), has been attempted by using its syrphid predator, *Salpingogaster nigra* Schiner, in Trinidad, West Indies (Kershaw, 1913). Guagliumi (1968) reported similar work on the biological control of another sugarcane cercopid, *Mahanarva rubicunda indentata* Walker (= *M. posticata* Stål), in Brazil, using the syrphid *Salpingogaster pygophora* Schiner. Knutson (1971) gives details of further prey and puparia of species of *Salpingogaster*. The limitation in the use of syrphid flies in biological control stems mainly from the problem of rearing the adults and the larvae which depend upon entirely different sources of food, as discussed by Schneider (1969). Frazer (1972), however, described a simple and efficient method of rearing aphidophagous hover-flies in the laboratory, and Růžička (1974) developed an artificial pollen diet for *Metasyrphus corollae* (F.) adults.

Cotes (1893) and Austen (1893) provided the first data on prey of Indian Syrphidae. Accounts of predacious habits of syrphid species from this area were summarised by Maxwell-Lefroy (1906), Howlett (1909), Fletcher (1914) and Beeson (1961). There is no complete list of the insect prey of syrphids of the Indian area, though some information is available in the general world catalogues of Thompson and Simmonds (1965) and of Herting and Simmonds (1971, 1972a, 1972b, 1972c, 1973). However, partial lists from India (Bhatia and Shaffi, 1933; Cherian, 1934; Mathur, 1935; Rahman, 1940; Anand *et al.*, 1967; Patel and Patel, 1969a; Rao, 1969a; Siddiqui and Krishnaswamy, 1972; Ghosh, 1974), Pakistan (Rahman, 1940; Alam and Hafiz, 1963; Habib and Ghani, 1970; Siddiqui and Krishnaswamy, 1972), and Sri Lanka (DeSilva, 1961) have been published. There are no records of syrphid prey either from Burma or from the island groups in this area. Added to the scarcity of information on the food-ecology of Indian Syrphidae, there appears to be a lack of awareness among Indian and other workers regarding the fact that only a small segment of species in this family are, in actuality, predacious; and that the larger number of them are not (see also Sevastopulo, 1975). Two examples of such misconceptions are found in Atwal *et al.* (1971) and in Abdel-Shaheed *et al.* (1972).

This paper presents a synthesis of our knowledge of the insect prey of syrphids from India and neighbouring countries, based not only on published records, but also on the results of my own rearings (Ghorpadé, 1973a, 1974) of field-collected material. Altogether, more than 170 different batches of syrphid larvae were collected and reared during 1968–72 involving about 60 syrphid-prey combinations. My own rearings have supplied 27 new prey records, while 19 more new records are included, based on information supplied by colleagues in correspondence and on the unpublished records in Rao (1969b). The area considered here comprises the Indian Union, Pakistan, Burma, Bangladesh, Nepal, Sri Lanka, Bhutan, the Maldives Islands and the Chagos Archipelago. The classification followed is based on Vockeroth (1969) for the Syrphinae and on Thompson (1969, 1972b) for the Microdontinae and Eristalinae (= Milesiinae, Milesinae). The nomenclature is that of the *Catalogue of Oriental Syrphidae* (Knutson *et al.*, 1975).

It should be noted here that except for my own prey records, which have been personally reared and both the predators and prey carefully identified, all other records listed are based on information published by the various workers to whom they are credited. The authenticity of these, in several cases, is not fully established and confirmation by careful work in future would be very desirable. However, where certain prey records or predator identities have seemed questionable, I have indicated these by a dagger (†).

All relevant literature up to the end of 1978 have been checked for prey data. Though every effort has been made to include all possible prey information pertaining to Indian Syrphidae, based on a fairly exhaustive search in the available literature, I am aware that some published records may not have been included in the paper. I would be very grateful if such omissions and any errors in the following list are promptly brought to my notice.

Syrphid-Prey List

For the current nomenclature of the prey insects, I have consulted the latest authoritative works. For the Psyllidae, I have followed the monograph of Mathur (1975). For the Aleyrodidae, the paper by David and Subramaniam (1976) was consulted. For the Aphididae, I have used the nomenclature as adopted by Eastop and Hille Ris Lambers (1976), with the exception that subgeneric and infraspecific names have been ignored, except in two cases. The prey are listed in alphabetical order under each syrphid species, and if more than two records are listed for each prey species under the same syrphid, these are chronologically arranged. Undetermined prey taxa (even genus not known) are listed alphabetically after the identified taxa based on the name of their host plants, whether common or scientific. Authors of scientific names of prey species are given in full when first cited, and are subsequently omitted. Where the actual locality is not specified, it could, in my opinion, be safely interpreted as 'India'. All localities given are from within the Indian Union unless otherwise specified. When only common English names of host plants were given in the original paper, I give its scientific equivalent, in parenthesis, when first mentioned. New prey records are asterisked (*) and erroneous or doubtful ones indicated by a dagger (†).

Subfamily SYRPHINAE

Tribe Paragini

Paragus atratus de Meijere

Aphididae (Homoptera)

Toxoptera aurantii (Boyer de Fonscolombe) — No locality (Rau, 1936); India (Thompson and Simmonds, 1965; Rao, 1969a).

Paragus bicolor (Fabricius)

Aphididae

Aphis craccivora Koch — Pakistan (Hamid *et al.*, 1977).

Paragus indicus Brunetti

Aphididae

Aphis citricola van der Goot — Kalimpong (Raychaudhuri *et al.*, 1978).

A. craccivora — Pakistan (Hamid *et al.*, 1977).

**Pentalonia nigronervosa* Coquerel — Mudigere (Siddappaji, *in litt.*).

**Toxoptera aurantii* — Assam (Sengupta, *in litt.*).

Aphids on *Carthamus oxyacantha* — Timurgaraha, in Pakistan (Ghani, 1965).

Paragus serratus (Fabricius) [probably misidentified in part]

Aphididae

Acyrtosiphon pisum (Harris) — Pakistan (Hamid *et al.*, 1974).

Aphis citricola — Gauhati, Nilambur (Rao, 1969b); India (Ghosh, 1974).

A. craccivora — Delhi (Kapur, 1942); Anand (Patel and Patel, 1969a); Coimbatore, Dehra Dun (Rao, 1969b); Bangalore (Ghorpadé, 1973a); India (Ghosh, 1974); Pakistan (Hamid *et al.*, 1977); Moirang in Manipur (Raychaudhuri *et al.*, 1978).

