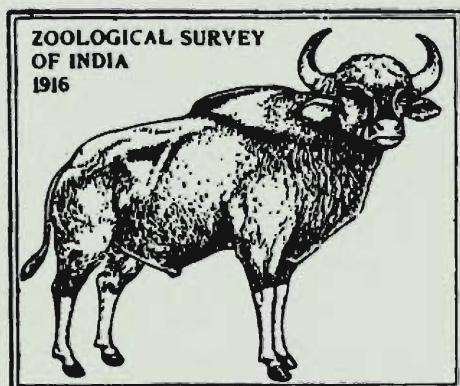


A Conspectus of Aphididae
(Homoptera) of Himachal Pradesh
in Northwest Himalaya, India

L. K. Ghosh



**ZOOLOGICAL SURVEY
OF INDIA**

ZOOLOGICAL SURVEY OF INDIA

TECHNICAL MONOGRAPH No. 16

A CONSPECTUS OF APHIDIDAE (HOMOPTERA)
OF HIMACHAL PRADESH IN NORTH-WEST HIMALAYA, INDIA

By

L. K. GHOSH

Zoological Survey of India, Calcutta-700 053



Edited by the Director. Zoological Survey of India

1986

ZOOLOGICAL SURVEY OF INDIA

TECHNICAL MONOGRAPH

Vol. 16**1986****Pages 1—282**

C O N T E N T S

	PAGE
SYSTEMATIC CONTENTS	i—xi
INTRODUCTION	... 1
ABBREVIATIONS	... 5
SYSTEMATIC ACCOUNT	... 6
CLASSIFIED LIST OF APHIDS OF HIMACHAL PRADESH	... 6
KEY TO THE SUBFAMILIES OF THE FAMILY APHIDIDAE	... 16
SUBFAMILY ANOECIINAE	... 18
APHIDINAE	... 21
CALLIPTERINAE	... 135
GREENIDEINAE	... 151
HORMAPHIDINAE	... 156
LACHNINAE	... 160
PEMPHIGINAE	... 171
APHIDS NOT EXAMINED	... 181
HOST PLANT—APHID CATALOGUE	... 185
SUMMARY AND CONCLUSIONS	... 209
REFERENCES	... 212
INDEX TO GENERA, SPECIES AND SUBSPECIES	... 229
ILLUSTRATIONS	... 235
ERRATA / ADDENDA	... 279

SYSTEMATIC CONTENTS

	PAGE
Family APHIDIDAE	16
Subfamily ANOECIINAE	18
Tribe Aiceonini	18
I. Genus <i>Aiceona</i> Takahashi	18
1. <i>Aiceona retipennis</i> David, Narayanan and Rajasingh	19
Tribe Anoeciini	19
II. Genus <i>Anoecia</i> Koch	19
2. <i>Anoecia corni</i> (Fabricius)	20
3. <i>Anoecia himalayaensis</i> Chakrabarti and Maity	21
Subfamily APHIDINAE	21
Tribe Aphidini	21
Subtribe Aphidina	21
III. Genus <i>Aphis</i> Linnaeus	22
4. <i>Aphis citricola</i> van der Goot	24
5. <i>Aphis ciematidis simlaensis</i> Kumar and Burkhardt	24
6. <i>Aphis craccivora</i> Koch	25
7. <i>Aphis fabae solanella</i> Theobald	26
8. <i>Aphis gossypii</i> Glover	26
9. <i>Aphis kurosawai</i> Takahashi	27
10. <i>Aphis nasturtii</i> Kaltenbach	27
11. <i>Aphis nerii</i> Boyer de Fonscolombe	27
12. <i>Aphis paraverbasci</i> Chakrabarti	28
13. <i>Aphis pollinosa</i> Walker	28
14. <i>Aphis punicae</i> Passerini	29
15. <i>Aphis ruborum longisetosus</i> Basu	29
16. <i>Aphis verbasci</i> Schrank	29
IV. Genus <i>Toxoptera</i> Koch	30
17. <i>Toxoptera aurantii</i> (Boyer de Fonscolombe)	31
18. <i>Toxoptera citricidus</i> (Kirkaldy)	31

