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A STUDY ON THE SEXUALES OF APHIDS (HOMOPTERA : APHIDIDAE) IN INDIA

by
R. C. BASU
and
D. N. RAYCHAUDHURI

Issued by The Director
Zoological Survey of India, Calcutta

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INTRODUCTION

So far about 600 aphid species distributed over 200 genera are known from India. These species mostly occur in the hilly areas. In the hilly terrains some species occur almost throughout the year while others are somewhat seasonal.

Most of the aphid species stated above breed parthenogenetically in Indian climate.

However, till 1960 sexuales of only 3 species of aphids were known from India. Subsequently stray reports of sexuales have been made from different parts of India. But at present sexuales of 80 species (*i.e.* about 13% of the known species) distributed over 53 genera (*i.e.* 26% of the known genera) could be found. They represented either only by males or oviparae or by both.

Out of 53 genera only males are known for 11 genera, oviparae for 13 genera and both males and oviparae for 29 genera. A similar analysis at the species level brings out that out of 80 species both males and oviparae are known for 31 species, while only males are known for 23 species and only oviparae for 26 species.

Most of the sexuales are known to occur at altitudes varying between *Ca* 750 m and *Ca* 4500 m during the colder part of the year. Inci-

dentally it may be stated that so far sexuales of only a few species are reported from places at lower altitude or even from plains.

A consolidated account of the available sexual forms has been provided in this paper in view of lack of such an account.

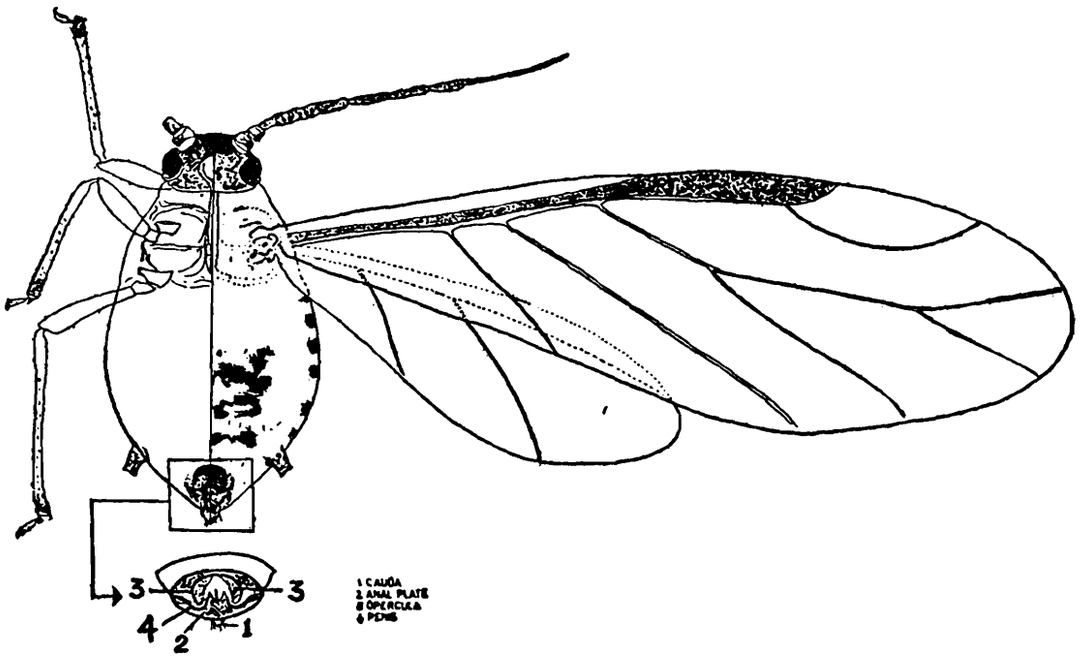
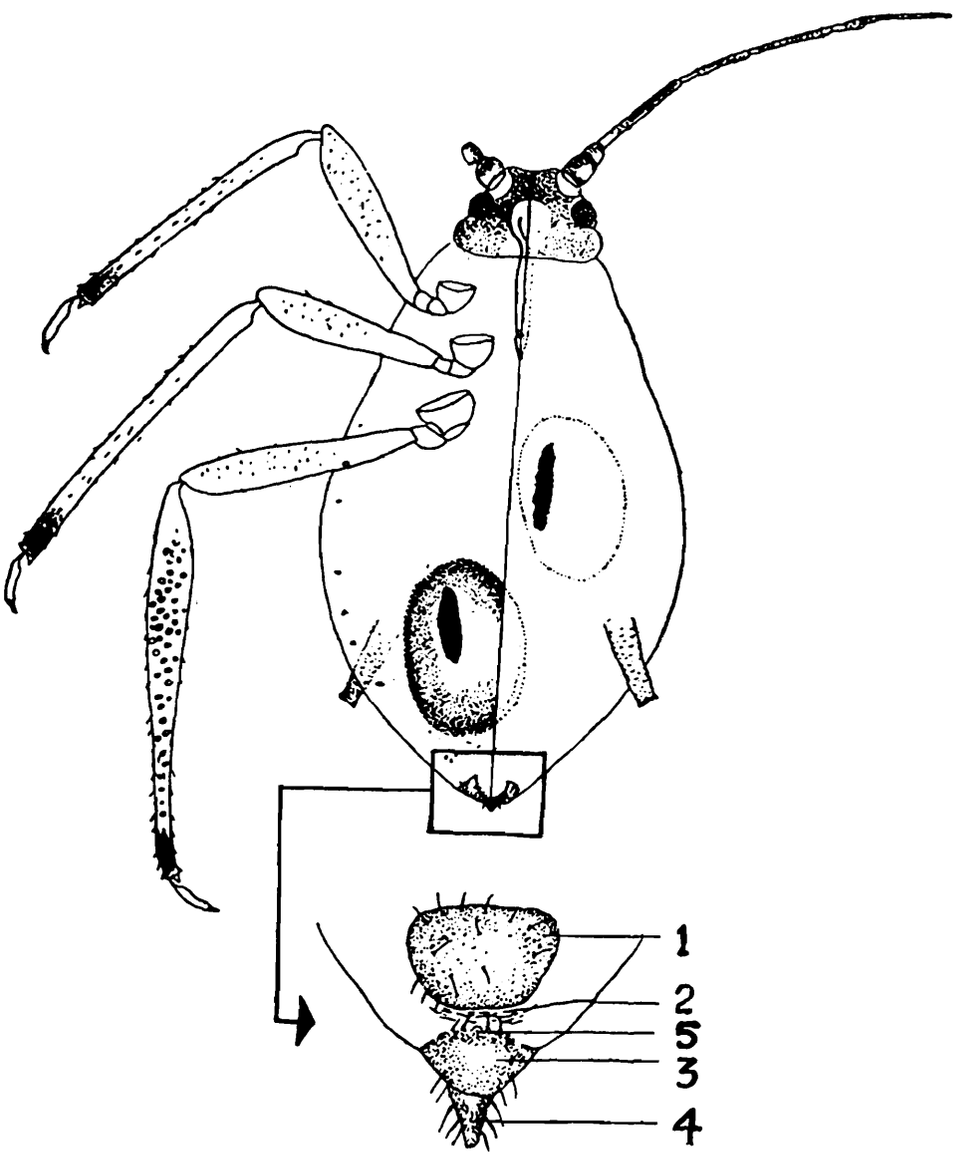


Fig. 1

Here, under each species the original reference and the Indian references concerning the find of the sexual morphs are provided. Besides, short description of the sexual morph with the measurements of one specimen in mm has been given in such cases where sexual form of a species is reported for the first time. Such description has also been provided even for those sexual morphs which have been reported before from India without any description. In this connection it may be pointed out that under each 'species the term 'material' refers only to specimens of sexual forms.

Male and female genitalia as observed after bleaching have been figured for some species. Besides, for oviparae the nature of the hind tibia which is usually swollen and bears pseudosensoria has been showen in the figures (Figs. 1, 2 & Pl-I).

Abbreviations used in the text are : processus terminalis—p.t., antennal segment III—segment III, Ultimate rostral segment—u.r.s., second segment of hind tarsus—h.t.2, Yellow pan water trap—Y.P.T.



1. GENITAL PLATE OR SUB-GENITAL PLATE
2. VULVA OR GENITAL PORE
3. ANAL PLATE
4. CAUDA
5. RUDIMENTARY GONAPOPHYSES

Fig. 2

SYSTEMATIC ACCOUNT

Subfamily : ANOECIINAE

I. Genus **Aiceona** Takahashi

Key to the species

Alate ovipara :

1. Hairs on fore wing scattered all over ; u.r.s. about 1.14 - 1.25 × h.t.2 ; dorsal cephalic hairs about 3.65-3.75 × b.d. III ; antennal segments III, IV, V and base of segment VI with 17-26, 8-12, 2-6 and 1 secondary rhinaria respectively — *litseae* Basu and Hille Ris Lambers

Hairs on the forewing arranged only along the costal margins and pterostigma ; secondary rhinaria more numerous	2
2. Processus terminalis about 0.94 × the base of last antennal segment ; u. r. s. about 1.40 × h.t. 2 ; siphuncular cone with 7-10 hairs ; longest dorsal cephalic hair about 6.16 × b.d. III	*paraosugii* Ghosh, Ghosh and Raychaudhuri
processus terminalis about 0.41-0.43 × the base of last antennal segment ; u. r. s. about 1.0-1.04 × h. t. 2 ; siphuncular cone with 27-30 hairs ; longest dorsal cephalic hair about 4.78-4.85 × b. d. III	*robustiseta* Ghosh and Raychaudhuri
Alate male :	
Fore wing reticulated near apex ; p. t. about 0.32 × the base of last antennal segment ; u. r. s. about 0.60 × h. t. 2 ; only antennal segment III with 20-22 secondary rhinaria	*retipennis* David, Narayanan and Rajasingh
Fore wing without reticulation ; p. t. about 0.56 × the base of last antennal segment ; u. r. s. nearly as long as h. t. 2 ; antennal segments III, IV, and V with 47-53, 10-13, and 6-7 secondary rhinaria respectively	*robustiseta* Ghosh and Raychaudhuri

1. **Aiceona litseae** Basu and Hille Ris Lambers

Aiceona litseae Basu and Hille Ris Lambers, 1968, *Ent. Bericht.*, **28** : 7.

Aiceona litseae: Ghosh, A. K., Ghosh, M. R. and Raychaudhuri, D. N., 1972, *Oriental Ins.*, **6** : 334 (misdet as alate ♂)

Material : 7 alate oviparous ♀ ♀, INDIA : West Bengal : Mongbul, 12. xii. 1970 from *Litsea polyantha*, coll. *M. R. Ghosh* ; 2 alate oviparous ♀ ♀, West Bengal : Mongbul, 16. iii. 1970, from *Litsea* sp. coll. *M. R. Ghosh* ; 1 alate oviparous ♀, West Bengal : Kurseong, 2. ii. 1970 from *Litsea* sp., coll. *S.D. Chakrabarti.*

2. **Aiceona paraosugii** Ghosh, Ghosh and Raychaudhuri

Aiceona paraosugii Ghosh, Ghosh and Raychaudhuri, 1971, *Oriental Ins.*, 5 : 324.

Aiceona paraosugii : Pal and Raychaudhuri, D. N., 1977, *Oriental Ins.*, II : 376.

Material : 1 alate oviparous ♀, INDIA : West Bengal : Kalimpong, ii. 1970, in Y.P.T., coll. *M. R. Ghosh.*

3. **Aiceona retipennis** David, Narayanan and Rajasingh

Aiceona retipennis David, Narayanan and Rajasingh, 1970, *Oriental Ins.*, **4** : 413.

Aiceona retipennis : Pal and Raychaudhuri, D. N., 1977, *Oriental Ins.*, **11** : 376.

Material : 1 alate ♂, INDIA : West Bengal, Kalimpong, ii. 1970, in Y.P.T coll. *M. R. Ghosh.*

4. **Aiceona robustiseta** Ghosh and Raychaudhuri

Aiceona robustiseta Ghosh and Raychaudhuri, 1972, *Oriental Ins.*, **7** : 553.

Aiceona robustiseta : Pal and Raychaudhuri, D. N., 1977, *Oriental Ins.*, **11** : 377.

Material : 2 alate oviparous ♀ ♀, INDIA : West Bengal : Kalimpong, ii. 1970, in Y.P.T., coll. *M. R. Ghosh* ; 1 alate oviparous ♀, West Bengal : Munsong, 8. vi. 1971, from *Litsea polyantha,* coll. *M. R. Ghosh.*

Subfamily : APHIDINAE

II. Genus **Acutosiphon** Basu, Ghosh and Raychaudhuri

5. **Acutosiphon obliquoris** Basu, Ghosh and Raychaudhuri

Acutosiphon obliquoris Basu, Ghosh and Raychaudhuri, 1971, *Proc. zool. Soc. Calcutta,* **23** : 84.

Acutosiphon obliquoris : Ghosh, M. R., Ghosh, A. K. and Raychaudhuri, D. N., 1971, *Proc. zool. Soc. Calcutta,* **23** : 48.

Acutosiphon obliquoris : Hille Ris Lambers, 1973, *Oriental Ins.*, **7** : 240.

Acutosiphon obliquoris : Ghosh, M. R., Basu, R. C. and Raychaudhuri, D. N, 1976, *Oriental Ins.*, **10** : 269.

Material : 4 alate ♂ ♂, INDIA : Sikkim : Gangtok, 26. xii. 1969, from an unidentified plant of Cyperaceae, coll. *M. R. Ghosh* ; 6 apterous oviparous ♀ ♀, Meghalaya : Shillong, 27. xii. 1964. from an unidentified plant, coll. *C.I.B.C.*, India.

III. Genus **Amphorophora** Buckton

6. **Amphorophora ampullata bengalensis** Hille Ris Lambers and Basu

Amphorophora ampullata bengalensis Hille Ris Lambers and Basu, 1956, *Ent. Bericht.*, **26** : 14.

Amphorophora ampullata bengalensis : Ghosh, A. K., Banerjee, H. and Raychaudhuri, D. N., 1971, *Oriental Ins.*, **5** : 103.

Amphorophora ampullata Buckton : Ghosh, L. K., 1971, *Oriental Ins.*, **5** : 131 (misdet).

Material : 1 apterous oviparous ♀, INDIA : Arunachal : Rahung, 28. xi. 1969, from an unidentified fern, coll. *H. Banerjee* ; 3 apterous oviparous ♀ ♀, Himachal Pradesh : 6. i. 1970 from an unidentified fern coll. *L. K. Ghosh* ; 2 apterous oviparous ♀ ♀, Arunachal : Ziro, 26. xi. 1971, from an unidentified fern, coll. *R. Basu.*

IV Genus **Aphis** Linnaeus

Key to the species

Apterous ovipara :

Second segment of hind tarsus with both ventral and dorsal secondary hairs besides primary hairs ; cauda elongate with the apex narrowed : hind tibiae about 8.0 × its maximum width near base	*craccivora* Koch
Second segment of hind tarsus with only ventral secondary hairs besides the primary ones ; cauda elongate with blunt apex ; hind tibiae about 5.50-7.20 × its maximum width which is at about the middle	*gossypii* group

Alate male :

1. Processus terminalis about 3.0 × the base of last antennal segment, 20-25 secondary rhinaria present on antennal segment III, 15-20 on IV and 10-18 on V	*craccivora* Koch
Processus terminalis about 2.0 to atmost 2.50 × the base of last antennal segment .	2

2. Processus terminalis about 2.30-2.50 × the base of last antennal segment, segment III with 28-35, IV with 15-24 and V with 15-20 secondary rhinaria distributed irregularly over entire length of the segment ; cauda elongate with blunt apex	*gossypii* group
Processus terminalis about 2.0 × the base of last antennal segment, secondary rhinaria on antennal segment V fewer *i. e.* only 6-8 ; cauda elongate and conical	*nasturtii* Kaltenbach

7. **Aphis clematidis simlaensis** Kumar and Burkhardt

Aphis clematidis simlaensis Kumar and Burkhardt, 1970, *J. Kansas Ent. Soc.*, **53** : 463.