A. gossypii Glover — India (Rao, 1969a); Ernakulam (Rao, 1969b); Bangalore (Ghorpadé, 1973a).

- Aphis* sp. – Gauhati (Rao, 1969b).
- **Lipaphis erysimi* (Kaltenbach) – Bangalore (Ghorpadé, 1973a).
- Melanaphis sacchari* (Zehntner) – Pusa (Bhatia and Shaffi, 1933); Bangalore (Ghorpadé, 1973a).
- Tetraneura nigriabdominalis* (Sasaki) – Coimbatore area (Vadivelu *et al.*, 1976).
- **Therioaphis trifolii* (Monell) – Bangalore (Ghorpadé, 1973a).
- Toxoptera aurantii* – No locality (Rau, 1936); India (Thompson and Simmonds, 1965; Rao, 1969a).
- **Toxoptera citricidus* (Kirkaldy) – Bangalore (Ghorpadé, 1973a).
- Aphids on the following host plants:
- Centaurea iberica* – Jandool, in Pakistan (Ghani, 1965).
- Cnicus wallichii* – Dehra Dun (Rao, 1969b).
- Cotton (*Gossypium* spp.) – Pusa (Bhatia and Shaffi, 1933); No locality (Rahman, 1940).
- Cucumis melo* – Butkhela and Timurgaraha, in Pakistan (Ghani, 1965).
- Dolichos lablab* – Pusa (Bhatia and Shaffi, 1933); No locality (Rahman, 1940).
- Mustard (*Brassica* spp.) – Pusa (Bhatia and Shaffi, 1933); No locality (Rahman, 1940).
- Phyllanthus emblica* – Pusa (Fletcher, 1916; Bhatia and Shaffi, 1933).
- Ragi (*Eleusine coracana*) shoots – No locality (Cherian, 1934).
- Ragi roots – Coimbatore (Fletcher, 1916; Bhatia and Shaffi, 1933); No locality (Cherian, 1934).
- Redgram (*Cajanus cajan*) – Samalkota (Fletcher, 1916; Bhatia and Shaffi, 1933); No locality (Rahman, 1940).
- Rosa* sp. – India (Rao, 1969b).
- Solanum* sp. – Pusa (Bhatia and Shaffi, 1933).
- Sorghum (*Sorghum bicolor*) shoots – No locality (Cherian, 1934).
- Sorghum roots – No locality (Cherian, 1934).
- Sugarcane (*Saccharum officinarum*) – No locality (Rahman, 1940; Butani, 1958).
- Sweet potato (*Ipomoea batatas*) – No locality (Cherian, 1934).
- Watermelon (*Citrullus lanatus*) – Hagari (Bhatia and Shaffi, 1933); No locality (Cherian, 1934; Rahman, 1940).

Psyllidae (Homoptera)

Euphalerus vittatus Crawford – Dehra Dun (Mathur, 1935).

Paragus tibialis (Fallén) [probably misidentified in part]

Aphididae

- Aphis citricola* – India (Rao, 1969a; Ghosh, 1974); Bangalore, Gauhati, Kalimpong, Nilambur, Shillong (Rao, 1969b).
- A. gossypii* – India (Rao, 1969a); Bangalore, Gauhati, Jullundur (Rao, 1969b).
- **Melanaphis sacchari* – Bangalore, Gauhati, Kalimpong, Nilambur, Shillong (Rao, 1969b).
- **Myzus persicae* (Sulzer) – Dinhat (Rao, 1969b).
- **Rhopalosiphum maidis* (Fitch) – Bangalore, Gauhati, Kalimpong, Nilambur, Shillong (Rao, 1969b).
- Aphids on *Osbeckia crinita* – Shillong (Rao, 1969b).

Paragus yerburiensis Stuckenberg

Aphididae

- Aphis citricola* – India (Rao, 1969a; Ghosh, 1974); Gauhati, Nilambur (Rao, 1969b); Bangalore (Ghorpadé, 1973a).
- **Aphis craccivora* – Coimbatore, Dehra Dun (Rao, 1969b); Bangalore (Ghorpadé, 1973a).
- A. gossypii* – India (Rao, 1969a); Mandya (Rao, 1969b); Bangalore (Ghorpadé, 1973a).
- **Melanaphis sacchari* – Bangalore (Ghorpadé, 1973a).
- Myzus persicae* – India (Rao, 1969a); Dinhat (Rao, 1969b).
- **Toxoptera aurantii* – Assam (Sengupta, *in litt.*).
- **T. citricidus* – Bangalore (Ghorpadé, 1973a).
- **T. odinae* (van der Goot) – Bangalore (Ghorpadé, 1973a).
- **Uroleucon compositae* (Theobald) – Bangalore (Ghorpadé, 1973a).

Paragus spp.

Adelgidae (Homoptera)

Adelges spp. – Himalayas (Narayanan *et al.*, 1967).

Aphididae

Aphids on the following host plants:

Centaurea sp. — No locality (Rahman, 1940).

Sonchus sp. — No locality (Rahman, 1940).

Tribe Melanostomatini

Melanostoma orientale (Wiedemann)

Aphididae

Lipaphis erysimi — Jullundur (Rao, 1969b); India (Ghosh, 1974).

Melanostoma sp.

Aphididae

Acyrtosiphon pisum — Pakistan (Hamid *et al.*, 1974).

Xanthandrus indicus Curran

Hyblaeidae (Lepidoptera)

Hyblaea puera Cramer — Rahatgaon, near Hoshangabad (Curran, 1933).

Tribe Bacchini

Baccha apicalis Loew

Aphididae

Aphids on 'Cambuk' (scientific name?) tree — Nilavelli, in Sri Lanka (Austen, 1893).

Psyllidae

Apsylla cistellata (Buckton) — Dehra Dun (Mathur, 1935); No locality (Singh, 1959).

Leuronota corniculata Mathur — Dehra Dun (Mathur, 1935).

Psylla sp. — Dehra Dun (Mathur, 1935).

Tenaphalara acutipennis Kuwayama — Pusa (Bhatia and Shaffi, 1933); Dehra Dun (Mathur, 1935); India (Thompson and Simmonds, 1965).

Trioza mallotica (Crawford) — Dehra Dun (Mathur, 1935).

Chrysopidae (Neuroptera)

Chrysopa sp. — Pusa (Bhatia and Shaffi, 1933).

Baccha sapphirina Wiedemann

Aphididae

Brachycaudus helichrysi (Kaltenbach) — Pakistan (Alam and Hafiz; 1963).

Pterochloroides persicae (Cholodkovsky) — India (Ghosh, 1974).

Aphids on orange (*Citrus reticulata*) — Pusa (Bhatia and Shaffi, 1933).

Psyllidae

**Psylla* sp. nr *simlae* Crawford — Bangalore (Ghorpadé, 1973a).

Psylla sp. — India (Thompson and Simmonds, 1965).

Psyllids on the following host plants:

Indigo (*Indigofera tinctoria*) — Pusa (Bhatia and Shaffi, 1933).

Undetermined plant — Coimbatore (Cherian, 1934).

Tribe Syrphini

Syrphus isaaci Bhatia

Aphididae

Lipaphis erysimi — No locality (Rahman, 1940); India (Ghosh, 1974).

Aphids on mustard — Pusa (Bhatia and Shaffi, 1933; Rai, 1976).

Syrphus nietneri Schiner [unpublished manuscript name: see Cotes (1893)]

Aphididae

Toxoptera aurantii – Sri Lanka (Cotes, 1893; Barlow, 1899).

Syrphus transversus Brunetti

Aphididae

Toxoptera aurantii – Sri Lanka (DeSilva, 1961).

Syrphus spp.

Aphididae

Aphis craccivora – Pakistan (Hamid *et al.*, 1977).