	Subtribe Rhopalosiphina	...	31
	V. Genus Hyalopterus Koch	...	32
19.	<i>Hyalopterus pruni</i> (Geoffroy)	...	32
	VI. Genus Hysteroneura Davis	...	33
20.	<i>Hysteroneura setariae</i> (Thomas)	...	33
	VII. Genus Melanaphis van der Goot	...	34
21.	<i>Melanaphis meghalayensis meghalayensis</i> Raychaudhuri and Banerjee		35
	VIII. Genus Rhopalosiphum Koch	...	35
22.	<i>Rhopalosiphum maidis</i> (Fitch)	...	36
23.	<i>Rhopalosiphum nymphaeae</i> (Linnaeus)	...	37
24.	<i>Rhopalosiphum padi</i> (Linnaeus)	...	38
25.	<i>Rhopalosiphum rufiabdominalis</i> (Sasaki)	...	38
	Tribe Macrosiphini	...	39
	IX. Genus Acutosiphon Basu, Ghosh and Raychaudhuri	...	46
26.	<i>Acutosiphon obliquoris</i> Basu, Ghosh and Raychaudhuri	...	46
	X. Genus Acyrtosiphon Mordvilko	...	47
27.	<i>Acyrtosiphon malvae</i> (Mosley) Complex	...	48
28.	<i>Acyrtosiphon phaseoli</i> Chakrabarti, Ghosh and Raychaudhuri		48
29.	<i>Acyrtosiphon rubi</i> Narzikulov	...	49
30.	<i>Acyrtosiphon sonchifoliae</i> Raychaudhuri, Ghosh and Das	...	49
31.	<i>Acyrtosiphon</i> (<i>Metopolophium</i>) <i>graminum</i> Raychaudhuri, Ghosh and Das	...	50
32.	<i>Acyrtosiphon</i> (<i>Metopolophium</i>) <i>ranunculum</i> , sp. nov.	...	50
33.	<i>Acyrtosiphon</i> (<i>Microlophium</i>) <i>rubifoliae</i> Raychaudhuri, Ghosh and Basu	...	52
	XI. Genus Amphicercidus Oestlund	...	52
34.	<i>Amphicercidus tuberculatus</i> David, Narayanan and Rajasingh...		52
	XII. Genus Amphorophora Buckton	...	54
35.	<i>Amphorophora ampullata bengalensis</i> Hille Ris Lambers	..	54
	XIII. Genus Aspidophorodon Verma	...	55
36.	<i>Aspidophorodon harvensis</i> Verma	...	55

XIV	Genus Aulacorthum Mordvilko	...	55
37.	<i>Aulacorthum delphinae</i> Das, Raychaudhuri and Raychaudhuri		57
38.	<i>Aulacorthum magnoliae</i> (Essig and Kuwana)	...	57
39.	<i>Aulacorthum nipponicum</i> (Essig and Kuwana)	...	58
40.	<i>Aulacorthum rhamni</i> Ghosh, Ghosh and Raychaudhuri	...	58
41.	<i>Aulacorthum sclerodorsi</i> (Kumar and Burkhardt)	...	58
42.	<i>Aulacorthum solani</i> (Kaltenbach)	...	59
43.	<i>Aulacorthum</i> (<i>Neomyzus</i>) <i>strobilantheae</i> sp. nov.	...	59
44.	<i>Aulacorthum</i> (<i>Perillaphis</i>) <i>perillae</i> Shinji	...	60
XV.	Genus Brachycaudus van der Goot	...	61
45.	<i>Brachycaudus amygdalinus</i> (Schouteden)	...	61
46.	<i>Brachycaudus helichrysi</i> (Kaltenbach)	...	62
XVI.	Genus Brevicoryne van der Goot	...	63
47.	<i>Brevicoryne barbareae</i> Nevsky	...	64
48.	<i>Brevicoryne brassicae</i> (Linnaeus)	...	65
XVII.	Genus Capitophorus van der Goot	...	65
49.	<i>Capitophorus hippophaes javanicus</i> Hille Ris Lambers	...	66
50.	<i>Capitophorus hippophaes mitegoni</i> Eastop	...	66
XVIII.	Genus Cavariella del Guercio	...	66
51.	<i>Cavariella aegopodii</i> (Scopoli)	...	68
52.	<i>Cavariella himachali</i> sp. nov.	...	69
53.	<i>Cavariella konoii</i> Takahashi	...	70
54.	<i>Cavariella nigra</i> Basu	...	70
55.	<i>Cavariella simlaensis</i> Chawdhuri, Basu and Raychaudhuri	...	71
XIX.	Genus Chaetomyzus Ghosh and Raychaudhuri	...	71
56.	<i>Chaetomyzus rhododendri</i> Ghosh and Raychaudhuri	...	72
XX.	Genus Chaetosiphon Mordvilko	...	72
57.	<i>Chaetosiphon glaber</i> David, Rajasingh and Narayanan	...	73
58.	<i>Chaetosiphon gracilicornis</i> David, Rajasingh and Narayanan	...	73
XXI.	Genus Coloradoa Wilson	...	74
59.	<i>Coloradoa rufomaculata</i> (Wilson)	...	74