Material : 1 apterous ♂, INDIA : Himachal Pradesh : Simla, 28. xi. 1966, from *Clematis* sp., coll. *R. Kumar.*

Note : Males are normally alatae in this Subfamily but the report of apterous male appears interesting.

8. **Aphis craccivora** Koch

Aphis craccivora Koch, 1854, Die Pflanzen. *Aphiden*, **1** : 124.

Aphis craccivora : Basu, R. C., Chakrabarti, S. and Raychaudhuri, D. N., 1968, *Oriental Ins.*, **2** : 349.

Material : 11 apterous oviparous ♀ ♀ and 2 alate ♂ ♂, INDIA : West Bengal : Calcutta, 6. ii. 1968, and 7. ii. 1968, from *Tinospora cordifolia*, coll. *D.N. Raychaudhuri.*

9. **Aphis gossypii** group

Aphis gossypii Glover, 1877, *Rept. Com. Agr. operations dept. for* 1876 136.

Aphis gossypii : Ghosh, A. K. and Raychaudhuri, D. N., 1962, *J. Asiat. Soc.*, **4** : 101.

Aphis sp. : Ghosh, L. K., 1967, *Indian J. Sci. Indust.* (B), **4** : 24.

Aphis gossypii group : Chowdhuri, A. N., Chakrabarti, S, Banerjee, H. and Raychaudhuri, D. N., 1960, *Sci. and Cult.* **36** : 550.

Aphis ? gossypii Glover : David and Hameed, 1975, *Oriental Ins.*, **9** : 215.

Material : 4 apterous oviparous ♀ ♀, INDIA : West Bengal : Rautara, 23. i. 1967, from *Citrus decumina*, coll. *L. K. Ghosh* ; 3 apterous oviparous ♀ ♀, Meghalaya : Shillong, 18. xii. 1968, from an unidentified plant of Rhamnaceae, coll. *R. Basu* ; 2 apterous oviparous ♀ ♀, Arunachal : Changlang, 20. xii. 1970, from *Perilla osmoides*, coll. *R. Basu* ; many apterous oviparous ♀ ♀, Himachal Pradesh : Keylong, viii. 1972, from *Calendula* sp., coll. *S. F. Hameed* ; 1 alate ♂, Assam : Tocklai, 18. i. 1960, from *Camellia sinensis*, coll. *A. K. Ghosh* ; 1 alate ♂, Himachal Pradesh : Simla, 28. x. 1968, from *Zinnia* sp., coll. *A. N. Chowdhuri* ; 2 alate ♂ ♂, Meghalaya : Shillong, 3. i. 1969, in Y.P.T, coll. *R. Basu* ; 1 alate ♂, West Bengal : Kalimpong, 20. ii. 1969, from *Erectites valerinifolia*, coll. *M. R. Ghosh* ; 2 alate ♂ ♂, Meghalaya : Maflong, 28. i. 1970, from *Salvia* sp., coll. *S. Sarkar* : 1 alate ♂, West Bengal : Peshoke, 11. xii. 1970, from *Bidens pilosa*, coll. *M. R.* Ghosh.

10. **Aphis nasturtii** Kaltenbach

Aphis nasturtii Kaltenbach, 1843, *Mon. der. Fam.* der pflanzen : 76

Aphis nasturtii : Chakrabarti, S., Chowdhuri, A. N. and Raychaudhuri D. N., 1969, *Oriental Ins.*, **3** : 329.

Aphis nasturtii : Basu, K. C., Ghosh, A. K. and Raychaudhuri, D. N., 1970, *Proc. zool. Soc. Calcutta*, **23** : 86

Material : 1 alate ♂, INDIA : Himachal Pradesh : Khardala, 29. xii. 1968, from an unidentified shrub, coll. *A. N. Chowdhuri* ; 2 alate ♂ ♂, Meghalaya : Shillong, 2. ii. 1969 and 4. ii. 1969, in Y.P.T., coll. *R. Basu.*

V Genus **Aulacorthum** Mordvilko

11. **Aulacorthum magnoliae** (Essig and Kuwana)

Rhopalosiphum magnoliae Essig and Kuwana, 1918, *Proc. California. Acad. Sci.*, **8** : 59.

Aulacorthum magnoliae (Essig and Kuwana) : Basu, A. N., 1968, *Oriental Ins.*, **3** : 356.

Aulacorthum magnoliae : Ghosh, A. K., Ghosh, M. R. and Raychaudhuri, D. N., 1972, *Oriental Ins.*, **6** : 334.

Material : 1 alate ♂, INDIA : West Bengal : Kalimpong, from *Cucurbita moschata*, coll. *A. N. Basu* ; 2 alate ♂ ♂, West Bengal : Peshoke, 11. xii. 1970, from *Cucurbita maxima* coll. *M. R. Ghosh.*

Note : Basu, A. N. (1969) Just mentioned November as time of occurance of alate male in Kalimpong without providing collection data and description. Later, Ghosh, A. C., Ghosh, M.R. and Ray-Chaudhuri, D. N. (1972) have provided the description with morphometric data of the alate male from the same locality.

12. **Aulacorthum** sp.

Aulacorthum sp. : Ghosh, A. K., Basu, R. C. and Raychaudhuri, D. N., 1970 *Oriental Ins.*, **4** : 66.

Aulacorthum sp. : Ghosh, A. K., Banerjee, H. and Raychaudhuri, D. N., 1971, *Oriental Ins.*, **5** : 109.

Material : 1 apterous oviparous ♀, INDIA : Arunachal : Bhaluk-pong, 31. xii. 1969, from *Pterospermum* sp., coll. *H. Banerjee* ; 1 alate ♂, Meghalaya : Shillong, 24. xii. 1968, in Y.P.T., coll. *R. Basu* and 2 alate ♂ ♂, 15. xii. 1969 from *Artemisia* sp. and 19. xii. 1969 from *Solanum* sp., coll. *H. Banerjee.*

Note : Specific determination has not been possible with the available material.

VI. Genus **Brachycaudus** van der Goot

13. **Brachycaudus helichrysi** (Kaltenbach)

Aphis helichrysi Kaltenbach, 1843, *Mon. der. Fam. der pflanzen* : 102.

Brachycaudus helichrysi (Kaltenbach) : Basu, R. C., Ghosh, A. K. and Raychaudhuri, D. N., 1970, *Proc. zool. Soc. Calcutta*, **23** : 86.

Brachycaudus helichrysi : Chowdhuri, A. N., Ghosh, A. K., Banerjee, H. and Raychaudhuri, D. N., 1970. *Sci. & Cult.*, **36** ; 550.

Brachycaudus helichrysi : Ghosh, M. R., Ghosh, A. K. and Raychaudhuri, D. N., 1971, *Proc. zool. Soc. Calcutta*, **24** ; 49.

Brachycaudus helichrysi : Ghosh, A. K., Ghosh, M. R. and Raychaudhuri, D. N., 1972, *Oriental. Ins.*, **6** : 336.

Material : 1 apterous oviparous ♀, INDIA : Meghalaya : Shillong, 13. xii. 1968, from *Prunus* sp., coll. *R. Basu* ; 1 alate ♂, Himachal Pradesh : Simla 1. xi. 1968, from ? *Lycopersicum esculantum*, coll. *A. N. Chowdhuri* ; 1 alate ♂, Sikkim : Singtam, 27. xii. 1968, from *Prunus* sp., coll. *M. R. Ghosh* ; 13 alate ♂ ♂, Meghalaya : Shillong, I and II, 1969, in Y.P.T., coll. *R. Basu* ; 2 alate ♂ ♂ ; West Bengal : Kalimpong, 19. xii. 1970, in Y.P.T., coll. *M.R. Ghosh.*

Apterous oviparous female : Body oval, 1.25 mm long with 0.65 mm as the maximum width, almost pale excepting antennal segments V and VI, rostrum, siphunculus, cauda and hind tibiae which are dark. Antennae short, about 0.50 × the body ; p.t. 3.0 × the base of the last antennal segment. Rostrum reaching hind coxae, u.r.s. 1.40 × h.t 2. Siphunculi 0.09 × the body, 1.70 × its basal width and nearly 2.0 × the cauda which is broad, about as long as width at base and bearing 6 hairs. Hind tibia swollen with numerous pseudosensoria. Otherwise as in apterous viviparae.

Measurements of the specimen in mm : Length of body 1.25, width 0.65 ; antenna 0.57, segments III:IV:V:VI 0.11:0.08:0.08:(0.05+0.15) ; u.r.s. 0.11. ; h.t. 2 0.08 ; siphunculus 0.12 ; cauda 0.06.

Alate male : Body dark brown. 1.50 mm- 1.70 mm long with 0.60 mm-0.80 mm as the maximum width. Antennae rather long, abont 0.70-0-80 × the body, antennal segment III with 32 to 60, segment IV with 17-36 and segment V with 5-17 secondary rhinaria distributed over their entire lengths ; p.t. 4.0-5.0 × the base of last antennal segment. Rostrum blunt, reaching almost mid coxae ; u.r.s. 1.40-1.60 × h.t. 2. Dorsum of abdomen with transverse pigmented bands and marginal blotches segmentally. Siphunculi rather short, 0.06-0.07 × the body, a little over 2.0 × its basal width and 1.30-1.60 × the cauda bearing 6 hairs. Wing venation normal. Otherwise as in alate viviparae.

Measurements of one specimen in mm : Length of body 1.61, width 0.72 ; antenna 1.25, segments III:IV:V:VI 0.37: 0.21:0.14 : (0.07+0.33) ; u.r.s. 0.11 ; h.t.2 0.08 ; siphunculus 0.10 ; cauda 0.07.

Note : The oviparae are not commonly found in India.

VII. Genus **Brachymyzus** Basu

14. **Brachymyzus jasmini** Basu

Brachymyzus Jasmini Basu, 1964, *J. Linn. Soc* (*zool*), **45** : 225.

Brachymyzus Jasmini : Mondal, P. K., Agarwala, B. K. and Raychaudhuri, D. N., 1978, *Entomon*, **3** : 105.

Material : 2 apterous oviparous ♀ ♀ , INDIA : Sikkim : Tsungthang, 14. xi. 1974, from *Nellia* sp., coll *P. K. Mondal* ; 1 alate ♂, Tsungthang, 14. xi. 1974, from *Pilea microphylla*. coll. *P. K. Mondal*.

VIII. Genus **Brevicoryne** van der Goot

15. **Brevicoryne brassicae** (Linnaeus)

Aphis brassicae Linnaeus, 1758, *Syst. Nat.*, **1** (10th ed.) : 452.

Brevicoryne brassicae (Linnaeus) : David, 1958, *J. Bombay Nat. Hist. Soc.*, **55** : 115.

Brevicoryne brassicae : Banerjee, H., Ghosh, A. K. and Raychaudhuri, D. N., 1969, *Oriental Ins.*, **3** : 257.

Brevicoryne brassicae Ghosh, A. K. Chakrabarti, S., Chowdhuri, A. N. and Raychaudhuri, D. N., 1969, *Oriental Ins.* **3** : 330.

Material : 1 apterous oviparous ♀, INDIA : Himachal Pradesh : Simla, in the month of March from *Brassica oleracea*, coll. *A. N. Azad* ; 3 alate ♂♂, Uttar Pradesh : Sangtang hills, 13. xi. 1968 ; from *Brassica* sp., coll. *H. Banerjee* ; 4 alate ♂♂, Uttar Pradesh : Kuti hills, 24. xi. 1968, from *Brassica* sp., coll. *H. Banerjee* : 1 alate ♂, Himachal Pradesh : Simla, 10. i. 1969, from *Brassica oleracea*, coll. *A. N. Chowdhuri.*

Alate male : Body 1.50 -1.80 mm long with 0.60-0.70 mm as the maximum width. Head dark brown. Antennae shorter than to nearly as long as body ; p. t. about 4.50-6.0 × the base of last antennal segment ; segment III wtth 30-50, segment IV with 6-10 and segment V with 5-9 secondary rhinaria ; longest hair on segment III about 0.40-0.50 × the basal diameter of the segment. Abdomen pale, dorsum with segmental pale to dark brown sclerotic patches, Siphunculi about 0.05-0.07 × the body and about 0.65-0.08 × the cauda. Wing venation normal. Otherwise as in alate viviparae.

Measurements of one specimen in mm : Length of body 1.68, width 0.64 ; antenna 1.61, segments III:IV:V:VI 0.42:0.24:0:20: (0.09+ 0.51) ; u.r.s. 0.10 ; h.t.2 0.14 ; siphunculus 0.09 ; cauda 0.12.

Note : Apterous ovipara of this species was reported by David (1958). He did neither provide any description nor morphometric and collection data. His material was not avilable to us for examination. Therefore, the description as well as the measurements of the ovipara has not been provided. Oviparae seem to be infrequent.

IX. Genus **Capitophorus** van der Goot

Key to the species

Apterous ovipara :

Longest hair on segment III about 1.0-1.25 × the basal diameter of the segment; siphunculi 0.30 × the body ; u. r. s. 2.0 × the h.t.2 ; antenna as long as body ; body 1.30 mm long	*formosartemisiae* (Takahashi)
Longest hair on segment III about 0.30-0.50 × the basal diameter of the segment ; siphunculi 0.21 × the boby ; u. r. s. 3.0-3.10 × the h.t.2 ; antenna shorter than body ; body 1.47 mm long . .	*meghalayensis* Basu and Raychaudhuri

16. **Capitophorus formosartemisiae** (Takahashi)

Myzus formasartemisiae Takahashi, 1921. *Aphididae of Formosa, pt.*, **1** : 25.

Capitophorus formosartemisiae (Takahashi) : Ghosh, A, K., Basu, R. C. and Raychaudhuri, D. N., 1971, *Kontyu*, **39** : 121.

Capitophorus formosartemisiae : Basu, R. C. and Raychaudhuri, D. N,, 1976, *Oriental Ins.* **10** : 571.

Material : 1 apterous oviparous ♀, Bhutan : Chiska village, 7. ii. 1968, from *Artemisia* sp., coll. *S. Mitra.*

17. **Capitophorus meghalayensis** Basu and Raychaudhuri

Capitophorus meghalayensis Basu and Raychaudhuri, 1976, *Oriental Ins.*, **10** : 575.

Capitophorus archangelskii Nevsky : *mis.det.* Basu, R. C., Ghosh, A. K. and Raychaudhuri, D. N., 1970, *Proc. zool. Soc. Calcutta*, **23** : 86.

Material: 2 apterous oviparous ♀ ♀, INDIA : Meghalaya : Shillong, 16. i. 1969, from *Elaeagnus* sp., coll. *R. Basu.*

X. Genus **Cavariella** del Guercio

18. **Cavariella (Cavaraiellia) aquatica** (Gillette and Bragg)

Siphocoryne aquatica Gillette and Bragg, 1916, *Ent. News*, **27** : 447.

Cavariella (Cavaraiella) aquatica (Gillette and Bragg) ; David and Hameed, 1975, *Oriental Ins.*, **9** : 218.

Material : 12 apterous oviparous ♀♀ and 4 apterous ♂♂, INDIA : Jammu and Kashmir : Srinagar, 21. xi. 1970, from *Salix* sp. coll. *K. Narayanan.*

Note : The report of apterous males from north west India by David and Hameed (1975) is interesting in view of occurrence of alate males of some other species under the same genus in north east India.

19. **Cavariella** sp.

Cavariella sp. : Basu, R. C., Ghosh, A. K. and Raychaudhuri, D. N., 1972, *Sci. & Cult.*, **38** : 494.

Material : 1 alate ♂, INDIA : Arunachal : Ziro, 26. xi. 1971, from an unidentified plant of Solanaceae, coll. *R. Basu.*

Note : Since the specific determination of the material has not been possible, short description and morphometric data of the morph are not provided here.

XI. Genus **Chaetosiphon** Mordvilko

20. **Chaetosiphon (Pentatrichopus) fragifolii** (Cockerell)

Myzus fragifolii Cockerell, 1901, *Canad. Ent.*, **33** : 101.
Chaetosiphon (*Pentatrichopus*) *fragifolii* (Cockerell) : Banerjee, H., Ghosh, A. K. and Raychaudhuri, D. N., 1969, *Oriental Ins.*, **3** : 257.