A. gossypii – India (Narayanan *et al.*, 1967).

Impatiens asiaticum dalhousiensis Verma – India (Ghosh, 1974).

Myzus persicae – India (Rao, 1969a).

Pemphigus spp. – Pakistan (Habib and Ghani, 1970).

Epistrophe sp. † [misidentification: probably *Episyrphus* sp.]

Aphididae

Melanaphis indosacchari (David) – Koothanallur, near Thanjavur (David, 1964).

M. sacchari – Koothanallur, near Thanjavur (David, 1964).

Metasyrphus confrater (Wiedemann)

Adelgidae

Adelges spp. – Himalayas (Narayanan *et al.*, 1967); Northwest Himalaya (Siddiqui and Krishnaswamy, 1972).

Aphididae

Acyrtosiphon pisum – Pakistan (Hamid *et al.*, 1974).

Aphis citricola – India (Rao, 1969a; Ghosh, 1974); Gauhati, Kalimpong, Shillong (Rao, 1969b).

A. craccivora – Dehra Dun, Jullundur, Kalimpong (Rao, 1969b); Anand (Patel *et al.*, 1975); Pakistan (Hamid *et al.*, 1977).

A. fabae solanella Theobald – Dehra Dun (Rao, 1969b); India (Ghosh, 1974).

A. gossypii – Delhi (Pruthi and Bhatia, 1938; Anand *et al.*, 1967); Pusa (Pruthi and Bhatia, 1938); India (Rao, 1969a; Ghosh, 1974); Jullundur, Shillong (Rao, 1969b); Northwest Himalaya (Siddiqui and Krishnaswamy, 1972).

A. sp. ? gossypii – Northwest Himalaya (Siddiqui and Krishnaswamy, 1972).

**A. rhoicola* Hille Ris Lambers – Dehra Dun (Rao, 1969b).

Aphis sp. – Jullundur (Rao, 1969b).

Brachycaudus cardui (Linné) – Northwest Himalaya (Siddiqui and Krishnaswamy, 1972).

Brachycaudus sp. – Northwest Himalaya (Siddiqui and Krishnaswamy, 1972).

Brevicoryne brassicae (Linné) – Northwest Himalaya (Siddiqui and Krishnaswamy, 1972).

Capitophorus carduinus (Walker) – Northwest Himalaya (Siddiqui and Krishnaswamy, 1972).

Cinara sp. – Northwest Himalaya (Siddiqui and Krishnaswamy, 1972).

Dysaphis sp. cf. *foeniculus* (Theobald) – Northwest Himalaya (Siddiqui and Krishnaswamy, 1972).

Dysaphis sp. – Northwest Himalaya (Siddiqui and Krishnaswamy, 1972).

Eriosoma lanigerum (Hausmann) – Srinagar (Bhatia and Shaffi, 1933); Punjab (Rahman, 1940); Kulu (Rahman and Khan, 1941a, 1941b); Kumaon (Singh, 1942; Lal and Singh, 1947); Pakistan (Alam and Hafiz, 1963); India (Thompson and Simmonds, 1965; Ghosh, 1974); Kashmir Valley (Zaka-ur-Rab, 1974).

Lipaphis erysimi – Lucknow (Rao, 1969b); India (Ghosh, 1974); Kalyani (Roy and Basu, 1978).

**Macrosiphoniella sanborni* (Gillette) – Dehra Dun (Rao, 1969b).

Mordvilkomemor sp. – Northwest Himalaya (Siddiqui and Krishnaswamy, 1972).

Myzus ? ornatus Laing – Northwest Himalaya (Siddiqui and Krishnaswamy, 1972).

**M. persicae* – Kulu, Srinagar (Rao, 1969b).

**Toxoptera odinae* – Bangalore (Ghorpadé, 1973a).

Aphids on the following host plants:

- Cabbage (*Brassica oleracea* var. *capitata*) – No locality (Brunetti, 1923; Rahman, 1940); Pusa (Bhatia and Shaffi, 1933).
 Chrysanthemum (*Chrysanthemum* spp.) – No locality (Brunetti, 1923; Rahman, 1940); Pusa (Bhatia and Shaffi, 1933).
 Cotton – No locality (Brunetti, 1923; Rahman, 1940); Pusa (Bhatia and Shaffi, 1933).
 Mustard – Pusa (Bhatia and Shaffi, 1933); No locality (Rahman, 1940).
 Pomegranate (*Punica granatum*) – Pusa (Bhatia and Shaffi, 1933).
 Wheat (*Triticum* spp.) – No locality (Brunetti, 1923; Rahman, 1940); Pusa (Bhatia and Shaffi, 1933).

Phylloxeridae (Homoptera)

Phylloxera quercus Boyer de Fonscolombe – Northwest Himalaya (Siddiqui and Krishnaswamy, 1972).

Aphelinidae (Hymenoptera)

Aphelinus mali Haliday – Kulu (Rahman and Khan, 1941b; accidental, through *Eriosoma lanigerum*).

Metasyrphus corollae (Fabricius)

Aphididae

Aphids on the following host plants:

- Brassica oleracea* – Timurgaraha, in Pakistan (Ghani, 1965).
Salvia moorcroftiana – Hangu, in Pakistan (Ghani, 1965).
Triticum aestivum – Ghalighi and Timurgaraha, in Pakistan (Ghani, 1965).

Metasyrphus latifasciatus (Macquart) † [misidentification for *I. scutellaris* ?]

Aphididae

- Aphis craccivora* – South Indian plains (Kalyanam, 1970).
A. gossypii – South Indian plains (Kalyanam, 1970).
Myzus persicae – South Indian plains (Kalyanam, 1970).
Toxoptera citricidus – South Indian plains (Kalyanam, 1970).

Aphids on the following host plants:

- Bean (*Vicia faba*) – South Indian plains (Kalyanam, 1970).
 Brinjal (*Solanum melongena*) – South Indian plains (Kalyanam, 1970).
 Chilli (*Capsicum annuum*) – South Indian plains (Kalyanam, 1970).
Citrus sp. – South Indian plains (Kalyanam, 1970).
Gliricidia sp. – South Indian plains (Kalyanam, 1970).
 Knolkohl (*Brassica caulorapa*) – South Indian plains (Kalyanam, 1970).
 Sorghum – South Indian plains (Kalyanam, 1970).

Betasyrphus adligatus (Wiedemann) † [misidentification]

Aphididae

Toxoptera aurantii – No locality (Rau, 1936); India (Thompson and Simmonds, 1965; Rao, 1969a).

Betasyrphus serarius (Wiedemann) [probably misidentified in part]

Aphididae

- Aphis citricola* – India (Rao, 1969a; Ghosh, 1974); Gauhati, Kalimpong, Mattanur, Shillong (Rao, 1969b).
 **A. craccivora* – Dehra Dun (Rao, 1969b).
A. fabae solanella – Dehra Dun (Rao, 1969b); India (Ghosh, 1974).
A. gossypii – India (Rao, 1969a; Ghosh, 1974); Kalimpong, Kulu (Rao, 1969b).
 **A. rhoicola* – Dehra Dun (Rao, 1969b).
Aphis sp. – Dehra Dun (Rao, 1969b).
Brachycaudus cardui – Pusa (Brunetti, 1923).
 **Lipaphis erysimi* – Kalimpong, Kulu (Rao, 1969b).
Macrosiphum rosae (Linne) – Kalimpong (Raychaudhuri *et al.*, 1978).
 **Myzus persicae* – Kulu (Rao, 1969b).
Toxoptera spp. – Gauhati (Rao, 1969b).