XXII. Genus Cryptaphis Hille Ris Lambers	...	75
60. <i>Cryptaphis rostrata</i> Chakrabarti and Raychaudhuri	...	75
XXIII. Genus Cryptomyzus Oestlund	...	76
61. <i>Cryptomyzus taoi</i> Hille Ris Lambers	...	76
XXIV. Genus Diphorodon Börner	...	76
62. <i>Diphorodon cannabis</i> (Passerini)	...	77
XXV. Genus Dysaphis Börner	...	77
63. <i>Dysaphis atinus</i> Ghosh, Basu and Raychaudhuri	...	79
64. <i>Dysaphis emicis</i> (Mimeur)	...	79
65. <i>Dysaphis foeniculus</i> (Theobald)	...	79
66. <i>Dysaphis ghanii</i> Stroyan	...	80
67. <i>Dysaphis stroyani</i> sp. nov.	...	80
XXVI. Genus Eoessigia David, Rajasingh and Narayanan	...	81
68. <i>Eoessigia indica</i> David, Rajasingh and Narayanan	...	82
XXVII. Genus Himalayaphis Ghosh and Verma	..	82
69. <i>Himalayaphis anemones</i> Ghosh and Verma	..	82
XXVIII. Genus Hyadaphis Kirkaldy		82
70. <i>Hyadaphis coriandri</i> (Das)	..	83
XXIX. Genus Hyalomyzus Richards	...	83
71. <i>Hyalomyzus fragaricola</i> sp. nov.	...	84
72. <i>Hyalomyzus scabripes</i> David and Narayanan	...	85
XXX. Genus Hyperomyzus Börner	...	86
73. <i>Hyperomyzus carduellinus</i> (Theobald)	...	87
74. <i>Hyperomyzus lactucae</i> (Linnaeus)	...	87
XXXI. Genus Impatientinum Mordvilko	...	88
75. <i>Impatientinum impatiensae dalhousiensis</i> Verma	...	88
XXXII. Genus Indoidiopterus Chakrabarti, Ghosh and Raychaudhuri		89
76. <i>Indoidiopterus geranii</i> (Chawdhuri, Basu, Chakrabarti and Raychaudhuri	...	89

XXXIII. Genus Indumasonaphis Ghosh, Basu and Raychaudhuri	89
77. <i>Indumasonaphis inulae</i> (Ghosh and Raychaudhuri) ...	91
78. <i>Indumasonaphis tuberculatus</i> Chakrabarti, Mondal and Raha	91
XXXIV. Genus Jacksonia Theobald ...	92
79. <i>Jacksonia campanulata</i> Chakrabarti ...	92
80. <i>Jacksonia papillata</i> Theobald ...	93
XXXV. Genus Liosomaphis Walker ...	93
81. <i>Liosomaphis atra</i> Hille Ris Lambers ...	94
82. <i>Liosomaphis himalayensis</i> Basu ...	95
XXXVI. Genus Lipaphis Mordvilko ...	95
83. <i>Lipaphis erysimi</i> (Kaltenbach) ...	96
XXXVII. Genus Longicaudus van der Goot ...	97
84. <i>Longicaudus himalayensis</i> Hille Ris Lambers ...	97
XXXVIII. Genus Macrosiphoniella del Guercio ...	97
85. <i>Macrosiphoniella kalimpongense</i> Basu and Raychaudhuri ...	98
86. <i>Macrosiphoniella sanborni</i> (Gillette) ...	99
87. <i>Macrosiphoniella yomogifoliae</i> (Shinji) ...	99
XXXIX. Genus Macrosiphum Passerini ...	99
88. <i>Macrosiphum pachysiphon</i> Hille Ris Lambers ...	102
89. <i>Macrosiphum indogeranii</i> Chakrabarti and Raychaudhuri ...	102
90. <i>Macrosiphum rosae</i> (Linnaeus) ...	103
91. <i>Macrosiphum</i> (<i>Sitobion</i>) <i>bambusicola</i> sp. nov. ...	103
92. <i>Macrosiphum</i> (<i>Sitobion</i>) <i>himalayensis</i> sp. nov. ...	104
93. <i>Macrosiphum</i> (<i>Sitobion</i>) <i>indicum</i> (Basu) ...	105
94. <i>Macrosiphum</i> (<i>Sitobion</i>) <i>miscanthi</i> (Takahashi) ...	106
95. <i>Macrosiphum</i> (<i>Sitobion</i>) <i>pseudoalpecuri</i> Chakrabarti ...	106
96. <i>Macrosiphum</i> (<i>Sitobion</i>) <i>rosaeiformis</i> Das ...	106
97. <i>Macrosiphum</i> (<i>Sitobion</i>) <i>sikkimensis</i> Ghosh and Raychaudhuri	106
XL. Genus Matsumuraja Schumacher ...	107
98. <i>Matsumuraja capitophoroides</i> Hille Ris Lambers ...	108

	XLI. Genus Micromyzodium David	...	108
99.	<i>Micromyzodium filicium</i> David	...	109
100.	<i>Micromyzodium strobilanthei</i> Ghosh	...	109
	XLII. Genus Micromyzus van der Goot	...	110
101.	<i>Micromyzus nigrum</i> van der Goot	...	111
	XLIII. Genus Myzaphis van der Goot	...	111
102.	<i>Myzaphis rosarum</i> (Kaltenbach)	...	111
103.	<i>Myzaphis turanica</i> Nevsky	...	112
	XLIV. Genus Myzus Passerini	...	113
104.	<i>Myzus ascalonicus</i> Doncaster	...	115
105.	<i>Myzus umefoliae</i> (Shinji)	...	115
106.	<i>Myzus dycei</i> Carver	...	115
107.	<i>Myzus mumecola</i> Matsumura	...	115
108.	<i>Myzus obtusirostris</i> David, Narayanan and Rajasingh	...	116
109.	<i>Myzus ornatus</i> Laing	...	116
110.	<i>Myzus persicae</i> (Sulzer)	...	116
	XLV. Genus Nasonovia Mordvilko	...	116
111.	<i>Nasonovia (Neokakima) rostrata</i> David and Hameed	...	117
	XLVI. Genus Neoacyrthosiphon Tao	...	118
112.	<i>Neoacyrthosiphon indicum</i> Ghosh, Verma and Raychaudhuri		118
	XLVII. Genus Neomasonaphis Ghosh and Raychaudhuri	...	119
113.	<i>Neomasonaphis rhododendris</i> Chakrabarti, Mondal and Raha...		119
	XLVIII. Genus Neomyzus van der Goot	...	119
114.	<i>Neomyzus circumflexus</i> (Buckton)	...	120
	XLIX. Genus Nudisiphon Chakrabarti and Bhattacharya	...	120
115.	<i>Nudisiphon chitinicauda</i> Chakrabarti and Bhattacharya	...	121
	L. Genus Raychaudhuriella Chakrabarti	...	121
116.	<i>Raychaudhuriella myzaphioides</i> Chakrabarti	...	121