Material : 2 alate ♂♂, INDIA : Uttar Pradesh : Gunji, 27. ix. 1968, in Y.P.T. coll, *H. Banerjee.*

Alate male : Body 1.82 - 1.86 mm long with 0.68 - 0.72 mm as maximum width. Head blackish brown, smooth. Antennae about 0.81 - 0.88 × the body ; p.t. about 2.0 - 2.36 × the base of last antennal segment ; segment III with 27 - 34, IV without any and V with 6-9 secondary rhinaria, longest hair on segment III about 0.37 - 0.40 × the basal diameter of the segment. Rostrum reaches slightly beyond fore coxae, u.r.s nearly as long as h.t. 2. Thorax dark brown. Abdominal dorsum with segmental dark brown spinal, pleural and marginal patches ; longest hair on anterior tergites about 0.30 × the basal diameter of the segment III. Siphunculi brown, slightly swollen on apical 0.50 portion, about 0.12-0.13 × the body and about 2.0-2.20 × the cauda bearing 5-6 hairs. Wing venation normal.

Measurements of one specimen in mm : Length of body 1.86, width 0.72 ; antenna 1.50, segments III:IV:V:VI 0.47:0.26:0.25: (0.11+0.26) ; u.r.s. 0.10 ; h.t.2 0.10 ; siphunculus 0.25 ; cauda 0.12.

Note : Banerjee, H., Ghosh, A. K. and Raychaudhuri, D.N. (1969) just reported the sexual form without any description.

XII. Genus **Coloradoa** Wilson

21. **Coloradoa rufomaculata** (Wilson)

Aphis rufomaculata Wilson, 1908, *Ent. News.*, **19** : 261.

Coloradoa rufomaculata (Wilson) : Rao and Kulkarni, 1977, *Natural Sciences J. Marathwada Univ.*, **16** (Sci.) : 147.

Material : 1 apterous oviparous ♀, INDIA : Marathwada : Aurangabad, 1. xii. 1971, from *Chrysanthemum indicum*, coll. *P. P. Kulkarni.*

XIII. Genus **Dysaphis** Borner

22. **Dysaphis ghanii** group

Dysaphis ghanii Stroyan , 1963 *Proc. R. ent. Soc. London* (B) **32** : 12.

Dysaphis ghanii : Ghosh, A. K., Chakrabarti, S., Chowdhuri, A. N. and Raychaudhuri, D. N., 1969, *Oriental Ins.*, **3** : 330.

Material : 2 alate ♂ ♂, INDIA : Himachal Pradesh : Khadrala, 26. xi. 1968, from *Fragaria nilgerriensis*, coll. *A. N. Chowdhuri* ; 2 alate ♂ ♂, Khadrala, 28. xi. 1968, from *Cotoneaster bacillaris*, coll. A. N. Chowdhuri ; 3 alate ♂ ♂, Khadrala, 2. xii. 1970 from *Cotoneaster bacillaris*, coll. *A. N. Chowdhuri*..

23. **Dysaphis** sp.

Dysaphis sp. : Banerjee, H., Ghosh, A. K. and Raychaudhuri, D. N, 1969, *Oriental Ins.*, **3** : 257.

Material : 1 alate ♂, INDIA : Uttar Pradesh ; Kuti hill. 29. ix. 1968. in Y.P.T., coll. *H. Banerjee.*

Note : Single alate male could not be identified up to species level. So short description and morphometric data of the morph have not been provided here.

XIV. Genus **Hayhurstia** del Guercio

24. **Hayhurstia artiplicis** (Linnaeus)

Aphis artiplicis Linnaeus, 1761. *Fauna Succica* (2nd ed.) : 262.

Hayhurstia artiplicis (*Linnaeus*) : Basu, R. C , Ghosh, A. K. and Raychaudhuri, D. N., 1972, *Sci. & Cult.*, **38** : 494.

Material 1 apterous oviparous ♀, INDIA : Arunachal : Hapoli (Ziro) 26. xi. 1971, from *Chenopodium album*, coll. *R. Basu.*

Apterous ovipara : Body 1.56 mm long with 0.97 mm as maximum width. Head very indistinctly rugose with hardly developed lateral frontal tubercles and with weakly developed median convexsity. Antennae about 0.50 × the body ; flagellar hair very short and sparse ; p.t. about 2.0 × the base of last antennal segment. Rostrum reaching past the mid coxae ; u.r.s. shorter than h.t. 2. Dorsum of abdomen pale excepting segment 8 bearing a brownish patch. Siphunculi nearly cylindrical with slight swelling medially, about 0.09 × the body and much shorter than cauda bearing 7 hairs. Hind tibiae swollen and with numerous pseudosensoria. Otherwise as in apterae viviparae.

Measurements of one specimen in mm : Length of body 1.56, width 0.97 ; antenna 0.76, segments III:IV:V:VI 0.18:0.08:0.09: (0.08+0.16) ; u.r.s. 0.09 ; h.t.2 0.11 ; siphunculus 0.11 ; cauda 0.14.

Note : Basu, R.C., Ghosh, A. K. and Raychaudhuri, D. N. (1972) Just reported the species. So a short description of the sexual morph has now been given here.

XV. Genus **Hyperomyzus** Borner

25. **Hyperomyzus lactucae** (Linnaeus)

Aphis lactucae Linnaeus, 1758, *Syst. Nat.*, **10** : 452.

Hyperomyzus lactucae (Linnaeus) : Ghosh, A. K., Chakrabarti, S., Chowdhuri, A. N. and Raychaudhuri,, D. N., 1969, *Oriental Ins.*, 3 : 331.

Material : 1 alate ♂, INDIA : Himachal Pradesh : Khadrala, 26. xi. 1968, from *Taxus baccata*, coll. *A. N. Chowdhuri.*

Alate male : Body 2.91mm long with the maximum width as 1.01mm. Head dark brown with well developed diverging lateral frontal tubercles. Antennae broken ; segments I-III dark brown, segment I about 1.4 ×

as long as its width ; segment III with numerous (68-75) secondary rhinaria scattered irregularly over the entire length ; longest hair on segment III shorter than its basal width. Rostrum reaching mid coxae, u.r.s. about as long as h.t.2. Dorsum of abdomen with short, transverse spinopleural dark bands on segments 1-8, these being a little reduced on anterior tergites, with small sclerotic spots marginally and with large dark sclerotic post-siphuncular sclerites. Siphunculi about 0.16 × the body with a basal cylindrical stem, gradually swollen from basal 0.50 portion, nearly smooth with a apical flange, with a distinct preapical circumcission and always with a few preapical striae, Cauda elongate, a little shorter than 0.50 × the siphunculi, with about 10 hairs. Wing venation normal.

Measurements of the alate male in mm : Length of body 2.91, width 1.01 ; antenna ? (broken) III 0.98 (rest broken) ; u.r.s. 0.14 ; h.t.2 0.14 ; siphunculus 0.48 ; cauda 0.21.

Note : Ghosh, A.K., Chakrabarti, S., Chowdhuri, A. N. and Raychaudhuri, D. N. (1969) reported the alate male of the species without providing any description for it.

XVI. Genus **Hysteroneura** Davis

26. **Hysteroneura setariae** (Thomas)

Siphonophora setariae Thomas, 1877, *Bull. Illinois State Lab. Nat. Hist.*, **2** : 5.

Hysteroneura setariae (Thomas) : Basu, R. C., Ghosh, A. K. and Raychaudhuri, D, N., 1970, *Proc. zool. Soc. Calcutta*, **23** : 86.

Hysteroneura setariae : Ghosh, M. R., Ghosh, A. K. and Raychaudhuri, D. N., 1971, *Proc. zool. Soc. Calcutta*, **24** : 49.

Material : 12 apterous oviparous ♀ ♀, INDIA : Meghalaya : Shillong, 12. xii. 1968, from *Prunus* sp., coll. *R. Basu* ; 4 apterous oviparous ♀ ♀, Sikkim : Gangtak, 26. xii. 1969, from an unidentified plant of Gramineae, coll. *M. R. Ghosh* ; 1 alate ♂, West Bengal : Mongbar, 5. xi. 1971, from an unidentified plant, coll. *M.R. Ghosh.*

Apterous ovipara : Body rather pale and short, about 1.20-1.50 mm long with the maximum width as 0.60-0.85 mm. Head brown. Antennae concolorous with head excepting segment III and basal 0.75 portion of segment IV obscure, about 0.70-0.80 × the body ; p.t. 4.0 -5.0 × the base of last antennal segment. Rostrum reaching beyond mid coxae ; u.r.s. blunt, nearly as long as to 1.12 × h.t. 2. Siphunculi

rather broad and stout, cylindrical with a broad base, about 0.09-0.10 × the body and nearly as long as cauda which is slightly darker than the viviparae, but with pale tip and 2 pairs of hairs. Hind tibiae greatly swollen, bearing numerous pseudosensoria. Otherwise as in apterae viviparae.

Measurements of one specimen in mm : Length of body 1.32, width 0.76 ; antenna 0.99, segments III:IV:V:VI 0.18 : 0.15 : 0.14 : (0.08+0.35) ; u.r.s. 0.09 ; h.t. 2 0.08 ; siphunculus 0.14 ; cauda 0.13.

Alate male : Body 1.50 mm long with 0.63 mm as the maximum width. Head light brown with almost flat frons. Antennae 6- segmented, light brown, slightly shorter than body ; segment III with 25-27, segment IV with 12-18 and segment V with 5-7 secondary rhinaria distributed irregularly over their entire lengths ; p.t. about 6.35 × the base of last antennal segment. Rostrum reaching almost mid coxae, u.r.s. blunt, slightly shorter than h.t. 2. Dorsum of abdomen rather pale with brownish segmental patches marginally and with narrow nearly continuous band on tergites 7 and 8. Siphunculi brown, nearly cylindrical with the apical part broaden,, densely imbricated, about 0.06 × body and slightly shorter than the digitiform cauda bearing 4 hairs. Wing venation normal. Otherwise as in alate viviparae.

Measurements of the specimen in mm. : Length of body 1.50, width 0.63 ; antenna 1.43, segments III:IV:V:VI 0.33:0.21:0.19: (0.08+ 0.51) ; u.r.s. 0.09 ; h.t.2 0.10 ; siphunculus 0.09 ; cauda 0.11.

Note : The ovipara of this species was reported by Basu, R. C. Ghosh, A. K, and Raychaudhuri, D. N. (1970) and Ghosh, M. R., Ghosh, A. K. and Raychaudhuri, D. N. (1971). But then they did not give any description and morphometric data of that morph. Therefore, these are provided here. Moreover, the alate male is now reported for the first time from India.

XVII. Genus **Impatientinum** Mordvilko

27. **Impatientinum impatiens** (Shinji)

Tuberosiphum impatiens Shinji, 1922, *Zool. Mag.*, **34** : 789.

Impatientinum impatiens (Shinji) : Ghosh A. K., Ghosh, M. R. and Raychaudhuri, D. N., 1971, *Oriental Ins.*, **5** : 214.

Material : 1 apterous oviparous ♀, INDIA : West Bengal : Jore Bunglow, 25. i. 1970, from *Smilax* sp., coll. *S. D. Chakrabarti.*

XVIII. Genus **Jacksonia** Theobold

28. **Jacksonia folisacculata** (Kumar and Burkhardt)

Xenosiphonaphis folisacculatus Kumar and Burkhardt, 1971, *J. Kansas Ent. Soc.*. **44** : 173.

Material : 2 alate ♂ ♂, INDIA : Himachal Pradesh : Fagu, 10. viii. 1966, from *Spiraea* sp., coll. *R. Kumar.*

29. **Jacksonia** sp.

Jacksonia sp. : Banerjee, H., Ghosh, A. K. and Raychaudhuri, D. N., 1969, *Oriental Ins.*, **3** : 257.

Material : 2 alate ♂ ♂, INDIA : Uttar Pradesh : Chealek, 29. ix. 1968, from *Sarcacea pruniformis*, coll. *H. Banerjee.*

Note : The material could not be identified upto species level. So the short description and morphometric data have been ommited here.

XIX. Genus **Liosomaphis** Walker

30. **Liosomaphis himalayansis** Basu

Liosomaphis himalayansis Basu, 1964, *J. Linn. Soc.* (*zool*). **45** : 231.

Liosomaphis himalayansis : Verma, 1974, *India J. Ent.*, **36** : 201.

Liosomaphis himalayansis : Ghosh, L. K. and Pramanik, 1976, *Newsl. zool. Surv. India*, **2** : 109.

Material : One alate ♂, INDIA : Himachal Pradesh : Simla, 12.xii.1971 on wing, coll. *K. D. Verma* ; 2 alate ♂ ♂, Himachal Pradesh : Kufri, 13. xii. 1973 on wing, coll. *L. K. Ghosh.*

XX. Genus **Lipaphis** Mordvilko

31. **Lipaphis erysimi** (Kaltenbach)

Aphis erysimi Kaltenbach, 1843, *Mon. der Fam. der Pflanzen* : 99.

Lipaphis erysimi (Kaltenbach) : Phalak, 1968, *Curr. Sci.*, **37** : 491.

Lipaphis pseudobrassicae Davis : Verma and Mathur, 1966, *Indian J. Ent.*, **28** : 277.

Lipaphis erysimi (Kaltenbach) : Basu, R. C., Ghosh, A. K. and Raychaudhuri, D. N., 1970, *Proc. zool. Soc. Calcutta*, **23** : 87.

Lipaphis erysimi : Ghosh. L. K., 1977, *Newsl. zool. Surv. India*, **3** : 26.

Material : Many apterous oviparous ♀ ♀, INDIA : West Bengal Kalimpong and Mirik, iii. 1967 from *Brassica campestris*, coll. *V. R. Phalak* ; 1 apterous oviparous ♀, Meghalaya : Cherrapunji, 20. xii. 1968, from an unidentified plant of Cruciferae, coll, *R. Basu* ; 1 alate ♂, Jammu and Kashmir : Jammu, 17. x. 1963, on wing, coll. *A. C. Mathur.* ; 3 apterous oviparous ♀ ♀, Himachal Pradesh. Thanedhar, 2. x. 1974, from *Brassica oleracea*, coll. *L. K. Ghosh.*

Apterous ovipara : Body pale, 1.64 mm long with 1.01 mm as the maximum width. Head brownish. Antennae about 0.60 × the body, without any secondary rhinaria ; hairs on antennae minute, longest one on segment III about 5-8μ long ; p.t, about 2.30 × the base of last antennal segment. Rostrum reaching mid coxae ; u.r.s. about 0.80 × h. t. 2. Dorsum of abdomen pale, with very small scattered sclerites. Siphunculi weakly clavate, about 0.11 × the body and 1.20 × the broadly conical cauda bearing 6 hairs. Hind tibiae swollen bearing numerous pseudosensoria. Otherwise as in apterae viviparae.

Measurements of one specimen in mm : Length of body 1.64, width 1.91 ; antenna 0.97, segments III:IV:V:VI 0.29:0.12:0.12:(0.09+0.21) ; u.r.s. 0.09 ; h.t 2 0.11 ; siphunculus 0.19 ; cauda 0.16.

Note : Verma and Mathur (1966) reported the alate male of this species as that of *Lipaphis pseudobrassicae* Davis which is a synonym of *Lipaphis erysimi* (Kaltenbach). Oviparous female of this species was reported by Phalak (1968) and by Basu, R. C., Ghosh, A. K. and Raychaudhuri, D.N. (1970) but they did not provide any description of the morph and the same is now given here.

XXI. Genus **Macromyzus** Takahashi

32. **Macromyzus manoji** Raha and Raychaudhuri

Macromyzus manoji Raha and Raychaudhuri, 1978, *Entomon*, **3** : 111.

Macromyzus? woodwardiae (Takahashi) : (*mis. det.*) Ghosh, A. K., Ghosh, M. R. and Raychaudhuri, D. N., 1972, *Oriental Ins.*, **6** : 337.

Material : 4 apterous oviparous ♀ ♀, INDIA : West Bengal : Lebong, 9. i. 1971 from an unidentified plant, coll. *S. D. Chakrabarti.*

This species was reported by Ghosh, A. K., Ghosh, M. R. and Raychaudhuri, D.N. (1972) with a ? mark. Re-examination of the material reveals that those are really *manoji* as described by Raha and Raychaudhuri, D.N. (1978).