Aphids on the following host plants:

Mustard – Pusa (Bhatia and Shaffi, 1933; Rai, 1976); No locality (Rahman, 1940).

Rubus sp. – Shillong (Rao, 1969b).

Scaeva albomaculata (Macquart)

Aphididae

Myzus persicae – India (Rao, 1969a; Ghosh, 1974); Jullundur (Rao, 1969b).

Lipaphis erysimi – Jullundur (Rao, 1969b); India (Ghosh, 1974).

Scaeva pyrastris (Linné)

Aphididae

Lipaphis erysimi – Jullundur (Rao, 1969b); India (Ghosh, 1974).

Aphids on the following host plants:

Brassica spp. – Jullundur (Rao, 1969b).

Coriandrum sativum – Dargai, in Pakistan (Ghani, 1965).

Prunus bokhariensis – Thall, in Pakistan (Ghani, 1965).

P. persica – Faizabad and Karakar Pass, in Pakistan (Ghani, 1965).

Raphanus sativus – Mingora, in Pakistan (Ghani, 1965).

Rumex hastatus – Ghalighi, in Pakistan (Ghani, 1965).

Scaeva selenitica (Meigen)

Aphididae

Lipaphis erysimi – Babugarh, Delhi (Anand *et al.*, 1967; Rai, 1976); India (Ghosh, 1974).

Dasysyrphus brunettii (Hervé-Bazin)

Aphididae

Aphids on undetermined plant – 'Hills' (Rahman, 1940).

Xanthogramma pruthii Deoras †

Aphididae

Myzus persicae – Delhi (Deoras, 1943).

Xanthogramma spp. †

Aphididae

Acyrtosiphon pisum – Bulandshahr, Delhi, Meerut, Saharanpur (Anand *et al.*, 1967).

Brevicoryne brassicae – Abbottabad and Rawalkot, in Pakistan (Habib, 1973).

Lipaphis erysimi – Bulandshahr, Delhi, Meerut, Saharanpur (Anand *et al.*, 1967; Rai, 1976).

Myzus persicae – India (Rao, 1969a).

Ischiodon scutellaris (Fabricius)

Aleyrodidae (Homoptera)

Trialeurodes ricini (Misra) – Hyderabad (Khan and Rao, 1948; Rai, 1976).

Aphididae

Acyrtosiphon pisum – Delhi (Lal and Gupta, 1953); Bangalore (Ghorpadé, 1973a); India (Ghosh, 1974).

Aphis citricola – India (Rao, 1969a, 1969b; Ghosh, 1974); Bangalore (Ghorpadé, 1973a); Loktak in Manipur (Raychaudhuri *et al.*, 1978).

A. craccivora – Delhi (Lal and Gupta, 1953; Saxena *et al.*, 1970); Davangere (Krishnamurti and Usman, 1954; Usman and Puttarudriah, 1955; Puttarudriah and ChannaBasavanna, 1957); Hyderabad (Khan and Husain, 1965; Rai, 1976); Anand (Patel and Patel, 1969a; Patel *et al.*, 1976); India (Rao, 1969b; Ghosh, 1974); Bangalore (Ghorpadé, 1973a).

A. fabae solanella – India (Rao, 1969b; Ghosh, 1974).

A. gossypii – Sri Lanka (DeSilva, 1961); India (Narayanan *et al.*, 1967; Rao, 1969a, 1969b; Ghosh, 1974); Anand (Patel and Patel, 1969a); Bangalore (Ghorpadé, 1973a).

- A. nerii* Boyer de Fonscolombe — Anand (Patel and Patel, 1969a); Bangalore (Ghorpadé, 1973a); India (Ghosh, 1974).
- **A. punicae* Passerini — Bangalore (Ghorpadé, 1973a).
- **A. rhoicola* — India (Rao, 1969b).
- **A. umbrella* (Börner) — Bangalore (Ghorpadé, 1973a).
- Brevicoryne brassicae* — India (Rao, 1969b; Ghosh, 1974).
- **Greenidea artocarp* (Westwood) — Bangalore (Ghorpadé, 1973a).
- **Hysteroneura setariae* (Thomas) — Bangalore (Ghorpadé, 1973a).
- Lipaphis erysimi* — Gwalior (Rakshpal, 1945; Bindra and Saxena, 1958); Delhi (Lal and Gupta, 1953; Lal and Haque, 1955; Rai, 1976); Anand (Patel and Patel, 1969a, 1969b); India (Rao, 1969b; Ghosh, 1974); Udaipur (Joshi and Sharma, 1973); Bangalore (Ghorpadé, 1973a); Kalyani (Roy and Basu, 1978).
- Melanaphis sacchari* — Bangalore (Ghorpadé, 1973a); Bhubaneswar (Patnaik *et al.*, 1977).
- Myzus persicae* — Delhi (Lal and Gupta, 1953); Anand (Patel and Patel, 1969a); India (Rao, 1969b; Ghosh, 1974); Bangalore (Ghorpadé, 1973a).
- Pentalonia nigronervosa* — Sri Lanka (DeSilva, 1961).
- Rhopalosiphum maidis* — Delhi (Mani, 1939); India (Rao, 1969b; Ghosh, 1974); Bangalore (Ghorpadé, 1973a).
- **Sarucallis kahawaluokalani* (Kirkaldy) — Bangalore (Ghorpadé, 1973a).
- **Sitobion avenae* (Fabricius) — India (Rao, 1969b).
- **S. rosaeiformis* (Das) — Bangalore (Ghorpadé, 1973a).
- **Therioaphis trifolii* — Bangalore (Ghorpadé, 1973a).
- Toxoptera aurantii* — Sri Lanka (Cotes, 1893; Barlow, 1899); Bangalore (Ghorpadé, 1973a); Assam (Sengupta, *in litt.*)
- **T. citricidus* — Bangalore (Ghorpadé, 1973a).
- **T. odinae* — Bangalore (Ghorpadé, 1973a).
- Uroleucon compositae* — Anand (Patel and Patel, 1969a, 1969b); Dharwar (Bhumannavar, 1977).
- **U. sonchi* (Linne) — Bangalore (Ghorpadé, 1973a).
- Aphids on the following host plants:
- Artemisia vulgaris* — India (Rao, 1969b).
- Brassica* spp. — Bangalore, Jullundur (Rao, 1969b).
- Cabbage — Pusa (Bhatia and Shaffi, 1933); No locality (Rahman, 1940).
- Calotropis* sp. — Pusa (Bhatia and Shaffi, 1933); No locality (Cherian, 1934).
- Carthamus lanatus* — Timurgaraha, in Pakistan (Ghani, 1965).
- C. oxyacantha* — Timurgaraha, in Pakistan (Ghani, 1965).
- Cassia* sp. — Butkhela, in Pakistan (Ghani, 1965).
- Chrysanthemum — No locality (Fletcher, 1961; Brunetti, 1923); Pusa (Bhatia and Shaffi, 1933).
- Citrullus vulgaris* var. *fistulosus* — Chitral, in Pakistan (Ghani, 1965).
- Cotton — Pusa (Bhatia and Shaffi, 1933); No locality (Cherian, 1934; Rahman, 1940).
- Crucifers — Amritsar, Barabanki, Bhubaneswar, Cuttack, Delhi, Pratapgarh, Sultanpur (Kundu *et al.*, 1967).
- Malva parviflora* — Ashrait, in Pakistan (Ghani, 1965).
- Mustard — Pusa (Bhatia and Shaffi, 1933); No locality (Rahman, 1940).
- Prunus amygdalus* — Munela, in Pakistan (Ghani, 1965).
- Radish (*Raphanus sativus*) — Bapatla (Krishnamoorthy and Dharmaraju, 1960).
- Redgram — No locality (Cherian, 1934); India (Rao, 1969b).
- Rose (*Rosa* spp.) — Dehra Dun (Brunetti, 1925).
- Rubus ellipticus* — India (Rao, 1969b).
- Sissoo (*Dalbergia sissoo*) — Pusa (Bhatia and Shaffi, 1933).
- Solanum* sp. — Pusa (Bhatia and Shaffi, 1933).
- Sorghum — No locality (Cherian, 1934).
- Tribulus terrestris* — Malakand, in Pakistan (Ghani, 1965).
- Watermelon — Hagari (Fletcher, 1916; Bhatia and Shaffi, 1933); No locality (Brunetti, 1923; Cherian, 1934; Rahman, 1940).
- Wheat — Pusa (Bhatia and Shaffi, 1933).