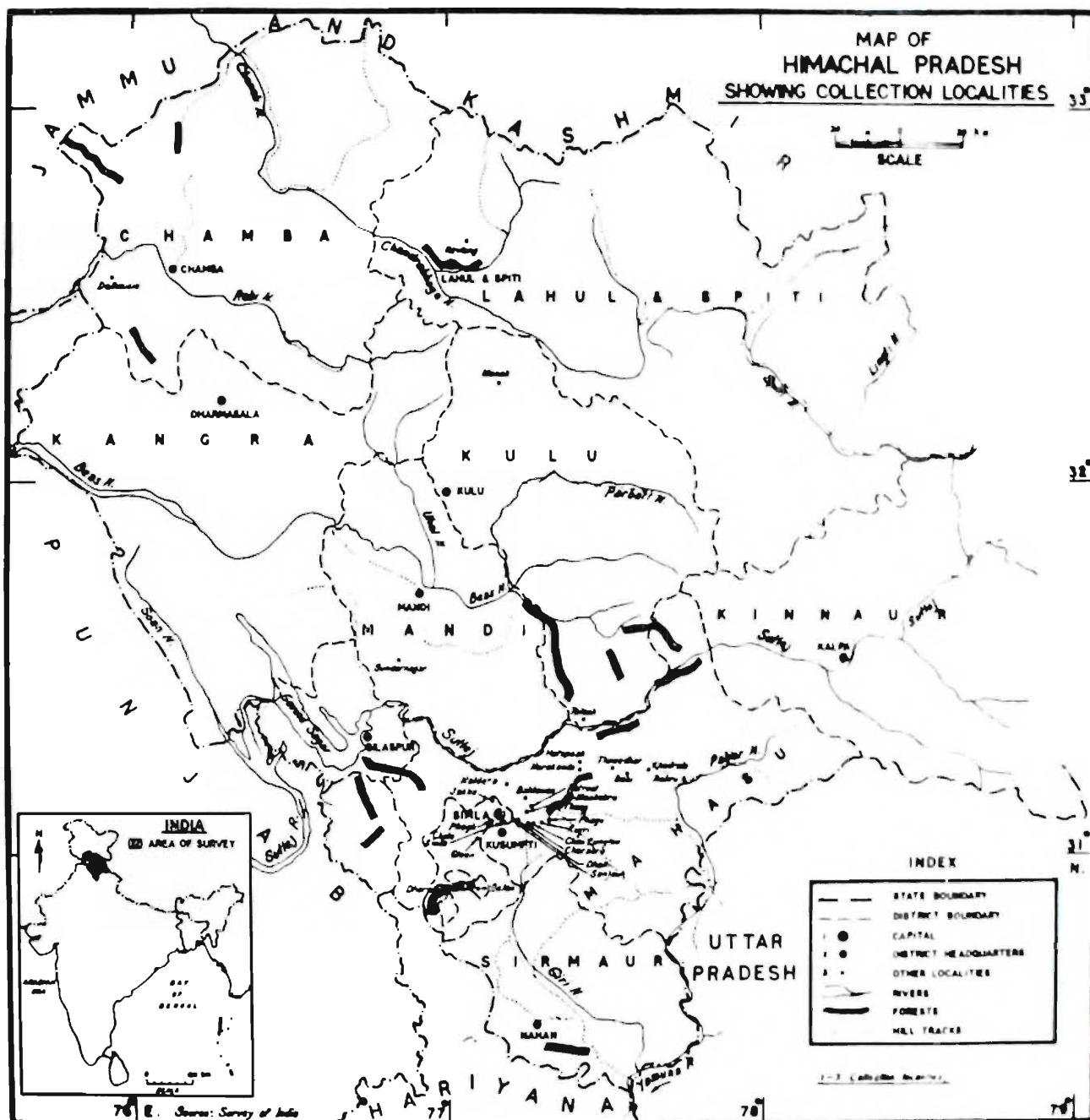
LI. Genus Rhopalosiphoninus Baker	...	121
117. <i>Rhopalosiphoninus indicus</i> sp. nov.	...	123
118. <i>Rhopalosiphoninus latysiphon</i> (Davidson)	...	124
119. <i>Rhopalosiphoninus longisetosus</i> Chakrabarti and Ghosh	...	124
120. <i>Rhopalosiphoninus sensoriatu</i> s Chakrabarti	...	124
LII. Genus Senisetotarsaphis Raychaudhuri, Ghosh and Das	...	124
121. <i>Senisetotarsaphis jakhuensis</i> Raychaudhuri, Ghosh and Das	...	125
LIII. Genus Spinaphis gen. nov.	...	125
122. <i>Spinaphis multisetosa</i> sp. nov.	...	125
LIV. Genus Tricaudatus Narzikulov	...	126
123. <i>Tricaudatus indicus</i> Ghosh, Basu and Raychaudhuri	...	127
124. <i>Tricaudatus polygoni</i> (Narzikulov)	...	127
LV. Genus Uroleucon Mordvilko	...	128
125. <i>Uroleucon fagopyri</i> (Chawdhuri, Basu, Chakrabarti and Raychaudhuri)	...	129
126. <i>Uroleucon himachali</i> Ghosh	...	130
127. <i>Uroleucon kashmiricus</i> (Verma)	...	130
128. <i>Uroleucon longisetosus</i> Chakrabarti and Verma	...	130
129. <i>Uroleucon minatii</i> Das, Raychaudhuri and Raychaudhuri	...	130
130. <i>Uroleucon simlaensis</i> Chakrabarti, Ghosh and Raychaudhuri...		131
131. <i>Uroleucon sonchi</i> (Linnaeus)	...	131
LVI. Genus Vesiculaphis del Guercio	...	131
132. <i>Vesiculaphis pieridis</i> Basu	...	132
133. <i>Vesiculaphis verbasci</i> Chowdhuri, Basu, Chakrabarti and Raychaudhuri	...	132
LVII. Genus Xenosiphonaphis Takahashi	...	133
134. <i>Xenosiphonaphis folisacculatus</i> Kumar and Burkhardt	...	133
Tribe Pterocommatini	...	134
LVIII. Genus Pterocomma Buckton	...	134
135. <i>Pterocomma populifoliae</i> (Fitch)	...	134