XXII. Genus **Macrosiphoniella** del Guercio

Key to the species

Apterous ovipara :

Longest hair on segment III not less than 2.40 × b.d.III ; p.t. about 5.0-6.0 × the base of antennal segment VI ; segment III with 20-25 secondary rhinaria ; cauda shorter than to as long as siphunculi.	*? kikungshana* Takahashi
Longest hair on segment III about 0.70-1.10 × b.d.III ; p.t. about 2.50-3.50 × the base of antennal segment III with 4-6 secondary rhinaria ; cauda always longer than siphunculi	*pseudoartemisiae* Shinji

33. **Macrosiphoniella ? kikunshana** Takahashi

Macrosiphoniella kikunshana Takahashi, 1937, *Lignan Sci. J.* **16** : 54.

Macrosiphoniella hikosanensis Moritsu : Ghosh, M.R., Ghosh, A. K. and Raychaudhuri, D. N., 1971, *Proc. zool. Soc. Calcutta*, **24** : 165.

Macrosiphoniella ? kikunshana Takahashi : Basu, R. C. and Raychaudhuri, D. N., 1976, *Oriental Ins.*, **10** : 301.

Material : 7 apterous oviparous ♀ ♀, INDIA : Sikkim : Chubba, 25. xii. 1970, from *Artemisia* sp., coll. *M. R. Ghosh* ; 4 apterous oviparous ♀ ♀, West Bengal : Tashiding, 11. v. 1970 from *Artemisia* sp. coll. *M. R. Ghosh.*

Note : Following Takahashi (1937) the Indian specimens appear close to *kikunshana* whose comparable material and detail description have not been available. So presently the Indian specimens are reported as *kikunshana* with ? mark.

34. **Macrosiphoniella pseudoartemisiae** Shinji

Macrosiphoniella pseudoartemisiae Shinji, 1933, *Kontyu*, **7** : 216.

Macrosiphoniella pseudoartemisiae : Ghosh, L. K., 1972, *Kontyu*, **40** : 73.

Macrosiphoniella pseudoartemisiae : Basu, R. C. and Raychaudhuri, D. N. 1976, *Oriental Ins.*, **10** : 302.

Material : 4 apterous oviparous ♀ ♀, BHUTAN : Simtokha, 21. ii. 1969, from *Artemisia* sp., coll. *S. K. Mitra* ; 6 apterous oviparous ♀ ♀, West Bengal : Munsong, 8. ii. 1971, from *Artemisia* sp., coll. *M. R. Ghosh.*

XXIII. Genus **Macrosiphum** Passerini

Key to the species

Apterous ovipara :

Hind tibiae with a row of short spine-like hairs besides normal hairs ; u.r.s. about 1.30-1.40 × h.t.2 ; p.t. 5.60-6.0 × the base of last antennal segment ; siphunculi about 3.0 × the cauda	*spinotibium* Ghosh, Ghosh and Raychaudhuri
Hind tibiae without spine like hair ; u.r.s. shorter to at most as long as h.t.2 ; p.t. about 4.50-5.0 × the base of last antennal segment ; siphunculi about 2.0 × the cauda	*rosaeformis* Das

35. **Macrosiphum (Sitobion) rosaeformis** Das

Macrosiphum rosaeformis Das, 1918, *Mem. Indian Mus.*, **6** : 158.

Macrosiphum (*Sitobion*) *rosaeformis* Das : Basu, R. C., Ghosh, A. K. and Raychaudhuri, D. N., 1970, *Proc. zool. Soc. Calcutta*, **23** : 87.

Macrosiphum (*Sitobion*) *rosaeformis* : Ghosh, A. K., Basu, R. C., and Raychaudhuri, D. N., 1970, *Oriental Ins.*, **4** : 72.

Material : 11 apterous oviparous ♀ ♀, INDIA : Meghalaya : Shillong, 18. xii. 1968, 21. i. 1969, 25. i. 1969 and 31. i. 1969, from *Rosa* sp., coll. *R. Basu* ; 4 apterous oviparous ♀ ♀, Meghalaya : Shillong, 20. ii. 1970, from *Rosa* sp., coll., *S. Sarkar* ; 5 alate ♂ ♂ : Meghalaya : Shillong, 7. i. 1960, from *Rosa* sp., coll. *A. K. Ghosh* ; 6 alate ♂ ♂, Meghalaya : Shillong, 11. xii 1968, 5. i. 1969. from *Rosa*, sp., coll., *R. Basu* ; 1 alate ♂, Meghalaya : Shillong, 28. ii. 1970, from *Rosa cania*, coll. *H. Banerjee* ; 1 alate ♂, Meghalaya : Shillong, 28. i. 1971, from *Rosa cania*, coll. *S. Sarkar.*

Apterous ovipara : Body 1.90-2.55 mm long with 0.90-1.30 mm as maximum width. Head light brown. Antennae slightly shorter to nearly as long as body ; p.t. 4.50-5.0 × the base of last antennal segment. Rostrum reaching beyond mid coxae, u.r.s. slightly shorter than to nearly as long as h.t. 2. Dorsum of abdomen absolutely pale. Siphunculi light brownish, cylindrical, about 0.20-0.25 × the body and about 2. 0 × the cauda bearing 10-12 hairs. Legs light brown, hind tibiae swollen and with numerous pseudosensoria. Otherwise as in apterae viviparae.

Measurements of one specimen in mm : Length of body 2.22, width 0.97 ; antenna 2.16, segments III:IV:V:VI 0.52:0.40:0.39 : (0.12+0.54) ; u.r.s. 0.10 ; h.t.2 0.10 ; siphunculus 0.52 ; cauda 0.26.

Alate male : Body 2.0-2.9 mm long with 0.70-1.20 mm as the maximum width. Head brown. Antennae dark brown, much longer than body ; segment III with 65-92, segment IV with 22-40 and segment V with 15-27 secondary rhinaria distributed irregularly over the entire lengths of the segments ; p.t. 4.50-6.50 × the base of last antennal segment. Rostrum reaching mid coxae, u.r.s. nearly as long as h.t.2. Dorsum of abdomen pale but with segmentally arranged sclerotic patches and with post siphuncular sclerites. Siphunculi cylindrical, about 0.13 -0.15 × the body and about 2.0 × the cauda bearing 8-11 hairs.

Measurements of one specimen in mm : Length of body 2.51, width 1.00 ; antenna 2.92, segments III:IV:V:VI 0.77:0.57:0.51: (0.15+0.72) ; u.r.s. 0.10 ; h.t.2 0.10 ; siphunculus 0.34 ; cauda 0.18.

Note : Basu, R.C., Ghosh, A. K. and Raychaudhuri, D.N. (1970) and Ghosh, A. K., Basu, R. C. and Raychaudhuri, D. N. (1970) from Shillong reported oviparous females and alate males respectively of the species without providing any description for the said morphs. Therefore, short descriptions are provided here.

36. **Macrosiphum spinotibium** Ghosh, Ghosh and Raychaudhuri

Macrosiphum spinotibium Ghosh, Ghosh and Raychaudhuri, 1970, *Oriental Ins.*, **4** : 381.

Macrosiphum spinotibium : Ghosh, A. K., Banerjee, H. and Raychaudhuri, D. N., 1971, *Oriental Ins.*, **5** : 106.

Material : 3 apterous oviparous ♀ ♀, INDIA : Arunachal : Direng 26. xi. 1969, from an unidentified plant, coll. *H. Banerjee*.

37. **Macrosiphum** sp. A

Macrosiphum sp. : Basu, R. C., Ghosh, A. K. and Raychaudhuri, D. N., 1970, *Proc. zool. Soc. Calcutta*, **23** : 87.

Macrosiphum sp. : Ghosh, A. K., Ghosh, M. R. and Raychaudhuri, D. N., 1972, *Oriental Ins.*, **6** : 336.

Material : 1 alate ♂; INDIA : Meghalaya : Shillong, 5. ii. 1969, in Y.P.T., coll, *R. Basu* ; 3 alate ♂ ♂, West Bengal : Lebong, 3. i. 1971, from *Vaccinium* sp., coll., *S. D. Chakrabarti* ; 1 alate ♂, West Bengal : Lebong, 9. i. 1971, from an unidentified plant, coll. *S. D. Chakrabarti.*

Note : The alate males collected could not be identified upto species level. So these are not incorporated in the key and the description has been omitted.

38. **Macrosiphum (Sitobion)** sp. B.

Macrosiphum (*Sitobion*) *fragariae* (Walker) : Ghosh, A. K. and Raychaudhuri, D. N., 1962, *J. Bombay nat. Hist. Soc.*, **59** : 244.

Macrosiphum (*Sitobion*) *avenae* subsp *miscanthi* Takahashi : Ghosh, A. K., and Raychaudhuri, D. N., 1962, *J. Asiat. Soc.*, **4** : 106.

Macrosiphum (*Sitobion*) sp. : Basu, R. C., Ghosh, A. K. and Raychaudhuri, D. N., 1970, *Oriental Ins.*, **4** : 72.

Macrosiphum (*Sitobion*) sp. : Ghosh, A. K., Banerjee, H. and Raychaudhuri, D. N., 1971, *Oriental Ins.*, **5** : 109.

Macrosiphum (*Sitobion*) ? *fragariae* (Walker) : Ghosh, L. K., 1971, *Oriental Ins.*, **5** : 131.

Macrosiphum (*Sitobion*) *miscanthi* Takahashi : Ghosh, A. K., Ghosh, M. R. and Raychaudhuri, D. N., 1972, *Oriental Ins.*, **6** : 336.

Material : 1 apterous oviparous ♀, INDIA : Meghalaya : Shillong, 8. i. 1960 from *Polygonum chinense*, coll. *A. K. Ghosh* ; 2 apterous ♀ ♀, West Bengal : Kurseong, 1. xii. 1970, from unidentified grass, coll. *S. D. Chakrabarti* ; 2 alate ♂ ♂, Meghalaya : Shillong, 29. xii. 1968, from *Allium sativum*, coll. *R. Basu* ; 1 alate ♂, Meghalaya : Shillong, 12. xii. 1969, from *Lindera* sp., coll. *H. Banerjee* ; 1 alate ♂, Himachal Pradesh : Simla, 6. i. 1970 from *Asplenium* sp., *L. K. Ghosh.*

Note : Both the oviparae and males of the above mentioned collection do not strictly fit with the description of either *fragariae* or *miscanthi* but these are more close to *miscanthi.* So, for the time being these are reported as *Macrosiphum* (*Sitobion*) sp.

XXIV Genus **Masonaphis** Hille Ris Lambers

Key to the species

Apterous ovipara :

Ultimate rostral segment 1.20 × h.t.2 and with 8 secondary hairs ; cauda with about 26 hairs ; antennal segment III with 100-110, segment IV with 70-80 and segment V with 35-42 secondary rhinaria distributed irregularly over their entire length	*anaphilidis* Basu
Ultimate rostral segment 1.25-1.35 × h.t.2 and with 4 secondary hairs ; cauda with 12-15 hairs ; antennal segment III with 87-115, segment IV with 32-46 and segment V with 13-20 secondary rhinaria distributed irregularly over their entire length	*rumicis* Chakrabarti and Raychaudhuri

39. **Masonaphis (Neomasonaphis) anaphilidis** Basu

Masonaphis anaphilidis Basu, 1964, *J. Linn. Soc.* (*Zool.*), **45** : 229.

Masonaphis anaphilidis : Ghosh, A. K., Banerjee, H. and Raychaudhuri, D. N., 1971, *Oriental Ins.*, **5** : 107.

Material : 1 alate ♂, INDIA : Arunachal : Rupa, 27. xi. 1969, from *Ageratum conyzoides*, coll. *H. Banerjee*.

40. **Masonaphis (Neomasonaphis) rumicis** Chakrabarti and Raychaudhuri

Masonaphis (*Neomasonaphis*) *rumicis* Chakrabarti and Raychaudhuri, D. N. 1975, *Oriental Ins.*, **9** : 203.

Masonaphis anaphilidis Basu : *mis. det.* Chakrabarti, S., Ghosh, A. K. and Raychaudhuri, D. N., 1972, *Curr. Sci.*, **41** : 70.

Material : 8 alate ♂ ♂, INDIA : Uttar Pradesh : Kathalia, 15 .x. 1970, from *Rumex* sp., coll. *S. Chakrabarti* ; 2 alate ♂ ♂, Almora : Kathalia, 16. x. 1970., from *Oxyria digyna*, coll. *S. Chakrabarti* ; many alate ♂ ♂, Almora : Sundardhunga, 15. x. 1970, from *Rumex* sp., coll. *S. Chakrabarti*.

XXV Genus **Megoura** Buckton

41. **Megoura cajanae** Ghosh, Ghosh and Raychaudhuri

Megoura cajanae Ghosh, Ghosh and Raychaudhuri, 1970, *Oriental Ins.*, **4** : 385.

Material : 1 apterous oviparous ♀, INDIA : West Bengal : Tista, 14. i. 1969, from *Cajanus cajan*, coll. *M. R. Ghosh.*

XXVI. Genus **Metopolophium** Mordvilko

Key to the species

Apterous ovipara :

Antennae shorter than body, p.t. about 2.16 × the base of last antennal segment ; siphunculi about 0.14 × the body and about 2.0 × the cauda .	*chandrani* (David and Narayanan)
Antennae much longer than body ; p.t. about 5.47 × the base of last antennal segment ; siphunculi about 0.31 × the body and about 2.50 × the cauda	*rubi* (Narzikulov)

42. **Metopolophium chandrani** (David and Narayanan)

Acyrthosiphon (*Metopolophium*) *chandrani* David and Narayanan, 1968, *Bull. Ent.*, **9** : 102.

Acyrthosiphon (*Metopolophium*) *chandrani* : David, Narayanan and Rajasingh, 1971, *Madras agric. J.*, **58** : 373.

Material : 2 apterous oviparous ♀ ♀, INDIA : Himachal Pradesh : Simla, 10. xi. 1968 from wild rose, coll. *K. Narayanan.*

43. **Metopolophium rubi** (Narzikulov)

Acyrthosiphon rubi Narzikulov, 1957, *Ent. Oborz.*, **36** : 673.

Acyrthosiphon rubi elliptici Stroyan and Nagaich, 1964, *Proc. R. ent. Soc. Lond.* (B), **33** : 60.

Material : 1 apterous oviparous ♀, INDIA : Uttar Pradesh : Chaubatiya, xi. 1957, from *Rubus ellipticus*, coll. *B. Nagaich.*

XXVII. Genus **Micromyzus** van der Goot

Key to the species

Apterous ovipara :

F.T.C. 3.3.2. ; antennae shorter than body (0.87 ×), p.t. shorter than segment III ; u.r.s. about 1.26×the h.t.2 and bears 2 secondary hairs ; tibiae little swollen than other tibiae and bear 20-25 pseudosensoria	*kalimpongensis* Basu
F.T.C. 3.3.3. ; antennae as long as to longer than body, p.t. as long as segment III ; u.r.s. nearly equal to h.t.2 and bears 4 secondary hairs ; hind tibiae twice as thick as other tibiae bearing 78-80 round to oval pseudosensoria	*mawphlongensis* Ghosh

Alate male :

F.T.C. 3.3.2. ; antennae much shorter than body, segment III with 24-38, IV with 18-25 and V with 7-11 protuberant secondary rhinaria arranged irregularly along the entire length ; u.r.s. about 1.23-1.37×h.t.2 and bears 2 secondary hairs	*kalimpongensis* Basu
F.T.C. 3.3.3 ; antennae longer than body, segment III with 35-42, IV with 23-30 and V with 11-15 protuberant secondary rhinaria ; u.r.s. as long as to little longer than h.t.2 and bears 4 secondary hairs	*mawphlongensis* Ghosh

44. **Micromyzus kalimpongensis** Basu

Micromyzus kalimpongensis Basu, 1967, *Bull. Ent.*, **8** : 11.

Micromyzus kalimpongensis : Mondal , P. K., Agarwala, B. K. and Raychaudhuri, D. N. 1978, *Entomon*, **3** : 107.