Dideopsis aegrota (Fabricius)

Aphididae

- **Aphis citricola* — Bylankuppe, Kalimpong, Mattanur (Rao, 1969b).
- **A. craccivora* — Bangalore (Ghorpadé, 1973a).

- **A. gossypii* – Bangalore (Ghorpadé, 1973a).
Pentalonia nigronervosa – Sri Lanka (DeSilva, 1961).
Rhopalosiphum maidis – Sri Lanka (DeSilva, 1961).
Toxoptera aurantii – No locality, but probably from Assam (Anon., 1973); Bangalore (Ghorpadé, 1973a);
 Assam (Sengupta, *in litt.*).
 **T. citricidus* – Bangalore (Ghorpadé, 1973a).
 **T. odinae* – Bangalore (Ghorpadé, 1973a).
 Aphids on the following host plants:
Artemisia vulgaris – Kalimpong (Rao, 1969b).
Citrus sp. – Coimbatore (Cherian, 1934).

Episyrphus alternans (Macquart)

Adelgidae

- Adelges* spp. – Northwest Himalaya (Siddiqui and Krishnaswamy, 1972).

Episyrphus balteatus (De Geer) [probably misidentified in part]

Adelgidae

- Adelges* spp. – Himalayas (Narayanan *et al.*, 1967); Northwest Himalaya (Siddiqui and Krishnaswamy, 1972).

Aphididae

- Acyrtosiphon pisum* – Pakistan (Hamid *et al.*, 1974).
Aphis citricola – India (Rao, 1969a, 1969b; Ghosh, 1974).
A. craccivora – Coimbatore (Rao and Krishnaswamy, 1952); India (Rao, 1969b); Bangalore (Ghorpadé, 1973a);
 Pakistan (Hamid *et al.*, 1977).
A. fabae solanella – India (Rao, 1969b; Ghosh, 1974); Bangalore (Ghorpadé, 1973a).
A. gossypii – India (Rao, 1969a, 1969b; Ghosh, 1974); Northwest Himalaya (Siddiqui and Krishnaswamy, 1972);
 Bangalore (Ghorpadé, 1973a).
A. sp. ? gossypii – Northwest Himalaya (Siddiqui and Krishnaswamy, 1972).
 **A. rhoicola* – India (Rao, 1969b).
Brachycaudus cardui – Northwest Himalaya (Siddiqui and Krishnaswamy, 1972).
Brachycaudus sp. – Northwest Himalaya (Siddiqui and Krishnaswamy, 1972).
Brevicoryne brassicae – Kulu (Batra, 1960); Lyallpur, in Pakistan (Khan and Yunus, 1970); Abbottabad and
 Rawalkot, in Pakistan (Habib, 1973).
Capitophorus carduinus – Northwest Himalaya (Siddiqui and Krishnaswamy, 1972).
Cinara sp. – Northwest Himalaya (Siddiqui and Krishnaswamy, 1972).
Dysaphis sp. cf. *foeniculus* – Northwest Himalaya (Siddiqui and Krishnaswamy, 1972).
Dysaphis sp. – Northwest Himalaya (Siddiqui and Krishnaswamy, 1972).
 **Hayhurstia atriplicis* (Linné) – India (Rao, 1969b).
Lipaphis erysimi – Anand (Patel and Patel, 1969a); Lyallpur, in Pakistan (Khan and Yunus, 1970); India (Rao,
 1969b; Ghosh, 1974); Bangalore (Ghorpadé, 1973a); Kalyani (Roy and Basu, 1978).
Melanaphis sacchari – Bangalore (Ghorpadé, 1973a); Bhubaneswar (Patnaik *et al.*, 1977); Kalimpong
 (Raychaudhuri *et al.*, 1978).
Mindarus japonicus Takahashi – Northwest Himalaya (Siddiqui and Krishnaswamy, 1972).
Mordvilkomemor sp. – Northwest Himalaya (Siddiqui and Krishnaswamy, 1972).
Myzus ? ornatus – Northwest Himalaya (Siddiqui and Krishnaswamy, 1972).
M. persicae – Bangalore (Usman and Puttarudriah, 1955; Puttarudriah and ChannaBasavanna, 1957; Ghorpadé,
 1973a); India (Rao, 1969a, 1969b; Ghosh, 1974); Lyallpur, in Pakistan (Khan and Yunus, 1970).
Rhopalosiphum maidis – No locality (Rahman, 1940); India (Rao, 1969b; Ghosh, 1974); Bangalore (Ghorpadé,
 1973a).
Sitobion rosaeiformis – Moirang in Manipur (Raychaudhuri *et al.*, 1978).
Toxoptera aurantii – No locality, but probably from Assam (Banerjee, 1966); Assam (Sengupta, *in litt.*).
 **T. odinae* – Bangalore (Ghorpadé, 1973a).
Toxoptera spp. – India (Rao, 1969b).
 **Uroleucon sonchi* – India (Rao, 1969b).
 Aphids on the following host plants:
Arundo donax – No locality (Cherian, 1934).