	Subfamily CALLIPTERINAE	...	135
	LIX. Genus Chaitophorus Koch	...	136
136.	<i>Chaitophorus indicus</i> Ghosh, Ghosh and Raychaudhuri	...	138
137.	<i>Chaitophorus kapuri</i> Hille Ris Lambers	...	138
138.	<i>Chaitophorus manaliensis</i> Chakrabarti	...	138
139.	<i>Chaitophorus salijaponicus niger</i> Mordvilko	...	138
140.	<i>Chaitophorus pakistanicus</i> Hille Ris Lambers	...	138
	LX. Genus Chromaphis Walker	...	139
141.	<i>Chromaphis hirsutustibis</i> Kumar and Lavigne	...	139
	LXI. Genus Euceraphis Walker	...	140
142.	<i>Euceraphis chuansiensis</i> Tao	...	140
	LXII. Genus Myzocallis Passerini	...	140
143.	<i>Myzocallis polychaetus</i> David	...	141
144.	<i>Myzocallis (Hoplocallis) ? pictus</i> (Farrari)	...	141
	LXIII. Genus Neobetulaphis Basu	...	142
145.	<i>Neobetulaphis pusilla</i> Basu	...	142
	LXIV. Genus Periphyllus van der Hoeven	...	143
146.	<i>Periphyllus aesculi</i> Hille Ris Lambers	...	143
147.	<i>Periphyllus himalayensis</i> Chakrabarti	...	144
148.	<i>Periphyllus vandenboschi</i> Hille Ris Lambers	...	144
	LXV. Genus Shivaphis Das	...	145
149.	<i>Shivaphis celti</i> Das	...	145
	LXVI. Genus Sipha Passerini	...	146
150.	<i>Sipha (Rungsia) maydis</i> (Passerini)	...	146
	LXVII. Genus Takecallis Matsumura	...	147
151.	<i>Takecallis affinis</i> sp. nov.	...	148
152.	<i>Takecallis arundinariae</i> (Essig)	...	149
	LXVIII. Genus Tinocalloides Basu	...	150
153.	<i>Tinocalloides montanus</i> Basu	...	150