Material : 1 apterous oviparous ♀ and 17 alate ♂ ♂, INDIA : Sikkim : Ringen, 9. xi. 1974, from *Elettaria cardamomum*. coll. *P. K. Mondal* ; 1 apterous oviparous ♀ and 11 alate ♂ ♂, Damthang, 23. x. 1975, from orchids, coll. *P. K. Mondal.*

45. **Micromyzus mawphlongensis** Ghosh

Micromyzus mawphlongensis Ghosh, 1974, *Oriental Ins.*, **8** : 163.

Material : 2 apterous oviparous ♀ ♀ and 4 alate ♂ ♂, INDIA : Meghalaya : Mawphlong : Khasi hills, 4. xi. 1972, from *Polypodium* sp., coll. *A. K. Ghosh.*

46. **Micromyzus** sp.

Micromyzus sp. : Basu, R. C., Ghosh, A. K. and Raychaudhuri, D. N., 1970, *Proc. zool. Soc. Calcutta*, **23** : 83.

Material : 2 apterous oviparous ♀ ♀, INDIA : Meghalaya : Cherrapunji, 20. xii. 1968, from *Symplocos* sp., coll. *R. Basu.*

Note : Because of the damaged condition of the specimens those could not be identified up to species level.

XXVIII. Genus **Myzus** Passerini

Key to the species

Alate male :

1.	Siphunculi clavate ; p.t. as long as to longer than segment III and 3.20-3.50 × the base of last antennal segment, antennae about 1.10-1.30 × the body	*persicae* (Sulzer)
	Siphunculi cylindrical ; p.t. much shorter than segment III	2
2.	Siphunculi 0.15 × the body and about 2.30 × the cauda ; antenna longer than body ; p.t. 2.75 × the base of last antennal segment, segment III with 53-57, IV with 22-23 and V with 14-16 secondary rhinaria	*ornatus* Laing
	Siphunculi 0.07-0.09 × the body and 1.20-1.70 × the cauda ; antennae about as long as body, p.t. 4.0-4.30 × the base of last antennal segment, segment III with 33-50 IV with 31-36 and V with 8-14 secondary rhinaria	*brevisiphon* Basu

47. **Myzus brevisiphon** Basu

Myzus brevisiphon Basu, 1969, *Oriental Ins.*, 3 : 180.

Myzus brevisiphon : Chakrabarti, S., Ghosh, A. K. and Raychaudhuri, D. N., 1972, *Curr. Sci.*, **41** : 70.

Myzus brevisiphon : Ghosh, A. K., 1974, *Oriental Ins.*, **8** : 170.

Myzus brevisiphon : Chakrabarti, S. and Raychaudhuri, D. N., 1975, *Oriental Ins.*, **9** : 204.

Myzus brevisiphon : Basu, R. C. and Raychaudhuri, D. N., 1976, *Oriental Ins.*, **10** : 98.

Material : 2 alate ♂ ♂, INDIA : Uttar Pradesh : Beluni, 17. x. 1970, from *Rhododendron campylocarpum*, coll. *S. Chakrabarti* ; 4 alate ♂ ♂, Meghalaya : Shillong, 5. v. 1972, from *Polygonum* sp., coll., *A. K. Ghosh* ; 2 alate ♂ ♂, Meghalaya : Shillong, 25. x. 1972, from *Polygonum* sp. coll. *S. Biswas.*

48. **Myzus ornatus** Laing

Myzus ornatus Laing, 1932, *Ent. Mon. Mag.*, **68** : 52.

Myzus ornatus : Chakrabarti, S., Ghosh, A. K. and Raychaudhuri, D. N., 1972, *Curr. Sci.*, **41** : 70.

Myzus ornatus : Chakrabarti, S. and Raychaudhuri, D. N., 1975, *Oriental Ins.*, **9** : 204.

Myzus ornatus : Basu, R. C. and Raychaudhuri, D. N., 1976, *Oriental Ins.*, **10** : 107.

Material : 1 alate ♂, INDIA : Uttar Pradesh : Sundardonga, 16. x. 1970 from *Fragaria nilgerriensis*, coll. *S. Chakrabarti.*

49. **Myzus persicae** (Sulzer)

Aphis persicae Sulzer, 1776, *Abgekurz Gesch der Ins.*, 105.

Myzus persicae (Sulzer) : Ghosh, A. K. and Raychaudhuri, D. N. 1962, *Sci., & Cult.*, **28** : 539,

Myzus persicae : Ghosh, L. K , 1969, *Sci. & Cult.* **35** : 493.

Myzus persicae : Basu, R. C. and Raychaudhuri, D. N., 1976, *Oriental Ins.*, **10** : 107.

Material : 2 alate ♂ ♂, INDIA : Delhi, 8. i. 1961, from *Solanum persicum*, coll. *M. K. Mookerjii* ; 1 alate ♂, Uttar Pradesh : Nainital, iii. 1968, from *Silene conoidea*, coll. *L. K. Ghosh* ; 2 alate ♂ ♂, Meghalaya : Shillong, 29. xii. 1968, 5. i. 1969 from *Prunus persica.* and in Y.P.T. respectively, coll. *R. Basu* ; 1 alate ♂, Uttar Pradesh : Beluni, 17. x. 1970, from *Rhododendron campylocarpum*, coll. *S. Chakrabarti.*

XXIX. Genus **Neoacyrthosiphon** Tao

50. **Neoacyrthosiphon (Pseudoacyrthosiphon) takahashii** Ghosh

Neoacyrthosiphon (*Pseudoacyrthosiphon*) *takahashii* Ghosh, A. K., 1969, *Proc. zool. Soc. Calcutta*, **22** : 121.

Neoacyrthosiphon (*Pseudoacyrthosiphon*) *takahashii* : Chakrabarti, S., Ghosh, A. K. and Raychaudhuri, D. N., 1972, *Curr. Sci.*, **41** : 70.

Neoacyrthosiphon (*Pseudoacyrthosiphon*) *takahashii* : Chakrabarti, S. and Raychaudhuri, D. N., 1975, *Oriental Ins.*, **9** : 205.

Material : Many apterous oviparous ♀ ♀ and 2 alate ♂ ♂, INDIA : Uttar Pradesh : Almora : Beluni, 17. x. 1970, from *Rhododendron campylocarpum*, coll. *S. Chakrabarti.*

XXX. Genus **Pentalonia** Coquerell.

51. **Pentalonia nigronervosa** Coquerell

Pentalonia nigronervosa Coquerell, 1859, *Ann. Soc. Ent. France*, **3** ; 260.

Pentalonia nigronervosa : Bhanotar and Ghosh, L. K., 1969, *Curr. Sci.*, **38** : 74.

Pentalonia nigronervosa : Bhanotar and Ghosh, L. K., 1969, *Bull. Ent.*, **10** : 97.

Material : 1 apterous oviparous ♀, INDIA : West Bengal : Rautara, 17. xii. 1967, from *Curcuma domestica*, coll. *L. K. Ghosh.*

XXXI. Genus **Perillaphis** Takahashi

52. **Perillaphis perillae** (Shinji)

Macrosiphum perillae Shinji 1924, *Zool. Mag.*, **36** : 363.

Aulacorthum (*Perillaphis*) *perillae* (Shinji) : Ghosh, A. K., Ghosh, M. R., and Raychaudhuri, D. N., 1972, *Oriental Ins.*, **6** : 335.

Aulacorthum (*Perillaphis*) *perillae* : Chakrabarti, S,, Chowdhuri, A. N. and Raychaudhuri, D. N., 1974, *Sci. & Cult.*, **40** : 461.

Material : 3 apterous oviparous ♀ ♀, INDIA : Meghalaya : Umpling, 10. xii. 1970, from an unidentified plant of Verbenaceae, coll. *S. Sarkar* ; 5 apterous oviparous ♀ ♀ and 1 alate ♂, West Bengal : Mongbul, 14. xii. 1970, from *Perilla* sp., coll. *M. R. Ghosh* ; 12 apterous oviparous ♀ ♀, and 2 alate ♂ ♂ Uttar Pradesh : Almora, 17. x. 1970, from *Rhododendron campylocarpum*, coll. *S. Chakrabarti.*

XXXII. Genus **Rhopalosiphoninus** Baker

53. **Rhopalosiphoninus longisetosa** Chakrabarti and Ghosh

Rhopalosiphoninus longisetosa Chakrabarti and Ghosh : Chakrabarti, S., Ghosh, A. K. and Raychaudhuri, D. N., 1974, *Oriental Ins* **8** : 528.

Material : 15 apterous oviparous ♀ ♀ and 1 alate ♂, INDIA : Himachal Pradesh : Simla : Jakoo Hills, 2. xii. 1970, from unidentified plant, coll. *A. N. Chowdhuri.*

XXXIII. Genus **Rhopalosiphum** Koch

Key to the species

Apterous ovipara :

1. Processus terminalis about 4.50-5.50 × base of last antennal segment ; u.r.s. slightly shorter to nearly as long as h.t.2 ; siphunculi about 0.08-0.09 × body and about 2.10 × the maximum width ; cauda nearly as long as siphunculi and with 4 hairs ; subgenital plate with 8 hairs — *padi* (Linnaeus)

   Processus terminalis about 1.56-3.20 × the base of last antennal segment ; subgenital plate with not less than 10 hairs — 2

2. Processus terminalis 1.56 × the base of last antennal segment ; u.r.s. about 0.69 × h.t.2 ; siphunculi 0.07 × the body and 2.20 × its maximum width ; cauda 1.18 × siphunculi and with 5 hairs ; subgenital plate with 15 hairs , — *maidis* (Fitch)

   Processus terminalis abont 2.60-3.20 × the base of last antennal segment ; u.r.s. 1.0-1.20 × h.t.2 ; siphunculi with a basal stem and a distal swollen portion, about 0.16-0.20 × the body and 3.75-4.50 × its maximum width; cauda about 0.40-0.60 × siphunculi and with 5-6 hairs ; subgenital plate with 30-38 hairs — *nymphaeae* (Linnaeus)

Alate male :

Antennae usually 6-segmented ; p.t. 3.40-4.40 × the base of last antennal segment ; segment III with 29-40, IV with 11-20 and V with 9-16 secondary rhinaria ; siphunculi with basal cylindrical stem and a distal portion, about 0.13-0.16 × the body — *nymphaeae* (Linnaeus)

Antennae 5-segmented; p.t. 6.25 × the base of last antennal segment; segment III with 52-54, IV with 14-15 and V with 2-3 secondary rhinaria; siphunculi cylindrical, roughly imbricated, about 0.10 × the body	*rufiabdominalis* (Sasaki)

54. **Rhopalosiphum maidis** (Fitch)

Aphis maidis Fitch, 1856, *Trans. New York Agr. Soc.*, **15** : 531.

Rhopalosiphum maidis (Fitch) : Menon and Ghai, 1969, *Oriental Ins.* **3** : 383.

Material : 1 apterous oviparous ♀, INDIA : Delhi, 2. xi 1965, from *Triticum vulgare*, coll. *M. G. R. Menon.*

55. **Rhopalosiphum nymphaeae** (Linnaeus)

Aphis nymphaeae Linnaeus 1781, *Fauna Suecica*, **2** : 260.

Rhopalosiphum nymphaeae (Linnaeus) : David, 1958, *J. Bombay nat. Hist. Soc.*, **55** : 114.

Rhopalosiphum nymphaeae : Ghosh, A. K., Basu, R. C. and Raychaudhuri, D. N. 1970, *Oriental Ins.*, **4** : 72.

Rhopalosiphum nymphaeae : Basu, R. C., Ghosh. A. K. and Raychaudhuri, D. N. 1970, *Proc. zool. Soc. Calcutta*, **23** : 88.

Rhopalosiphum nymphaeae : David, Narayanan and Rajasingh, 1971, *Madras agric. J.*, **58** : 372.

Material : 3 apterous oviparous ♀ ♀ and 3 alate ♂ ♂, INDIA : Meghalaya : Shillong, 12. xii. 1968, from *Prunus* sp., coll. *R. Basu* ; sp. 1 alate ♂, Coimbatore, I. 1958, from *Eichhornia crassipes*, coll. *S. K. David* ; 1 alate ♂, Jammu and Kashmir : Srinagar : 5. xi. 1968 from *Rosa* sp. coll. *K. Narayanan* ; 2 alate ♂ ♂ ; Meghalaya : Shillong, 29. xii. 1968 from *Curcuma longa* and *Prunus persica*, coll. *R. Basu* ; 1 alate ♂ Nagaland : Nagarjan, 8. xi. 1969, from *Prunus domestica*, coll *H. Banerjee* ; 1 alate ♂, Meghalaya : Dawki, 28. xi, 1970, from an unidentified plant, coll. *S. Sarkar* ; 1 alate ♂, Meghalaya : Dawki, 30. xii. 1968, from *Fleurya* sp., coll. *S. Sarkar.*

Apterous ovipara : Body pale, rather short, 1.20 - 1.40 mm long with 0.80 - 0.90 mm as maximum width. Antennae 6 - segmented, often segmentation between segments III and IV inconspicuous, about 0.60 - 0.80 × the body ; p.t. about 2.60 - 3.20 × the base of last antennal

segment ; rostrum reaching beyond hind coxae, u.r.s. 1.10-1.20 × h.t. 2. Dorsum of abdomen pale. Siphunculi with a basal cylindrical stem and distal clavate portion, about 0.16 - 0.20 × the body and 1.6 - 2.5 × the cauda which bears 5-6 hairs. Hind tibiae much swollen with numerous pseudosensoria. Otherwise as in apterae viviparae.

Measurements of one specimen in mm : Length of body 1.25, width 0.83 ; antenna 0.82, segments III:IV:V:VI 0.17 : 0.11 : 0.12 ; (0.08+ 0.23) ; u.r.s. 0.11 ; h.t.2 0.09 ; siphunculus 0.21 ; cauda 0.11.

Alate male : Body rather dark, about 1.50-1.90 mm long with 0.60-0.80 mm as maximum width. Antennae 6-segmented, about 0.07-0.09 × the body ; p.t. about 3.40-4.40 × the base of last antennal segment, 29-40 secondary rhinaria distributed on segment III, 11-20 on segment IV and 9-16 on segment V Rostrun reaching beyond mid coxae, u.r.s. 1.20-1.40 × h.t.2. Dorsum of abdomen well pigmented and with marginal dark patches. Siphunculi dark, smooth, with a basal cylindrical stem and distal clavate portion, about 0.13-0.16 × the body and 2.10-2.60 × the cauda bearing 4-6 hairs. Otherwise as in alate viviparae.

Measurements of one specimen in mm : length of body 1.56, width 0.62 ; antenna 1.39, segments III:IV:V:VI 0.30:0.21:0.19: (0.10+0.42) ; u.r.s. 0.13 ; h.t.2 0.10 ; siphunculus 0.23 ; cauda 0.09.

Note : Descriptions of the apterous oviparae and alate males were not provided while reporting the sexual forms of the species from India by the different authors. So the descriptions of these morphs are now provided here.

56. **Rhopalosiphum padi** (Linnaeus)

Aphis padi Linnaeus, 1758, *Syst. Nat.* (10th ed.) : 451.

Material : 2 apterous oviparous ♀ ♀, INDIA : Meghalaya : Shillong, 12. xii. 1968, from *Prunus* sp., coll. *R. Basu.*

Apterous ovipara ; Body pale brown about 1.24-1.50 mm long with 1.02 mm as the maximum width. Head brown. Antennae usually 6 - segmented, but sometimes segmentation between segments III and IV indistinct and then appearing as 5 segmented, about 0.78 - 0.90 × the body ; p.t. about 4.50 - 5.50 × the base of last antennal segment. Ultimate rostral segment slightly shorter than to nearly as long as h.t.2.

Dorsum of abdomen rather pale. Siphunculi brown, cylindrical, imbricated, about 0.08 - 0.09 × the body, nearly as long as short cauda with spinular imbrications and bearing 4 hairs. Hind tibiae swollen with 5 - 6 round pseudosensoria. Otherwise as in apterae viviparae.

Measurements of one specimen in mm : Length of body 1.50, width 1.02 ; antenna 1.35, segments III:IV:V:VI 0.25 : 0.20: 0.19: (0.09+0.49) ; u.r.s. 0.10 ; h.t. 2 0.10 siphunculus 0.13 ; cauda 0.13.