- Berberis ceratophylla* — Saidu Sharif, in Pakistan (Ghani, 1965).
Brassica campestris — Kat Qila, in Pakistan (Ghani, 1965).
 Cabbage — Pusa (Bhatia and Shaffi, 1933); No locality (Rahman, 1940); Kulu (Batra, 1956).
Cirsium sp. — Northwest Himalaya (Siddiqui and Krishnaswamy, 1972).
 Cotton — Pusa (Bhatia and Shaffi, 1933); No locality (Rahman, 1940).
Lactuca scariola — Peshawar, in Pakistan (Ghani, 1965).
 Maize (*Zea mays*) — No locality (Rahman, 1940).
 Mustard — Lyallpur, in Pakistan (Rahman, 1942).
Populus ciliata — Northwest Himalaya (Siddiqui and Krishnaswamy, 1972).
Prunus bokhariensis — Timurgaraha, in Pakistan (Ghani, 1965).
P. persica — Kokari and Saidi Sharif, in Pakistan (Ghani, 1965).
Rosa sp. — Saidu Sharif, in Pakistan (Ghani, 1965).
Rumex dentatus — Saidu Sharif, in Pakistan (Ghani, 1965).
Rumex sp. — Northwest Himalaya (Siddiqui and Krishnaswamy, 1972).
Sonchus asper — Garhi Habib Ullah, in Pakistan (Ghani, 1965).
 Sunflower (*Helianthus annuus*) — Pusa (Bhatia and Shaffi, 1933).
Tamarix articulata — Peshawar, in Pakistan (Ghani, 1965).
 Undetermined grass — No locality (Cherian, 1934).

Coccoidea (Homoptera)

Coccids on the following host plants:

- Cotton — Pusa (Bhatia and Shaffi, 1933); No locality (Rahman, 1940).
 Undetermined plant — Northwest Himalaya (Siddiqui and Krishnaswamy, 1972).

Phylloxeridae

- Phylloxera quercus* — Northwest Himalaya (Siddiqui and Krishnaswamy, 1972).

Psyllidae

- Tenaphalara acutipennis* — India (Thompson and Simmonds, 1965) †

Allograpta javana (Wiedemann) [misidentification ?]

Aphididae

- Aphis craccivora* — Delhi (Narayanan, 1941; Pruthi, 1942); Hyderabad (Khan and Husain, 1965; Rai, 1976).
A. gossypii — India (Rao, 1969a); Bangalore (Rao, 1969b; Ghorpadé, 1973a).
 **Lipaphis erysimi* — Bangalore (Ghorpadé, 1973a).
Melanaphis sacchari — Bhubaneswar (Patnaik *et al.*, 1977).
Myzus persicae — Delhi (Pruthi, 1946; Isaac, 1946); India (Rao, 1969a); Bangalore (Ghorpadé, 1973a).
Rhopalosiphum maidis — Bangalore (Ghorpadé, 1973a, 1973b).
Sitobion rosaeiformis — Moirang in Manipur (Raychaudhuri *et al.*, 1978).
Therioaphis trifolii — Bangalore (Ghorpadé, 1973a, 1973b).
Toxoptera odinae — Bangalore (Ghorpadé, 1973a, 1973b).

Aphids on the following host plants:

- Brassica* spp. — Bangalore (Rao, 1969b).
 Cotton — Pusa (Bhatia and Shaffi, 1933).

Coccoidea

- Ferrisiana virgata* (Cockerell) — Jabalpur (Rawat and Modi, 1968).

Delphacidae

- Peregrinus maidis* (Ashmead) — Bangalore (Ghorpadé, 1973a, 1973b).

Psyllidae

- Psylla* sp. — Dehra Dun (Mathur, 1935).
Tenaphalara acutipennis — Pusa (Bhatia and Shaffi, 1933); Dehra Dun (Mathur, 1935); India (Thompson and Simmonds, 1965).

Trioza pitformis Mathur — Dehra Dun (Mathur, 1935).

Psyllids on undetermined plant — Shillong (Bhatia and Shaffi, 1933).

Sphaerophoria ? indiana Bigot [probably misidentified in part]

Aphididae

**Aphis gossypii* — Bangalore (Ghorpadé, 1973a).

Lipaphis erysimi — Jullundur (Rao, 1969b); Bangalore (Ghorpadé, 1973a); India (Ghosh, 1974).

Melanaphis sacchari — Bangalore (Ghorpadé, 1973a); Bhubaneswar (Patnaik *et al.*, 1977).

Myzus persicae — Delhi (Pruthi, 1946; Isaac, 1946); India (Rao, 1969a); Jullundur (Rao, 1969b).

Uroleucon compositae — Dharwar (Bhumannavar, 1977).

Aphids on the following host plants:

Maize — No locality (Rahman, 1940).

Pea (*Pisum sativum*) — No locality (Rahman, 1940).

Sphaerophoria menthastri (Linné) †

Aphididae

Acyrtosiphon pisum — Pakistan (Hamid *et al.*, 1974).

Sphaerophoria scripta (Linné) †

Aphididae

Lipaphis erysimi — Anand (Patel and Patel, 1969a).

Sphaerophoria spp.

Aphididae

Brevicoryne brassicae — Abbottabad and Rawalkot, in Pakistan (Habib, 1973).

Lipaphis erysimi — Bangalore (Rao, 1969b).

Myzus persicae — India (Rao, 1969a); Bangalore (Rao, 1969b).

UNDETERMINED SYRPHID SPECIES

Adelgidae

Pineus sp. — Shillong (Chacko, 1973).

Aleyrodidae

Aleurocanthus rugosus Karam Singh — Pusa (Singh, 1931).

A. spiniferus (Quaintance) — Pondicherry, Poona (Singh, 1931).

Dialeurodes pallida Karam Singh — Pusa (Singh, 1931).

Aphididae

Aphis nerii — Calcutta (Mukerji and Behura, 1947).

Brachycaudus helichrysi — Kumaon (Lal and Siddiqui, 1952); India (Ghosh, 1974).

Hyadaphis coriandri (Das) — India (Ghosh, 1974).

Macrosiphoniella sanborni — India (Ghosh, 1974).

Pterochloroides persicae — India (Ghosh, 1974).

Sitobion miscanthi (Takahashi) — India (Ghosh, 1974).

S. rosaeiformis — India (Ghosh, 1974).

Tetraneura nigriabdominalis — South India (Krishna Ayyar, 1935); Bangalore (Gadiyappanavar, 1970).

Toxoptera aurantii — India (Ghosh, 1974).

Tuberolachnus salignus (Gmelin) — India (Ghosh, 1974).

Delphacidae

Nilaparvata lugens Stål — North Madras (Tirumala Rao, 1950).

Psyllidae

Diaphorina citri Kuwayama — Pusa (Husain and Nath, 1929).

Lepidoptera

'Small caterpillars' (Arctiidae, etc.) in pods of *Crotalaria sericea* and *Sutherlandia* sp. — No locality (Beeson, 1961).

Thysanoptera

Undetermined species — India (Ramakrishna Ayyar, 1929).

Subfamily ERISTALINAE

Note: Members of this subfamily (except of the tribe Pipizini) are not predacious; hence the following records are erroneous and should be disregarded.

Tribe Pipizini

Neocnemodon sp. nr *vitripennis* (Meigen)

Adelgidae

Adelges spp. — Northwest Himalaya (Siddiqui and Krishnaswamy, 1972).