Subfamily GREENIDEINAE	...	151
LXIX. Genus <i>Eutrichosiphum</i> Essig and Kuwana	...	151
154. <i>Eutrichosiphum</i> (<i>Eutrichosiphum</i>) <i>simlaensis</i> sp. nov.	...	152
155. <i>Eutrichosiphum</i> (<i>Eutrichosiphum</i>) <i>vandergooti</i> Raychaudhuri	...	153
156. <i>Eutrichosiphum</i> (<i>Neoparatrichosiphum</i>) <i>atini</i> Raychaudhuri and Chatterjee	...	154
157. <i>Eutrichosiphum</i> (<i>Neoparatrichosiphum</i>) <i>khasyanum</i> (Ghosh and Raychaudhuri)	...	154
158. <i>Eutrichosiphum</i> (<i>Paratrichosiphum</i>) <i>alnicola</i> Basu	...	155
159. <i>Eutrichosiphum</i> (<i>Paratrichosiphum</i>) <i>neoalnicola</i> Raychaudhuri, Ghosh and Das	...	155
Subfamily HORMAPHIDINAE	...	156
LXX. <i>Astegopteryx</i> Karsch	...	156
160. <i>Astegopteryx minuta</i> (van der Goot)	...	157
LXXI. Genus <i>Ceratovacuna</i> van der Goot	...	157
161. <i>Ceratovacuna lanigera</i> Zehntner	...	158
LXXII. Genus <i>Pseudoregma</i> Doncaster	...	158
162. <i>Pseudoregma bucktoni</i> Ghosh, Pal and Raychaudhuri	...	159
LXXIII. Genus <i>Pseudothoracaphis</i> Raychaudhuri, Ghosh and Das	...	159
163. <i>Pseudothoracaphis himachali</i> Raychaudhuri Ghosh, and Das	...	159
LXXIV. Genus <i>Reticulaphis</i> Takahashi	...	159
164. <i>Reticulaphis distylli rotifera</i> Hille Ris Lambers and Takahashi		160
Subfamily LACHNINAE	...	160
Tribe <i>Cinarini</i>	...	160
LXXV. Genus <i>Cinara</i> Curtis	...	161
165. <i>Cinara confinis tenuipes</i> Chakrabarti and Ghosh	...	162
166. <i>Cinara chaetorostrata</i> Ghosh and Raychaudhuri	...	162
167. <i>Cinara maculipes</i> Hille Ris Lambers	...	163
LXXVI. Genus <i>Indocinara</i> Ghosh, Basu and Raychaudhuri		163
168. <i>Indocinara hottesis</i> Ghosh, Basu and Raychaudhuri	...	163

	Tribe Lachnini	...	164
	LXXVII. Genus Lachnus Burmeister	...	165
169.	<i>Lachnus acutihirsutus</i> Kumar and Burkhardt	...	166
170.	<i>Lachnus longirostrum</i> David and Ghosh	...	166
171.	<i>Lachnus longisetosus</i> Ghosh	...	166
172.	<i>Lachnus tropicalis</i> (van der Goot)	...	166
	LXXVIII. Genus Nippolachnus Matsumura	...	167
173.	<i>Nippolachnus bengalensis</i> Basu and Hille Ris Lambers	...	167
174.	<i>Nippolachnus himalayensis</i> (van der Goot)	...	168
175.	<i>Nippolachnus piri</i> Matsumura	...	168
	LXXIX. Genus Stomaphis Walker	...	168
176.	<i>Stomaphis</i> ? <i>longirostris</i> Fabricius	...	169
	LXXX. Genus Tuberolachnus Mordvilko	...	169
177.	<i>Tuberolachnus salignus</i> (Gmelin)	...	170
	Tribe Tramini	...	170
	LXXXI. Genus Protrama Baker	...	170
178.	<i>Protrama longitarsus sclerodensus</i> Kumar	...	171
	Subfamily PEMPHIGINAE	...	171
	Tribe Eriosomatini	...	172
	LXXXII. Genus Eriosoma Leach	...	173
179.	<i>Eriosoma lanigerum</i> (Hausmann)	...	173
	LXXXIII. Genus Tetraneura Hartig	...	174
180.	<i>Tetraneura indica</i> sp. nov.	...	175
	Tribe Pemphigini	...	176
181.	<i>Epipemphigus imaicus</i> (Cholodkovsky)	...	177
	LXXXV. Genus Prociphilus Koch	...	177
182.	<i>Prociphilus</i> (<i>Stagona</i>) <i>himalayaensis</i> Chakrabarti	...	178
183.	<i>Prociphilus taxus</i> Ghosh, Chakrabarti, Chowdhuri and Raychaudhuri	...	178

	LXXXVI. Genus Thecabius Koch	...	178
184.	<i>Thecabius affinis</i> (Kaltenbach)	...	179
	Tribe Fordini	...	179
	LXXXVII. Genus Kaburagia Takagi	...	180
185.	<i>Kuburagia ailanthis</i> Chowdhuri, Basu, Chakrabarti and Raychaudhuri	...	180
	LXXXVIII. Genus Smynthurodes Westwood	...	180
186.	<i>Smynthurodes betae</i> Westwood	...	181



INTRODUCTION

Aphids are small soft-bodied homopteran insects which infest almost every plant. Practically no plant part is spared by these insects and as a consequence of their infestations the plants show various malformations. Besides causing direct injury to the plants, some of the species are notoriously known as vectors of quite a few plant viral diseases. The aphids enjoy a more or less cosmopolitan distribution and are found in abundance in places having temperate climate.