Note : Oviparous morph of this species is reported for the first time from India.

57. **Rhopalosiphum rufiabdominalis** (Sasaki)

Toxoptera rufiabdominalis Sasaki, 1839, *Rept. Hokkaido Agr. Exp. Sta.*, **17** : 202

Material : 1 alate ♂, INDIA : Meghalaya : Muflong, 28, i. 1970, from *Pyrus communis*, coll. *S. Sarkar.*

Alate male : Body 1.75 mm long as the maximum width. Head dark brown with weakly developed lateral frontal tubercles. Antennae 5 - segmented, about 0.84 × body, dark brown ; segment III with 50-52, segment IV with with 13 - 15 and segment V with 2 - 3 (near base) secondary rhinaria ; p.t. about 6.25 × the base of last antennal segment. Rostrum reaching beyond mid coxae ; u.r.s. about 1.27 × h.t.2. Dorsum of abdomen pale with maginal segmental dark sclerotic patches and transverse brownish bands on tergites 7 and 8. Siphunculi cylindrical, roughly imbricated, about 0.10 × body and 1.50 × the cauda bearing 5 hairs. Otherwise as in alate viviparae.

Measurements of the specimen in mm : Length of body 1.75, width 0.85 ; antenna 1.48, segments III:IV:V: 0·50 : 0.28 : (0.08+0.50) ; u.r.s. 0.12 ; h.t.2 0.09 ; siphunculus 0.17 ; cauda 0.12.

Note : Alate male of this species is reported for the first time from India.

XXXIV. Genus **Schizaphis** Borner

58. **Schizaphis ? punjabipyri** (Das)

Toxoptera punjabipyri Das, 1918, *Mem. Indian Mus.*, **6** : 198.

Schizaphis ? rotundiventris (Signoret) : (*mis. det.*) Ghosh, A. K., Basu, R. C., and Raychaudhuri, D. N., 1969, *Oriental Ins.*, **4** : 72.

Material : 3 alate ♂♂, INDIA : Meghalaya : Shillong, 24. xii. 1968, 25. xii. 1968 and 12. i. 1969 in Y.P.T., coll. *R. Basu*; 2 alate ♂♂ West Bengal : Kalimpong, 17. xii. 1970, from *Pyrus communis*, coll. *M. R. Ghosh.*

Alate male : Body about 1.60 - 1.75 mm long with 0.57 - 0.70 mm as maximum width. Head dark brownish. Antennae dark brown, 6-segmented, about 0.90 × to as long as body ; segment III with 28 - 37, IV with 18 - 27 and V with 15 - 25 secondary rhinaria distributed irregularly over entire length of the segment ; p.t. about 5.0 - 6.0 × the base of last antennal segment Rostrum reaching mid coxae, u.r.s. about 1.10 - 1.25 × h.t.2. Dorsum of abdomen pale with brown marginal sclerites on segments 2-6 and transverse sclerotic bands on tergite 7 and 8 besides some scattered sclerotic patches. Siphunculi dark, cylindrical, about 0.13 - 0.15 × body, about 2.50 - 3.0 × the dark cauda bearing 4 - 6 hairs. Otherwise as in alate viviparae.

Measurements of one specimen in mm : Length of body 1.76, width 0.57 ; antenna 1.76, segments III:IV:V:VI 0.45:0.27:0.25: (0.11+0.59) ; u.r.s. 0.10 ; h.t.2. 0.08 ; siphunculus 0.24 ; cauda 0.08.

Note : The alate males approach to *punjabipyri* but authentic material of the same could not be obtained for comparison. So the specimens are presently reported as *punjabipyri* with a query mark.

XXXV Genus **Semiaphis** van der Goot

59. **Semiaphis heraclei** (Takahashi)

Brachycolus heraclei Takahashi, 1921, *Aphididae of Formosa, pt.* 1 : 60.

Semiaphis ? *heraclei* (Takahashi) : Basu, R. C., Ghosh, A. K, and Raychaudhuri, D, N., 1970, *Proc. zool. Soc. Calcutta*, **23** : 88.

Material : apterous oviparous ♀, INDIA : Meghalaya : Shillong, 17. xii. 1968, from an unidentified plant of Rosaceae, coll. *R. Basu.*

Apterous ovipara : Body pale, 1.40 mm long with 0.79 mm as maximum width. Head smooth, almost flat. Antennae 6 -segmented about 0.60 × the body ; flagellar hairs minute and very sparse ; p.t. about 2.50 × as long as the base of last antennal segment. Rostrum reaching mid coxae. u.r.s. short and blunt, about 0.75 × h.t.2. Dorsum of abdomen pale, dorsal abdominal hairs very short and scanty. Siphunculi very short, a little less than 2.0 × its basal width, about

0.035 × the body and 0.55 × the cauda bearing 6 - 7 hairs. Hind tibiae swollen with numerous pseudosensoria. Otherwise as in apterae viviparae.

Measurements of the specimen in mm : Length of body 1.40, width 0.79 ; antenna 0.83, segments III:IV:V:VI 0.18 : 0.12 : 0.12 : (0.08+ 0.19) ; u.r.s. 0 .07 ; h.t.2 0.09 ; siphunculus 0.05 ; cauda 0.09.

Note : Basu, R. C., Ghosh, A. K. and Raychaudhuri, D. N. (1970) reported the oviparous female of this species with a query mark. Re-examination of the material reveals it as *heraclei* and a short description for the same is provided here.

XXXVI. Genus **Shinjia** Takahashi

60. **Shinjia pteridifoliae** (Shinji)

Microtarsus pteridifoliae Shinji, 1929. *Lansania*, **1** : 44.

Shinjia pteridifoliae (Shinji) : Basu, R. C., Ghosh, A. K. and Raychaudhuri, D. N., 1970, *Proc. zool. Soc. Calcutta*, **23** : 88

Material : 15 apterous oviparous ♀ ♀, INDIA : Meghalaya : Shillong, 4. i. 1969, from an unidentified fern, coll. *R. Basu* ; 1 alate ♂, Meghalaya : Shillong, 31 xii. 1968, from *Sauravia* sp., coll. *R. Basu.*

Apterous ovipara : Body pale, about 1.30-1.40 mm long with 0.70-0.80 mm as maximum width. Head smooth with very low diverging lateral frontal tubercles. Antennae 6 - segmented, brownish with basal two segments pale, about 1.20-1.30 × the body ; p.t. 6.50-7.50 × the base of last antennal segment. Rostrum reaching beyond mid coxae, u.r.s. obtuse, about 0.12 mm long. Hairs on head, dorsum of abdomen and antennae with acute to acuminate apices and about 4 - 7 μ long. Siphunculi rather short, very weakly clavate, about 0.20 × the body and 3.0 × the cauda bearing only 4 - 5 hairs. Hind tibiae swollen with numerous pseudosensoria. Otherwise as in apterae viviparae.

Measurements of one specimen in mm : Length of body 1.39, width 0.73 ; antenna 1.75, segments III:IV:V:VI 0.34 : 0.23 : 0.23 : (0.11+ 0.72) ; u.r.s. 012 ; siphunculus 0.28 ; cauda 0.09

Alate male : Body 1.50 mm long with 0.66 mm as maximum width. Head light brownish, smooth, almost flat. Antennae brownish, about 1.25 × the body ; flagellar hairs inconspicuous, segment III with 30-35, IV with 18 - 20 and V with 9 - 12 secondary rhinaria, p.t. about

6.50 × the base of last antennal segment. Rostrum reaching nearly hind coxae, u.r.s. rather long about 0.14 mm long. Dorsum of abdomen with pale brownish patches marginally on each segment, a central patch on tergites 3 - 4 and a transverse band on tergite 8. Siphunculi brownish, cylindrical to weakly clavate, about 0.16 × the body and about 3.0 × the cauda bearing 5 hairs. Otherwise as in alate viviparae.

Measurements of the specimen in mm : Length of body 1.50, width 0.66 ; antenna 1.98, segments III:IV:V:VI 0.44 : 0.27 : 0.27 (0.11+ 0.72) ; u.r.s. 0.14 : siphunculus 0.24 ; cauda 0.08.

Note : Basu, R.C., Ghosh, A. K. and Raychaudhuri, D.N. (1970) reported the apterous oviparous female and alate male of the species without any description for the morphs and these are now provided here.

XXXVII. Genus **Tricaudatus** Narzikulov

61. **Tricaudatus polygoni** (Narzikulov)

Rhopalosiphoninus polygoni Narzikulov, 1953, *Izv. otd. Estestv. Nauk A. N. Tadz.* SSR, **4** : 62.

Tricaudatus polygoni tuberculatus Hille Ris Lambers and Basu, 1966, *Ent. Bericht.*, **26** : 28.

Tricaudatus polygoni (Narzikulov) : Chakrabarti, S. and Raychaudhuri, D, N. 1975, *Oriental Ins.*, **9** : 207.

Material : 3 apterous oviparous ♀ ♀, INDIA : West Bengal : Darjeeling, 6.i.1958, from *Spiraea corymbosa*, coll. *S. Das* ; 1 alate ♂, Uttar Pradesh : Almora, 17. x. 1970 from *Potentilla mooniana*, coll. *S. Chakrabarti.*

XXXVIII. Genus **Trichosiphonaphis** Takahashi

62. **Trichosiphonaphis polygoni** (van der Goot)

Phorodon polygoni van der Goot, 1917, *Contrib. Faune Indes. Neerl.*, **1**(3) : 44.

Metaphorodon polygoni (van der Goot) : Chakrabarti, S., Ghosh, A. K. and Raychaudhuri, D. N., 1972, *Curr. Sci.* **41** : 70.

Trichosiphonaphis polygoni (van der Goot) :Chakrabarti, S., and Raychaudhuri, D. N., 1975, *Oriental Ins.*, **9** : 207.

Material : 1 alate ♂, INDIA : Uttar Pradesh : Almora : Sundardhunga, 16. x. 1970, from *Fragaria nilgerrensis*, coll. *S. Chakrabarti* ; 1 alate ♂, Uttar Pradesh : Almora : Beluni, 17. x. 1970, from *Potentilla mooniana*, coll. *S. Chakrabarti*.

XXXIX. Genus **Uroleucon** Mordvilko

63. **Uroleucon longisetosus** Chakrabarti and Verma

Uroleucon longisetosus Chakrabarti and Verma, 1975, *Oriental Ins.*, **9** : 169.

Dactynotus formosanus Takahashi : (*mis det.*) Chakrabarti, S., Ghosh, A.K. and Raychaudhuri, D. N., 1972, *Curr. Sci.*, **41** : 70.

Material : 1 apterous oviparous ♀, INDIA : Uttar Pradesh : Almora, 14. x. 1970. from *Lactuca hastata*, coll. *S. Chakrabarti* ; 2 apterous oviparous ♀ ♀ and 1 alatoid ♂, Himachal Pradesh : 29. x. 1968, from *Prenanthes bruniana*, coll. *A. N. Chowdhuri*.

Subfamily CALLAPHIDINAE

XL. Genus **Chromaphis** Walker

64. **Chromaphis hirsutatibis** Kumar and Lavigne

Chromaphis hirsutatibis Kumar and Lavigne, 1970, *Pan. Pac. Entomol.*, **46** : 123.

Material : 3 apterous oviparous ♀ ♀, INDIA : Uttar Pradesh : Bhowali, 24. v. 1969, from *Aleurites moluccana*, coll. *S. Chakrabarti* ; 1 alate ♂, Uttar Pradesh : Almora : Nainital, 23. v. 1969 in Y.P.T., coll. *S. Chakrabarti*.

Apterous ovipara : Body pale, about 1.45-1.62 mm long with 0.70 mm as maximum width. Eyes with distinct occular tubercles. Antennae about 0.30-0.33 × the body ; hairs on antennae rather short, longest one on segment III about 0.50 × the basal diameter of the segment ; p.t. about 0.30 - 0.40 × the base of last antennal segment ; ultimate rostral segment about 0.60 - 0.64 × h.t.2. Dorsum of abdomen pale ; hairs on anterior tergite short and sparse, about 0.16 × the basal diameter of antennal segment III ; each of the abdominal tergites 1 - 7 with paired lateral tubercles each bearing 2 - 3 hairs with spatulate apices, longest of these about 1.50 × the basal diameter of segment III. Siphunculi short, truncate with an apical flange, Hind tibiae somewhat swollen and bear numerous pseudosensoria. Otherwise as in apterous viviparae.

Measurements of one specimen in mm : Length of body 1.45, width 0.70 ; antenna 0.42, segments III:IV:V:VI 0.18 : 0.09 : 0.08 (0.07+ 0.02) ; u.r.s. 0.06 ; h.t.2 0.10 ; siphunculus 0.06.

Alate male : Body 1.60 mm long with 0.98 mm as maximum width. Head dark brown, Antennae about 0.73 × the body, longest hair on segment III about 0.75 × the basal diameter of the segment ; segment III with 31, IV with 5-6 and V with 3 secondary rhinaria ; p.t. about 0.44 × the base of last antennal segment. Abdominal dorsum with distinct, brown paired marginal hair-bearing sclerites on segments 1-5, but on tergites 7 and 8 these appear paler and smallar and with small, paired spinal sclerites on tergites 1 - 3, those on tergites 4, 5, 7, and 8 appear as narrow median band, Siphunculi truncate, shorter than oviparae. Otherwise an in alate viviparae.

Measurements of the alate male in mm : Length of body 1.61, width 0.98 ; antenna 1.18, segments III:IV:V:VI 0.50 : 0.24: 0.23 : (0.09+0.04) ; u.r.s. 0.08 ; h.t.2 0.10 ; siphunculus 0.03.

Note : Sexual morphs of this species reported for the first time from India.

XLI. Genus **Myzocallis** Passerini

65. **Myzocallis polychaetus** David.

Myzocallis (*Dryomyzus*) *polychaetus* David, 1969, *Oriental Ins.*, **3** : 79.

Myzocallis polychaetus David : Chakrabarti, S. and Raychaudhuri, D. N., 1974, *Indian J. Ent.*, **36** : 129.

Material : 30 apterous oviparous ♀ ♀ and 4 alate ♂ ♂, INDIA : Himachal Pradesh : Khadrala, 29.xi 1968, from *Quercus dealbata*, coll. *A. N. Chowdhuri.*

XLII. Genus **Shivaphis** Das

66. **Shivaphis bambusicola** (David, Rajasingh and Narayanan)

Cranaphis bambusicola David, Rajasingh and Narayanan, 1970, *Oriental Ins.*, **4** ; 408.

Material : 1 apterous oviparous ♀, INDIA : West Bengal : Darjeeling, 14.xi. 1968, from *Bambusa* sp., coll. *S. G. Rajasingh.*

XLIII. Genus **Taoia** Quednau

67. **Taoia indica** (Ghosh and Raychaudhuri)

Euceraphis indica Ghosh and Raychaudhuri, 1972, *Oriental Ins.*, **6** : 373.

Euceraphis chuansinensis Tao : Ghosh, A. K., Ghosh, M. R. and Raychaudhuri, D. N., 1971, *Oriental Ins.*, **5** : 211.

Material 1 apterous ♀, INDIA : West Bengal : Mongpu, 23. xii. 1969, from *Betula alnoides*, coll. *M. R. Ghosh* ; 1 alatoid ♂, Meghalaya : Shillong, 24. vii. 1970, from *Alnus nepalensis*, coll. *S. Sarkar* ; 2 alatoid ♂ ♂, West Bengal ; Durbin, 15. xii. 1970 from *Alnus nepalensis*, coll. *M. R. Ghosh* ; 1 alatoid ♂, Sikkim : Gangtok, 23. xii. 1970, from *Betula alnoides*, coll. *M. R. Ghosh* ; 1 alatoid ♂, West Bengal : Mongbul, 13. iv. 1971 from *Alnus nepalensis*, coll. *M. R. Ghosh.*

Note : Ghosh, A. K. and Raychaudhuri, D. N. (1972) reported the sexuales of this species as apterous male. Re-examination of the material reveals that there is the trace of wing bud on both the sides of the material. So the same is now considered as alatoid male.