Tribe Cheilosini

Pelecocera spp. † [misidentification for *Baccha* sp.?]

Psyllidae

Arytaina punctipennis Crawford — Bihar (Grove and Ghosh, 1914).

Psylla sp. — India (Thompson and Simmonds, 1965).

Tribe Eristalini

Eristalinus laetus Wiedemann †

Aphididae

Aphis gossypii — Delhi, Karnal (Anand *et al.*, 1967); India (Ghosh, 1974).

Eristalinus obscuritarsis de Meijere †

Aphididae

Lilaphis erysimi — Ludhiana (Atwal *et al.*, 1971).

Eristalis tenax (Linné) †

Aphididae

Lilaphis erysimi — Ludhiana (Atwal *et al.*, 1971).

Eristalodes paria (Bigot) †

Aphididae

Lilaphis erysimi — Delhi (Rai, 1976) †

Tribe Eumerini

Eumerus sp. nr *albifrons* Walker †

Aphididae

Melanaphis sacchari — Bhubaneswar (Patnaik *et al.*, 1977).

Tribe Milesiini

Syrirta rufifacies Bigot †

Aphididae

Aphids on mango (*Mangifera indica*) — Coimbatore (Cherian, 1934).

Subfamily MICRODONTINAE

Mircrodon bellus Brunetti †

Coccoidea

Saissetia formicarii (Green) in nests of the ant *Crematogaster dohrni* Mayr
(Hymenoptera: Formicidae) — Northeast India (Das, 1959); Assam (Sengupta, *in litt.*).

Microdon sp. †

Aphididae

Toxoptera aurantii in nests of the ant *Crematogaster* sp. (Formicidae) — Northeast India (Das, 1959).

Prey-Syrphid Index

Prey taxa not identified (even to genus) are excluded from the index, except in two cases (Lepidoptera and Thysanoptera). I have omitted to give the host plants on which the named prey were feeding in order to avoid making the list too cumbersome to use. Host plant data are available in the original papers cited and in Ghorpadé (1973a). In this index, only the names of predators and prey are given, all further details being obtainable from the syrphid-prey list preceding it. The index includes all records, including erroneous ones, which are indicated by a dagger (†) and should be checked with the preceding syrphid-prey list. The prey-syrphid index has been arranged alphabetically, except for the syrphid species, which are listed under each prey species in the same sequence as they appear in the syrphid-prey list.

PREY SPECIES

PREDATOR SPECIES

Order HEMIPTERA

Suborder HOMOPTERA

Family Adelgidae

Adelges spp. *Paragus* sp., *Metasyrphus confrater*, *Episyrphus alternans*, *E. balteatus*,
Neocnemodon sp. nr *vitripennis*
Pineus sp. Undetermined syrphid species

Family Aleyrodidae

Aleurocanthus rugosus Undetermined syrphid species
A. spiniferus Undetermined syrphid species
Dialeurodes pallida Undetermined syrphid species
Trialeurodes ricini *Ischiodon scutellaris*

Family Aphididae

Acyrtosiphon pisum *Paragus serratus*, *Melanostoma* sp., *Metasyrphus confrater*, *Xanthogramma* sp.†,
Ischiodon scutellaris, *Episyrphus balteatus*, *Sphaerophoria menthastri*†
Aphis citricola *Paragus indicus*, *P. serratus*, *P. tibialis*, *P. yerburiensis*, *Metasyrphus confrater*,
Betasyrphus serarius, *Ischiodon scutellaris*, *Dideopsis aegrota*, *Episyrphus*
balteatus
A. craccivora *Paragus bicolor*, *P. indicus*, *P. serratus*, *P. yerburiensis*, *Syrphus* sp., *Metasyrphus*
confrater, *M. latifasciatus*†, *Betasyrphus serarius*, *Ischiodon scutellaris*, *Dideopsis*
aegrota, *Episyrphus balteatus*, *Allograpta javana*
A. fabae solanella *Metasyrphus confrater*, *Betasyrphus serarius*, *Ischiodon scutellaris*, *Episyrphus*
balteatus
A. gossypii *Paragus serratus*, *P. tibialis*, *P. yerburiensis*, *Syrphus* sp., *Metasyrphus confrater*,
M. latifasciatus†, *Betasyrphus serarius*, *Ischiodon scutellaris*, *Dideopsis aegrota*,
Episyrphus balteatus, *Allograpta javana*, *Sphaerophoria ?indiana*, *Eristalinus*
laetus†
A. sp. ? gossypii *Metasyrphus confrater*, *Episyrphus balteatus*
A. nerii *Ischiodon scutellaris*, Undetermined syrphid species
A. punicae *Ischiodon scutellaris*