Since midnineteenth century a few entomologists focussed their attention to these insects in a more critical manner. This resulted in the publication of regional monographs concerning the taxonomy of these insects. The outstanding work of that time can be found in the publications by Buckton (1876-1883). This taxonomic work on aphids did actually gain momentum in early twentieth century and till date, a series of publications on regional basis are available. Some of the outstanding works are those by Theobald (1914-1920) on African and British aphids ; Hille Ris Lambers (1938-1953) on European aphids ; Börner (1952) on Central European aphids ; van der Goot (1916-1917) on aphids of Dutch East Indies and Holland ; Cottier (1953) on New Zealand aphids ; Palmer (1952) on Rocky Mountain aphids ; Takahashi (1919-1965) and Tao (1961-1970) on Formosan aphids ; Matsu-mura (1910-1920) ; Miyazaki (1971) ; Shinji (1922-1949) and Takahashi (1921-1966) on Japanese aphids ; Das (1918) on Lahore (formerly in India) aphids ; Eastop (1958, 1961) on African and Australian (1966) aphids ; Bodenheimer and Swirski (1957) on aphids of Middle East ; Mordvilko (1914, 1919) and Shaposhnikov (1964) on Russian aphids. Stroyan's (1964) checklist of British aphids contains the most recent opinions on the nomenclature of the 513 British aphids. Fossil aphids from Canadian and Baltic amber have been studied in recent times by Richards (1969) and Heie (1967) respectively.

Szelegiewicz (1969) and Smith (1972) may be consulted for details of these references.

From the above, it is obvious that India, inspite of having enough potentiality as an agricultural country, could not draw the attention of the entomologists to tackle this group of insects until recent times. However, the first report of Indian aphids dates back to 1893 when Cotes reported the aphid species from North-East India. The second report by Buckton appeared in 1896 from North-West India. After a long gap, van der Goot (1913-1917) made a few stray reports from North-East India. Since late 1950's North-East India received the attention in respect of exploration of aphid fauna. Such works have been discussed in the book

'Monograph on Aphids of North-East India and Bhutan edited by D. N. Raychaudhuri (1980). Also, Ghosh, A. K. (1980, 1982, 1984) has worked on the aphid fauna of India and adjacent countries.

Aphids of Peninsular India have been reported by Ayyar (1932), David *et al.* (1968-71), Deshpande (1937), George (1925, 1928) and Krishnamurti (1928, 1930).

Aphids of North-West India were brought to light by Bhattacharyya, Maity and Chakrabarti (1980); Bhalla (1971); Bindra and Sekhon (1969, 1969a); Chakrabarti (1976-1978); Chakrabarti, Ghosh, A. K. and Chowdhuri (1970, 1971a, 1971b, 1972a, 1972b, 1974); Chakrabarti, Chowdhuri and Raychaudhuri, D. N. (1974); Chakrabarti and Verma (1975); Chakrabarti and Maity (1978, 1980, 1982); Chakrabarti and Raychaudhuri, D. N. (1978); Chakrabarti and Bhattacharyya (1982); Chakrabarti, Mandal and Saha (1983); Chowdhuri *et al.* (1969); David and Narayanan (1968); David (1969); David *et al.* (1968-1971); David and Hameed (1975); Das (1918); Das, S. K., Raychaudhuri, D. and Raychaudhuri, D. N. (1981); Doncaster (1956); Goutam and Verma (1982); Ghosh, A. K. *et al.* (1969); Ghosh, L. K. (1969-1977); Ghosh, L. K. and Paramanik (1976); Goot (1971); Hille Ris Lambers (1968); Kumar (1973); Kumar and Burkhardt (1970); Kumar and Lavigne (1970); Maity, Bhattacharyya and Chakrabarti (1980, 1982); Maity and Chakrabarti (1980, 1981); Raychaudhuri, D. N., Ghosh, L. K. and Das, S. K. (1980); Richards and Kumar (1971); Sharma and Bhalla (1964); Stroyan (1964); Verma (1965-1974); since a number of papers of Indian aphids have been published, for limitation in space such references have not been given here.

The present work, however, is concerned with the first consolidated account of aphids occurring in Himachal Pradesh, one of the states in North-west India. This state is comprised of 12 districts and is bounded on the north by Jammu and Kashmir, on the south partly by the Punjab and partly by Uttar Pradesh, on the east by a portion of Great Himalaya and on the west by the Punjab. The altitude of the state varies between 305 and 6,500 metres. The average annual rainfall of the state is about 1523 mm and the maximum and minimum temperatures are on an average of 35°C and 2°C respectively.

The whole territory of Himachal Pradesh is mountaineous. It has a deeply broken topography, complex geological structure and a rich temperate and subtropical flora at different localities. The southern part of the state is as hot as the plains while the northern region has a temperate summer and winter with extreme cold and heavy snowfall. Most of the rainfall is received in monsoon during July and August. The vegetational pattern of the state can be characterised as follows. In the subtropical zone

of the Kulu Himalaya are found *Otia*, *Punica* and others. Forests of *Pinus* are also seen in the temperate zone. Mixed conifer forests show distinct zonation, *Quercus* being generally found with these conifers.

On the southern part of Rhotang pass, *Betula* and *Rhododendron* at the sub-alpine zone and along the pass itself many alpine herbs appear during the summer months. Beyond the Rhotang pass is the district of Lahaul and Spiti. The flora at the interior of this district is of "steppe" type. Several species like *Areneria*, *Asparagus* sp., *Oxytropis*, *Artemisia*, *Ephedra* etc. are found. The dry slopes in Lahaul are marked by shrubby junipers, *Berberis* and *Pedicularis*.