XLIV Genus **Tinocallis** Matsumura

Key to the species

Apterous ovipara :

Antennae about 0.80 × the body ; p.t. as long as the base of segment VI and about 0.31 × segment III	*distincta* Ghosh, Ghosh and Raychaudhuri
Antennae about 0.90 × to as long as body ; p.t. longer than the base of segment VI and about 0.50 × segment III	*himalayansis* Ghosh, Ghosh and Raychaudhuri

68. **Tinocallis distincta** Ghosh, Ghosh and Raychaudhuri

Tinocallis distincta Ghosh, Ghosh and Raychaudhuri, 1970, *Oriental Ins.*, **4** : 389.

Tinocallis distincta : Ghosh, A. K., Ghosh, M. R. and Raychaudhuri, D. N., 1972, *Oriental Ins.*, **6** : 339.

Material : 1 apterous oviparous ♀, INDIA : West Bengal : Kalimpong, 20. i. 1969, from an unidentified plant of Leguminosae, coll. *M. R. Ghosh.* 3 alate ♂ ♂, West Bengal : Kalimpong, 16. xi 1970, from an unidentified plant of Leguminosae, coll. *M. R. Ghosh.*

69. **Tinocallis himalayansis** Ghosh, Ghosh and Raychaudhuri

Tinocallis himalayansis Ghosh, Ghosh and Raychaudhuri, 1971, *Oriental Ins.*, 5 : 218.

Material: 3 apterous oviparous ♀ ♀, INDIA : West Bengal : Kalimpong, 26. xii. 1969, from and unidentified plant of Leguminosae, coll. *M. R. Ghosh.*

XLV. Genus **Tinocalloides** Basu

70. **Tinocalloides montanus** Basu

Tinocalloides montanus Basu, 1969, *Oriental Ins.*, 3 : 367.

Tuberodefectus eastopi Kumar and Levigne, 1970, *Pan Pacific Entomologist*, 46 : 120.

Tinocalloides montanus Basu : Ghosh, M. R., Ghosh, A. K. and Raychaudhuri, D. N., 1971, *Proc. zool. Soc. Calcutta*, 24 : 50.

Material; 4 apterous oviparous ♀ ♀ and 1 alate ♂, INDIA : West Bengal : Darjeeling : Kalimpong, 29. i. 1965 and 23. xii. 1966, from *Prunus cerasus*. coll. *A. N. Basu*; 2 alate ♂ ♂, Himachal Pradesh : Simla, 23. xii. 1966, from *Purnus* sp., coll. *R. Kumar*; 1 alate ♂, Sikkim : Gangtok, 26. xii. 1969, from an unidentified plant, coll. *M. R. Ghosh.*

Subfamily CHAITOPHORINAE

XLVI. Genus **Periphyllus** van der Hoeven

Key to the species

Apterous ovipara :

Processus terminalis about 3.6-5.3 × base of the last antennal segment ; antennae about 0.8-1.04 × body ; longest hair on segment III about 6.8-7.5 × the basal diameter of the segment ; u.r.s. shorter than h.t.2 ; body about 3.3-3.97 mm long	*villosii* Chakrabarty
Processus terminalis about 1.5 × the base of last antennal segment ; antennae about 0.7 × the body ; longest hair on segment III about 3.5-4.5 × the basal diameter of the segment ; u.r.s. longer than h.t.2 ; body about 2.2-2.3 mm long	*aesculi* Hille Ris Lambers

71. **Periphyllus aesculi** Hille Ris Lambers

Periphyllus aesculi Hille Ris Lambers, 1923, *Stylops*, **2** : 200.

Periphyllus aesculi : Ghosh, L. K., 1976, *Newsl. zool. Surv. India*, **2** : 210.

Material : 4 apterous oviparous ♀ ♀, INDIA : Himachal Pradesh : Simla Hills, x. 1974, from *Aesculus* sp., coll. *L. K. Ghosh.*

72. **Periphyllus villosii** (Chakrabarti)

Chaitophorus villosii Chakrabarti, 1977, *Oriental Ins.*, **11** : 219.

Periphyllus vandenboschi Hille Ris Lambers : (*mis det.*) Chakrabarti, S., Ghosh, A. K. and Raychaudhuri, D. N., 1972, *Curr. Sci.*, **40** : 70.

Periphyllus viridis (Matsumura) : (*mis det.*) Chakrabarti, S. and Raychaudhuri, D. N., 1975, *Oriental Ins.*, **9** : 209.

Material : 5 apterous oviparous ♀ ♀, and 3 alate ♂ ♂, INDIA : Uttar Pradesh Almora : Dhauniadung, 15. x. 1970 from *Acer villosum*, coll. *S. Chakrabarti* ; 8 apterous viviparous ♀ ♀ and 1 alate ♂, Almora : Kathalia, 21. x. 1970, from *Acer villosum*, coll. *S. Chakravarti.*

Subfamily GREENIDEINAE

XLVII. Genus **Eutrichosiphum** Essig and Kuwana

73. **Eutrichosiphum quercifoliae** Raychaudhuri, Ghosh, Banerjee and Ghosh.

Eutrichosiphum quercifoliae : Raychaudhuri, D. N., Ghosh, M. R., Banerjee, M. and Ghosh, A. K., 1973, *Kontyu*, **41** : 57.

Material : 1 alate oviparous ♀, INDIA : West Bengal : Peshoke, 11. xii. 1970, from *Quercus* sp. , coll. *M. R. Ghosh.*

Note : Raychaudhuri, D. N., Ghosh, M. R., Banerjee, M. and Ghosh, A. K, (1973) reported the alate oviparous females but on page 57 of the publication the term alate oviparae has been misprinted as alate viviparae.

XLVIII. Genus **Greenidea** Schouteden

74. **Greenidea (Trichosiphum) anonae** (Pergande)

Trichosiphum anonae Pergande. 1906, *Ent. News Philadelphia*, **17** : 208.

Greenidea (*Trichosiphum*) *anonae* (Pergande) : Raychaudhuri, D. N., 1956, *Zool. Verhl.*, **31** : 50.

Material : 1 alate ♂, INDIA : Pusa, ii. 1934, from ? *Neicotiana tabacum.*

XLIX. Genus **Greenideoida** van der Goot

75. **Greenideoida ceyloniae** van der Goot

Greenideoida ceyloniae van der Goot, 1917, *Contrib. Faune Indes Neerl.*, **1** (3) : 141.

Greenideoida ceyloniae : Ghosh, A. K., 1976, *Oriental Ins.*, **10** : 43.

Material : 8 alate oviparous ♀ ♀ and 2 alate ♂ ♂, 6 alate nymph of oviparae, INDIA : Assam : Jorhat, 20. iii. 1974, from *Mesua ferrea*, coll. *D. Saharia.*

XLX. Genus **Mollitrichosiphum** Suenaga

76. **Mollitrichosiphum tenuicorpus** (Okajima)

Trichosiphum tenuicorpus Okajima, 1908, *Bull. Coll. Agric. Tokyo. Imp. Univ.*, **8** : 22.

Material : 1 alate oviparous ♀, INDIA : West Bengal ; Kalimpong, 16. iii. 1970, from an unidentified plant, coll. *M. R. Ghosh* ; 1 alate oviparous ♀, Meghalaya : Shillong, 21. ix. 1970, from *Measa indica*, coll. *S. Sarkar.*

Alate ovipara : Body about 3.09 mm long with the maximum width as 1.18 mm. Head pale brownish. Antennae 6 - segmented, about 0.60 × the body ; hairs on antennae long and fine, those on segment III about 3.20 - 4.50 × the basal diameter of the segment ; segment III with 13-15 large, round secondary rhinaria distributed irregularly over the entire length, p.t. about 1.50 × the base of last antennal segment. Rostrum reaching beyond mid coxae, segments 4 + 5 of rostrum about 1.30-1.60 × h.t.2. Dorsum of abdomen with pale brownish discontinuous patch medially besides brownish patches marginally. Siphunculi long, cylindrical about 0.55 - 0.57 × the body, covered with numerous fine hairs with spinulose apex and ill developed flange. Hind tibiae with stridulatory ridges but without pseudosensoria. Otherwise as in alate viviparae.

Measurements of one specimen in mm : Length of body 3.09, width 1.18 ; antenna 1.80, segments III :IV:V:VI 0.69: 0.25 : 0.25 (0.18+ 0.26) ; u.r.s. (4+5) 0.19 ; h.t.2 0.12 ; siphunculus 1.76.

Note : Sexual morph of this species is reported for the first time from India.

77. **Mollitrichosiphum (Metatrichosiphon) alni** Ghosh, Ghosh and Raychaudhuri

Mollitrichosiphum (*Metatrichosiphon*) *alni* Ghosh, Ghosh and Raychaudhuri 1970, *Oriental. Ins.*, **4** : 200.

Mollitrichosiphum (*Metatrichosiphon*) *alni* : Ghosh, M. R. Ghosh, A. K. and Raychaudhuri, D. N., 1971, *Proc. zool. Soc. Calcutta*, **24** : 167.

Mollitrichosiphum (*Metatrichosiphon*) *alni* : Mondal, P. K. and Raychaudhuri, D. N., 1977, *Sci. & Cult.*, **43** : 535.

Material : 3 alate oviparous ♀ ♀, INDIA : Sikkim : Gangtok, 23. xii. 1970, from *Alnus nepalensis*, coll. *M. R. Ghosh* ; 1 alate ♂, Gangtok, 16.xi. 1964, from *Alnus nepalensis*, coll. *P. K. Mondal.*

XLXI. Genes **Paratrichosiphum** Takahashi

78. **Paratrichosiphum** sp.

Paratrichosiphum sp. : Ghosh, A. K. and Raychaudhuri, D. N., 1971, *Sci. & Cult.*, **37** : 483.

Material : 2 alate oviparous ♀ ♀, INDIA : Arunachal : Mio, x. 1970, from *Styrax* sp., coll. *A. K. Ghosh* ; 11 alate ♂ ♂, West Bengal : Kalimpong, x. 1971 and i. 1971 in Y.P.T., coll. *M. R. Ghosh.*

Note : The material could not be identified upto species level. So the description as well as morphometric data for the same are not provided.

XLXII. Genus **Schoutedenia** Rubsaamen

79. **Schoudenia lutea** (van der Goot)

Setaphis lutea van der Goot, 1917, *Contrib. Faune Indes Neerl.*, **1** (3) ; 154.

Schoutedenia emblica andhraka David and Hille Ris Lambers, 1956, *Indian J. Ent.*, **18** : 43.

Schoutedenia emblica (Patel and Kulkarni) : David, 1958, *J. Bombay nat. Hist. Soc.*, **55** : 114.

Schoutedenia lutea (van der Goot) : Ghosh, A. K., Ghosh, M. R. and Raychaudhuri, D. N., 1971, *Oriental Ins.*, **6** : 339.

Material: Apterous oviparous ♀♀ and 1 apterous ♂, INDIA: Baptala in August from *Phyllanthus emblica*. coll. *S. K. David*; 1 apterous oviparous ♀, West Bengal: Tashiding, 18. vii. 1970, from an unidentified plant, coll. *M. R. Ghosh*; 3 alate ♂♂, West Bengal: Darjeeling: Rambhi, 9. xii. 1970. from *Flueggea macrophyla*, coll. *M. R. Ghosh*.

Note: The alate males of the above species have been collected in North East India and in that context the report of apterous male by David (1958) from South India for the same species appears interesting.

Subfamily LACHNINAE

XLXIII. Genus **Protrama** Baker

80. **Protrama penecacea** Stroyan

Protrama penecacea Stroyan. 1964, *Indian J. Ent.*, **26** : 211.

Protrama penecacea : Verma, 1969, *Bull. Ent.*, **10** : 102.

Material: 1 apterous ♂, INDIA: Jammu and Kashmir: Jammu, 21. xii. 1962, from root of *Helianthus tuberosus*., coll. *M. L. Sharma*.

The systematic account is followed by a discussion on the life cycle of aphids of India from the view point of the available sexual morphs which have been seperately listed along with other relevant data.

List of Sexuales of aphids found in India (Plants with ? marks denote doubtful host plants)

Aphid-species	Available sexual morph	Collected from plants / Y.P.T.	Plant family
Subfamily: ANOECIINAE			
1. *Aiceona litseae* Basu and Hille Ris Lambers	Alate ovipara	*Litsea polyantha* *Litsea* sp.	Lauraceae ,,
2. *Aiceona paraosugii* Ghosh Ghosh and Raychaudhuri	Alate ovipara	Y.P.T.	
3. *Aiceona retipennis* David Narayanan and Rajasingh	Alate male	Y.P.T.	

	Aphid-species	Available sexual morph	Collected from plants / Y.P.T.	Plant family
4.	*Aiceona robustiseta* Ghosh and Raychaudhuri	Alate ovipara	Y.P.T. *Litsea polyantha*	 Lauraceae
Subfamily : APHIDINAE				
5.	*Acutosiphon obliquoris* Basu, Ghosh and Raychaudhuri	Apterous ovipara Alate male	Unidentified Unidentified	 Cyperaceae
6.	*Amphorophora ampullata bengalensis* Hille Ris Lambers and Basu	Apterous ovipara	Unidentified Fern	
7.	*Aphis clematidis simlaensis* Kumar and Burkhardt	Apterous male	*Clematis* sp.	Ranunculaceae
8.	*Aphis craccivora* Koch	Apterous ovipara Alate male	*Tinospora cordifolia*	Menispermaceae
9.	*Aphis gossypii* group	Apterous ovipara	*Citrus decumina* Unidentified *Perilla osmoides* *Calendula* sp.	Rutaceae Rhamnaceae Labiatae Compositae
		Alale male	*Camellia sinensis*	Magnoliaceae
	Aphis gossypii group	Alate male	*Zinnia* sp. *Erectiles valirinifolia* *Bidens pilosa* *Salvia* sp.	Compositae ,, ,, Labiatae
10.	*Aphis nasturtii* Kaltenbach	Alate male	Unidentified Y.P.T.	
11.	*Aulacorthum magnoliae* (Essig and Kuwana)	Alate male	*Cucurbita maxima* *Cucurbita moschata*	Cucurbitaceae Cucurbitaceae
12.	*Aulacorthum* sp.	Apterous ovipara Alate male	*Pterospermum* sp. *Artemisia* sp. *Solanum* sp.	Sterculaceae Compositae Solanaceae
13.	*Brachycaudus helichrysi* (Kaltenbach)	Apterous ovipara Alate male	*Prunus* sp. ? *Lycopersicum esculantum* *Prunus* sp. Y.P.T.	Rosaceae Solanaceae Rosaceae
14.	*Brachymyzus jasmini* Basu	Apterous ovipara Alate male	*Nellia* sp. *Pilea microphylla*	Rosaceae Urticaceae
15.	*Brevicoryne brassicae* (Linnaeus)	Apterous ovipara	*Brassica oleracea*	Cruciferae
		Alate male	*Brassica oleracea* *Brassica* sp.	,, ,,
16.	*Capitophorus formosartemisiae* (Takahashi)	Apterous ovipara	*Artemisia* sp.	Compositae