PREY SPECIES

PREDATOR SPECIES

<i>A. rhoicola</i>	<i>Metasyrphus confrater</i> , <i>Betasyrphus serarius</i> , <i>Ischiodon scutellaris</i> , <i>Episyrphus balteatus</i>
<i>A. umbrella</i>	<i>Ischiodon scutellaris</i>
<i>Aphis</i> spp.	<i>Paragus serratus</i> , <i>Metasyrphus confrater</i> , <i>Betasyrphus serarius</i>
<i>Brachycaudus cardui</i>	<i>Metasyrphus confrater</i> , <i>Betasyrphus serarius</i> , <i>Episyrphus balteatus</i>
<i>B. helichrysi</i>	<i>Baccha ?sapphirina</i> , Undertermined syrphid species
<i>Brachycaudus</i> sp.	<i>Metasyrphus confrater</i> , <i>Episyrphus balteatus</i>
<i>Brevicoryne brassicae</i>	<i>Metasyrphus confrater</i> , <i>Xanthogramma</i> sp.†, <i>Ischiodon scutellaris</i> , <i>Episyrphus balteatus</i> , <i>Sphaerophoria</i> sp.
<i>Capitophorus carduinus</i>	<i>Metasyrphus confrater</i> , <i>Episyrphus balteatus</i>
<i>Cinara</i> sp.	<i>Metasyrphus confrater</i> , <i>Episyrphus balteatus</i>
<i>Dysaphis</i> sp. cf. <i>foeniculus</i>	<i>Metasyrphus confrater</i> , <i>Episyrphus balteatus</i>
<i>Dysaphis</i> sp.	<i>Metasyrphus confrater</i> , <i>Episyrphus balteatus</i>
<i>Eriosoma lanigerum</i>	<i>Metasyrphus confrater</i>
<i>Greenidea artocarp</i>	<i>Ischiodon scutellaris</i>
<i>Hayhurstia atriplicis</i>	<i>Episyrphus balteatus</i>
<i>Hyadaphis coriandri</i>	Undetermined syrphid species
<i>Hysteroneura setariae</i>	<i>Ischiodon scutellaris</i>
<i>Impatiens asiaticum dalhousiensis</i>	<i>Syrphus</i> sp.
<i>Lipaphis erysimi</i>	<i>Paragus serratus</i> , <i>Melanostoma orientale</i> , <i>Syrphus isaaci</i> , <i>Metasyrphus confrater</i> , <i>Betasyrphus serarius</i> , <i>Scaeva albomaculata</i> , <i>S. pyrastris</i> , <i>S. selenitica</i> , <i>Xanthogramma</i> sp.†, <i>Ischiodon scutellaris</i> , <i>Episyrphus balteatus</i> , <i>Allograpta javana</i> , <i>Sphaerophoria ?indiana</i> , <i>S. ? scripta</i> , † <i>S. sp.</i> , <i>Eristalinus obscuritarsis</i> †, <i>Eristalis tenax</i> †, <i>Eristalodes paria</i> †
<i>Macrosiphoniella sanborni</i>	<i>Metasyrphus confrater</i> , Undetermined syrphid species
<i>Macrosiphum rosae</i>	<i>Betasyrphus serarius</i>
<i>Melanaphis indosacchari</i>	<i>Epistrophe</i> sp. †
<i>M. sacchari</i>	<i>Paragus tibialis</i> , <i>P. serratus</i> , <i>P. yerburiensis</i> , <i>Epistrophe</i> sp.†, <i>Ischiodon scutellaris</i> , <i>Episyrphus balteatus</i> , <i>Allograpta javana</i> , <i>Sphaerophoria ? indiana</i> , <i>Eumerus</i> sp. nr <i>albifrons</i> †
<i>Mindarus japonicus</i>	<i>Episyrphus balteatus</i>
<i>Mordvilkomemor</i> sp.	<i>Metasyrphus confrater</i> , <i>Episyrphus balteatus</i>
<i>Myzus ? ornatus</i>	<i>Metasyrphus confrater</i> , <i>Episyrphus balteatus</i>
<i>M. persicae</i>	<i>Paragus tibialis</i> , <i>P. yerburiensis</i> , <i>Syrphus</i> sp., <i>Metasyrphus confrater</i> , <i>M. latifasciatus</i> †, <i>Betasyrphus serarius</i> , <i>Scaeva albomaculata</i> , <i>Xanthogramma pruthii</i> †, <i>X. sp.†</i> , <i>Ischiodon scutellaris</i> , <i>Episyrphus balteatus</i> , <i>Allograpta javana</i> , <i>Sphaerophoria ? indiana</i> , <i>S. sp.</i>
<i>Pemphigus</i> sp.	<i>Syrphus</i> sp.
<i>Pentalonia nigronevosa</i>	<i>Paragus indicus</i> , <i>Ischiodon scutellaris</i> , <i>Dideopsis aegrota</i>
<i>Pterochloroides persicae</i>	<i>Baccha ? sapphirina</i> , Undetermined syrphid species
<i>Rhopalosiphum maidis</i>	<i>Paragus tibialis</i> , <i>Ischiodon scutellaris</i> , <i>Dideopsis aegrota</i> , <i>Episyrphus balteatus</i> , <i>Allograpta javana</i>
<i>Sarucallis kahawaluokalani</i>	<i>Ischiodon scutellaris</i>
<i>Sitobion avenae</i>	<i>Ischiodon scutellaris</i>
<i>S. miscanthi</i>	Undetermined syrphid species
<i>S. rosaeiformis</i>	<i>Ischiodon scutellaris</i> , <i>Episyrphus balteatus</i> , <i>Allograpta javana</i> , Undetermined syrphid species
<i>Tetraneura nigriabdominalis</i>	<i>Paragus serratus</i> , Undetermined syrphid species
<i>Therioaphis trifolii</i>	<i>Paragus serratus</i> , <i>Ischiodon scutellaris</i> , <i>Allograpta javana</i>
<i>Toxoptera aurantii</i>	<i>Paragus astratus</i> , <i>P. indicus</i> , <i>P. serratus</i> , <i>P. yerburiensis</i> , <i>Syrphus nietneri</i> , <i>S. transversus</i> , <i>Betasyrphus adligatus</i> †, <i>Ischiodon scutellaris</i> , <i>Dideopsis aegrota</i> , <i>Episyrphus balteatus</i> , Undetermined syrphid species, <i>Microdon</i> sp. †
<i>T. citricidus</i>	<i>Paragus serratus</i> , <i>P. yerburiensis</i> , <i>Metasyrphus latifasciatus</i> †, <i>Ischiodon scutellaris</i> , <i>Dideopsis aegrota</i>

PREY SPECIES	PREDATOR SPECIES
<i>T. odinae</i>	<i>Paragus yerburiensis</i> , <i>Metasyrphus confrater</i> , <i>Ischiodon scutellaris</i> , <i>Dideopsis aegrota</i> , <i>Episyrphus balteatus</i> , <i>Allograpta javana</i>
<i>Toxoptera</i> spp.	<i>Betasyrphus serarius</i> , <i>Episyrphus balteatus</i>
<i>Tuberolachnus salignus</i>	Undetermined syrphid species
<i>Uroleucon compositae</i>	<i>Paragus yerburiensis</i> , <i>Ischiodon scutellaris</i> , <i>Sphaerophoria ? indiana</i>
<i>U. sonchi</i>	<i>Ischiodon scutellaris</i> , <i>Episyrphus balteatus</i>
	Superfamily Coccoidea
<i>Ferrisiana virgata</i>	<i>Allograpta javana</i>
<i>Saissetia formicarii</i>	<i>Microdon bellus</i> †
	Family Delphacidae
<i>Nilaparvata lugens</i>	Undetermined syrphid species
<i>Peregrinus maidis</i>	<i>Allograpta javana</i>
	Family Phylloxeridae
<i>Phylloxera quercus</i>	<i>Metasyrphus confrater</i> , <i>Episyrphus balteatus</i>
	Family Psyllidae
<i>Apsylla cistellata</i>	<i>Baccha apicalis</i>
<i>Arytaina punctipennis</i>	<i>Pelecocera</i> sp. †
<i>Diaphorina citri</i>	Undetermined syrphid species
<i>Euphalerus vittatus</i>	<i>Paragus serratus</i>
<i>Leuronota corniculata</i>	<i>Baccha apicalis</i>
<i>Psylla</i> sp. nr <i>simlae</i>	<i>Baccha sapphirina</i>
<i>Psylla</i> spp.	<i>Baccha apicalis</i> , <i>B. sapphirina</i> , <i>Allograpta javana</i> , <i>Pelecocera</i> sp. †
<i>Tenaphalara acutipennis</i>	<i>Baccha apicalis</i> , <i>Episyrphus balteatus</i> †, <i>Allograpta javana</i>
<i>Trioza malloticola</i>	<i>Baccha apicalis</i>
<i>T. pitformis</i>	<i>Allograpta javana</i>
	Order HYMENOPTERA
	Family Aphelinidae
<i>Aphelinus mali</i>	<i>Metasyrphus confrater</i>
	Order LEPIDOPTERA
	Family Hyblaeidae
<i>Hyblaea puera</i>	<i>Xanthandrus indicus</i>
	Family Arctiidae
Undetermined arctiids, etc.	Undetermined ^{syrphid} trips species
	Order NEUROPTERA
	Family Chrysopidae
<i>Chrysopa</i> sp.	<i>Baccha apicalis</i>
	Order THYSANOPTERA
Undetermined thrips species	Undetermined syrphid species

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