	Aphid-species	Available sexual morph	Collected from plants / Y.P.T.	Plant family
17.	*Capitophorus meghalayensis* Basu and Raychaudhuri	Apterous ovipara	*Elaeagnus* sp.	Elaeagnaceae
18.	*Cavariella* (*Cavaraiellia*) *aquatica* (Gillette and Bragg)	Apterous ovipara Apterous male	*Salix* sp. ,,	Salicaceae ,,
19.	*Cavariella* sp.	Alate male	Unidentified	Solanaceae
20.	*Chaetosiphon* (*Pentatrichopus*) *fragifolii* (Cockerell)	Alate male	Y.P.T.	
21.	*Coloradoa rufomaculata* (Wilson)	Apterous ovipara	*Chrysanthemum indicum*	Compositae
22.	*Dysaphis ghanii* group	Alate male	*Fragaria nilgerrensis* *Cotoneaster bacillaris*	Rosaceae ,,
23.	*Dysaphis* sp.	Alate male	Y.P.T.	
24.	*Hayhurstia atriplicis* (Linnaeus)	Apterous ovipara	*Chenopodium album*	Chenopodiaceae
25.	*Hyperomyzus lactucae* (Linnaeus)	Alate male	*Taxus baccata*	Taxaceae
26.	*Hysteroneura setariae* (Thomas)	Apterous ovipara Alate male	*Prunus* sp. Unidentified Unidentified	Rosaceae Gramineae
27.	*Impatientinum impatiens* (Shinji)	Apterous ovipara	*Salix* sp.	Salicaceae
28.	*Jacksonia folisacculata* (Kumar and Burkhardt)	Alate male	*Spiraea* sp.	Rosaceae
29.	*Jacksonia* sp.	Alate male	*Sarcocea pruniformis*	Buxaceae
30.	*Liosomaphis himalayensis* Basu	Alate male	Y.P.T.	
31.	*Lipaphis erysimi* (Kaltenbach)	Apterous ovipara Alate male	*Brassica campestris* *Brassica oleracea* Unidentified Y.P.T.	Cruciferae ,, ,,
32.	*Macromyzus manoji* Raha and Raychaudhuri	Apterous ovipara	Unidentified	
33.	*Macrosiphoniella ? kikunshana* Takahashi	Apterous ovipara	*Artemisia* sp.	Compositae
34.	*Macrosiphoniella pseudoartemisiae* Shinji	Apterous ovipara	*Artemisia* sp.	,,

	Aphid-species	Available sexual morph	Collected from plants / Y.P.T.	Plant family
35.	*Macrosiphum* (*Sitobion*) *rosaeformis* Das	Apterous ovipara	*Rosa* sp.	Rosaceae
		Alate male	*Rosa cania*	,,
			Rosa sp.	,,
36.	*Macrosiphum spinotibium* Ghosh, Ghosh and Raychaudhuri	Apterous ovipara	Unidentified	
37.	*Macrosiphum* sp. A	Alate male	*Vaccinium* sp. Y.P.T. Unidentified	Vacciniaceae
38.	*Macrosiphum* (*Sitobion*) sp. B	Apterous ovipara	*Polygonum chinensis*	Polygonaceae
			Unidentified grass	Gramineae
		Alate male	? *Allium sativum*	Liliaceae
			? *Lindera* sp.	Lauraceae
			? *Asplenium* sp.	Aspleniaceae
39.	*Masonaphis* (*Neomasonaphis*) *anaphilidis* Basu	Alate male	*Ageratum conyzoides*	Compositae
40.	*Masonaphis* (*Neomasonaphis*) *rumicis* Chakrabarti and Raychaudhuri	Alate male	*Oxyria digyna*	Geraniaceae
			Rumex sp.	Polygonaceae
41.	*Megoura cajane* Ghosh, Ghosh and Raychaudhuri	Apterous ovipara	*Cajanus cajan*	Papilionaceae
42.	*Metopolophium chandrani* (David and Narayanan)	Apterous ovipara	wild rose	Rosaceae
43.	*Metopolophium rubi* (Narzikulov)	Apterous ovipara	*Rubus ellipticus*	Rosaceae
44.	*Micromyzus kalimpongensis* Basu	Apterous ovipara	*Elettaria cardamomum*	Zingiberaceae
		Alate male		
		Apterous ovipara	Orchid	Orchidaceae
		Alate male	,,	,,
45.	*Micromyzus mawphlongensis* Ghosh	Apterous ovipara	*Polypodium* sp.	Polypodiaceae
		Alate male	,,	,,
46.	*Micromyzus* sp.	Apterous ovipara	*Symplocos* sp.	Symplocaceae
47.	*Myzus brevisiphon* Basu	Alate male	*Rhododendron campylocarpum*	Ericaceae
			Polygonum sp.	Polygonaceae
48.	*Myzus ornatus* Laing	Alate male	*Fragaria nilgerrensis*	Rosaceae
49.	*Myzus persicae* (Sulzer)	Alate male	*Solanum persicum*	Solanaceae
			Silene conodea	Caryophyllaceae
			Prunus persica	Rosaceae
			Rhododendron campylocarpum	Ericaceae

	Aphid-species	Available sexual morph	Collected from plants / Y.P.T.	Plant family
50.	*Neoacyrthosiphon* (*Pseudoacyrthosiphon*) *takahashii* Ghosh	Apterous ovipara Alate male	*Rhododendron campylocarpum*	Ericaceae
51.	*Pentalonia nigronervosa* Coquerell	Apterous ovipara	*Curcuma domestica*	Zingiberaceae
52.	*Perillaphis perillae* (Shinji)	Apterous ovipara	*Perilla* sp. Unidentified *Rhododendron campylocarpum*	Labiatae Verbenaceae Ericaceae
		Alate male	*Rhododendron campylocarpum*	Ericaceae
53.	*Rhopalosiphoninus longisetosa* Chakrabarti and Ghosh	Apterous ovipara Alate male	Unidentified ,,	
54.	*Rhopalosiphum maidis* (Fitch)	Apterous ovipara	*Triticum vulgare*	Gramineae
55.	*Rhopalosiphum nymphaeae* (Linnaeus)	Apterous ovipara Alate male	*Prunus* sp. ? *Eichhornia crassipes* *Rosa* sp. ? *Curcuma longa* *Prunus persica* *Prunus* sp. ? *Cucurbita* sp. ? *Fleurya* sp.	Rosaceae Pontederiaceae Rosaceae Zingiberaceae Rosaceae ,, Cucurbitaceae Urticaceae
56.	*Rhopalosiphum padi* (Linnaeus)	Apterous ovipara	*Prunus* sp.	Rosaceae
57.	*Rhopalosiphum rufiabdominalis* (Sasaki)	Alate male	*Pyrus communis*	,,
58.	*Scizaphis* ? *punjabipyri* (Das)	Alate male	*Pyrus communis*	,,
59.	*Semiaphis heraclei* Takahashi	Apterous ovipara	Unidentified	Rosaceae
60.	*Shinjia pteridifoliae* (Shinji)	Apterous ovipara Alate male	*Sauravia* sp, ,,	Sauraviaceae ,,
61.	*Tricaudatus polygoni* (Narzikulov)	Apterous ovipara Alate male	*Spiraea corymbosa*	Rosaceae
62.	*Trichosiphonaphis polygoni* (van der Goot)	Alate male	*Frageria nilgerrensis* *Potentilla mooniana*	,, ,,
63.	*Uroleucon longisetosus* Chakrabarti and Verma	Apterous ovipara Apterous ovipara Alatoid male	*Lactuca hastata* *Prenanthes bruniana* ,,	Compositae ,, ,,

	Aphid-species	Available sexual morph	Collected from plants / Y.P.T.	Plant family
Subfamily : CALLAPHIDINAE				
64.	*Chromaphis hirsutatibis* Kumar and Levigne	Apterous ovipara Alate male	*Eleurites moluccana* Y.P.T.	Euphorbiaceae
65.	*Myzocallis polychaetus* David	Apterous ovipara Alate male	*Quercus dealbata* ,,	Fagaceae ,,
66.	*Shivaphis bambusicola* (David, Narayanan and Rajasingh)	Apterous ovipara	*Bambusa* sp.	Gramineae
67.	*Taoia indica* (Ghosh and Raychaudhuri)	Apterous ovipara Alatoid male	*Betula alnoides* *Alnus nepalensis* *Betula alnoides*	Betulaceae ,, ,,
68.	*Tinocallis distincta* Ghosh, Ghosh and Raychaudhuri	Apterous ovipara Alate male	Unidentified Unidentified	Leguminosae ,,
69.	*Tinocallis himalayensis* Ghosh, Ghosh and Raychaudhuri	Apterous ovipara	Unidentified	Leguminosae
70.	*Tinocalloides montanus* Basu	Apterous ovipara Alate male	*Prunus cerasus* ,,	Rosaceae ,,
Subfamily : CHAITOPHORINAE				
71.	*Periphyllus aesculi* Hille Ris Lambers	Apterous ovipara Alate male	*Aesculus* sp. ,,	Hippocastinaceae
72.	*Periphyllus villosii* Chakrabarti	Apterous ovipara	*Acer villosum*	Sapindaceae
Subfamily : GREENIDEINAE				
73.	*Eutrichosiphum quercifoliae* Raychaudhuri, Ghosh, Banerjee and Ghosh	Alate ovipara	*Quercus* sp.	Fagaceae
74.	*Greenidea anonae* (Pergande)	Alate male	? *Nicotiana tabacum*	Solanaceae
75.	*Greenidea ceyloniae* van der Goot	Alate ovipara Alate male	*Mesua ferra* ,,	Guttiferae ,,
76.	*Mollitrichosiphum tenuicorpus* (Okajima)	Alate ovipara	*Maesa indica* ,,	Myrsinaceae ,,
77.	*Mollitrichosiphum alni* Ghosh, Ghosh and Raychaudhuri	Alate ovipara Alate male	*Alnus nepalensis* ,,	Betulaceae ,,
78.	*Paratrichosiphum* sp.	Alate ovipara Alate male	*Styrax* sp. ,,	Styraceae ,,

	Aphid-species	Available sexual morph	Collected from plants / Y.P.T.	Plant family
79.	*Schoutedenia lutea* (van der Goot)	Apterous ovipara Apterous male Alate male	*Phyllanthus emblica* *Flueggea macrophylla*	Euphorbiaceae Euphorbiaceae
Subfamily : LACHNINAE				
80.	*Protrama penecacea* Stroyan	Apterous male	*Helianthus tuberosus*	Compositae

DISCUSSION

From what has been stated above in the taxonomic part and list of Sexuales of Aphids found in India the following facts are revealed :

1. 13% of the total aphid species recorded from India produce sexuales. Out of these species, 23 are known only by males, 26 by only oviparae and 31 by both males and oviparae.

2. These sexuales are distributed over all the subfamilies of Aphididae except Hormaphidinae and Pemphiginae.

3. These sexuales are mostly found at higher altitudes during colder part of the year.

4. The oviparae are usually apterous except in the subfamily Anoeciinae and Greenideinae and the males are almost always alate except in the subfamily Lachninae.

From the above it can be said that in Indian climate the majority of the aphids have anholocyclic thelytocus life cycle and only for a few species there is anholocyclic development coupled with a minor, perhaps sometimes abortive gamic cycle. A similar idea is given by Bodenheimer and Swirski (1957) for aphids of Middle East, Richards (1965) for Canadian Callaphidine aphids and Eastop (1966) for Australian aphids. None the less it can reasonably assumed that some species like *Aphis craccivora*, *Brachycaudus helichrysi*, *Brachymyzus jasmini*, *Brevicoryne brassicae*, *Cavariella* (*Cavaraiellia*) *aquatica* *Macrosiphum* (*Sitobion*) *rosaeformis*, *Micromyzus kalimpongensis*, *Micromyzus mawphlongensis*, *Neoacyrthosiphon* (*Pseudoacyrtosiphon*) *takahashii*, *Perillaphis perillae*, *Rhopalosiphoninus longisetosa*, *Rhopalosiphum nymphaeae*, *Shinjia pteridifoliae*, *Tricaudatus polygoni*, *Uroleucon*

longisetosa, Chromaphis hersutatibis, Taoia indica, Tinocallis distincta, Periphyllus villosii, Greenideoida ceyloniae, Mollitrichosiphum (*Metatrichosiphon*) *alni* and *Schoutedenia lutia* are perhaps leading holocyclic life cycle in Indian climate since in these species both oviparae and males could be found over and above usual parthenogenetic forms. Some of the above species have their host plants very restricted at least in respect of plant families. The significance of the find of males and oviparous females on the same host plant as viviparae may be attributed to laying of eggs for over wintering purpose to overcome the ill effects of cool winter.

Usually the alate forms are looked upon as migrants. So the males which are usually alate can be supposed to have been produced for migrating to the primary host in case of host alternating species for mating with the oviparae if found there at all or else the males can be looked upon as abortive gamic form. The report of apterous male for *Aphis clematidis simlaensis* by Kumar and Burkhardt (1970), that for *Cavariella* (*Cavaraiellia*) *aquatica* by David and Hameed (1975) and that for *Schoutedenia emblica* (=*lutea*) by David (1958), appear somewhat interesting since the males in the tribes Aphidini and Macrosiphini and of *Schoutedenia* under Indian temperate climate are so far known mostly alatae. If however, the males are truly apterous then it becomes a point of interest to enquire into fact of extreme neoteny for males inspite of the possible necessity of host alternation for perpetuation of sexual cycle if it really occurs. Otherwise these instances should have to be looked upon as examples of abortive gamic forms. A similar asumption can be made for the apterous oviparae in cases where these are the only sexual morphs found. The find of an apterous male in *Protrama penecacea* is an example of extreme neoteny. So also the find of alate oviparae in *Aiceona* sp. and the species under Greenideinae are cases of zero neoteny

The find of majority of the sexuales at higher altitudes during colder part of the year suggests that lower temperature and shorter day length influence production of sexual or in otherwords the production of sexuales can be correlated with physico-chemical changes of the host plants harboured by the parthenogenetic forms brought by the changes in the climate.

SUMMARY

In this paper sexuales of 80 species distributed over 53 genera under 6 subfamilies of Aphididae are reported from India. Among

the sexuales only males are known for 11 of these genera, oviparae for 14 genera and both males and oviparae for other 28 genera.

The sexuales are mostly known from areas of higher altitudes (*ca* 750 metre to *ca* 4500 metre) during colder part of the year.

On the basis of the find of sexuales a discussion on the nature of life-cycle followed by the majority of the Indian aphids has been incorporated.

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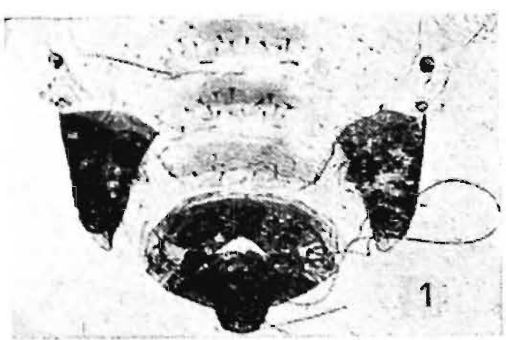
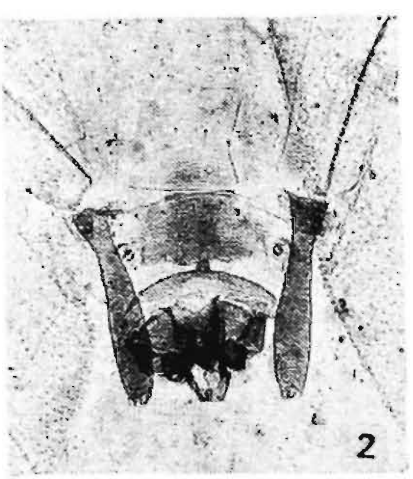
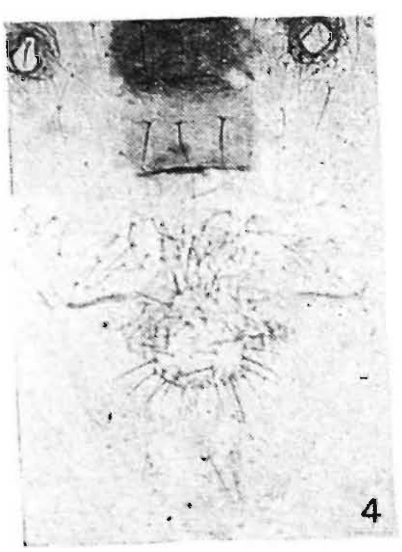
BASU & RAYCHAUDHURI PLATE I







1. *Acutosiphon obliquoris* Basu, Ghosh and Raychaudhuri : Posterior portion of alate ♂ showing genital structure. 2. *Cavariella* sp. : Posterior portion of alate ♂ showing genital structure. 3. *Dysaphis ghanii* group : Posterior portion of alate ♂ showing genital structure. 4. *Aiceona robustiseta* Ghosh and Raychaudhuri : Posterior portion of apterous oviparous ♀ showing genital structure. 5. *Aphis craccivora* Koch : Apterous oviparous ♀ . 6. *Myzocallis polychaetus* David : Posterior portion of apterous oviparous ♀ showing the eggs within the body and swollen hind tibia.