The Sutlej valley system forms another important sector where excellent coniferous-forests are found. Extensive forests are also found in the territory lying between Spiti and Tehri Garhwal Himalayas. The character and composition of the forests vary greatly depending upon the topography, rainfall and altitude. Here *Quercus*, *Pinus* and *Cedrus* are often abundantly found.

From the foregoing account of the state it is perhaps not unreasonable to assume that the aphid fauna will be very much varied because of the intimate association of the aphids and the plants as well as of the climate itself.

In this state, aphid survey has started since 1968 and till 1984 about 251 species belonging to 102 genera were known. Of these, 70 species and 6 genera have been described as new. Among the new species and new genera, 12 and 1 respectively are described in this contribution. Three species of aphids occurring in the state are new records for India. These aphid species are distributed over 7 subfamilies. Of these subfamilies, the subfamily Aphidinae is the most predominant. The above records of aphids give an idea about the endemism of the state as also an idea about the distributional pattern of the known species. An analysis of the aphid fauna of Himachal Pradesh reveals that it constitutes about 5% of the total species known from the world, 24.5% of the species from the Oriental and 35.7% of the species from the Indian aphid fauna. Of the 251 species so far known from Himachal Pradesh, 97 species, constituting 38.5%, are endemic in origin, of the remaining 154 exotic species, about 33% are Palaearctic, 3.5% Ethiopian, 12% Oriental, 4.4% Malayan, 7.5% Nearctic and 1% Australian in Origin. In order to have a glimpse of the aphid species occurring in the area, a table has been given under "Summary and Conclusion".

Of the 251 species so far known, males and oviparous females are known for 37 species. The find of these sexuales in the area hints at the possibility of completion of holocycle for these species, although anholocyclic type of life cycle is shown by majority of the aphids found in the area. The significance of anholocyclic life-cycle needs hardly to be emphasized in

view of the find of a large number of viviparous individuals which initiate colonies on different plants at the same time.

Some of the aphids affect quite a few economically important plants. These are *Hysteroneura setariae* (Thomas), *Macrosiphum (Sitobion) miscanthi* Takahashi, *Rhopalosiphum maidis* (Fitch), *Rhopalosiphum rufiabdominalis* (Sasaki) on cereals ; *Brevicoryne brassicae* (Linnaeus), *Lipaphis erysimi* (Kaltenbach), *Myzus persicae* (Sulzer) on cruciferous plants ; *Aphis gossypii* Glover, *Myzus persicae* on vegetables ; *Chromaphis hirsutustibis* Kumar and Lavigne, *Eriosoma lanigerum* (Hausmann), *Toxoptera aurantii* (Boyer de Fonscolombe), *T. citricidus* (Kirkaldy) on fruit trees.

However, this work provides the first consolidated account of the aphids of Himachal Pradesh and this together with the work of Verma (1965-1974) on Kashmir aphids and that of Chakrabarti and his co-workers (1972-83) on the Kumaon and Garhwal Himalayas gives an idea of the western and central Himalayan aphid species. It may be mentioned here that out of 251 species of aphids known till 1984 from the state, material of 186 species could be examined. For the examined species detailed description of the well known species have been omitted while additional description has been provided with the little known ones. Detailed generic diagnosis has been incorporated. Description of new species or even newly reported morphs of the known species has been given. Under each of the above species, wherever possible, biological notes have been given chiefly to focus the live colour, the site of infestations and association with other insects. The species which were not available for examination have been listed separately along with the necessary references. Running keys, wherever necessary, have been provided for easy identification of the different taxa.

The bulk of the aphid material has been collected by the author and these are in the collections of Zoological Survey of India, Calcutta. The systematic part of work starts with a classified list of aphids dealt with here.

The work has been supplemented by a hostplant-aphid catalogue chiefly to give an idea about polymorphism and host restriction of the species available in this state.

The entire work has been reviewed in brief and suitably illustrated.

The author expresses his deep sense of gratitude to Late Prof. D. N. Raychaudhuri, D. Sc. (Leiden), Department of Zoology, University of Calcutta for kindly suggesting the problem and offering constant guidance during the course of the study. Grateful thanks are due to Director, Zoological Survey of India, Calcutta, for encouragement. He is much thankful to : Dr. S. K. Bhattacharya and Dr. A. K. Ghosh, Scientists D ; Dr. S. K. Tandon and Dr. B. Datta, Scientists C ; Dr. R. C. Basu, Scientist B ; Sri G. Sivagurunathan, Sri B. C. Saha, Sri M. L. De, Sri Pranab Kumar Ghosh and Sri N. C.

Roy, Publication Division, Zoological Survey of India, Calcutta for numerous courtesies.

Sincere thanks are due to Dr. D. Hille Ris Lambers, Bennekom, Holland ; Dr. V. F. Eastop and Dr. J. P. Doncaster, British Museum (Nat. Hist.), England ; Dr. H. L. G. Stroyan, Herpenden, England ; Dr. F. W. Quednau, Quebec, Canada ; Dr. W. R. Richards, Canada, for their valuable comments on the identity of some of the aphid species or for making available some aphid material on loan or for sending valuable off-prints.

Some material were received on loan for study also from Dr. R. Kumar, U. S. National Museum, America ; Dr. M. Miyazaki, Hokkaido University, Japan ; Dr. K. D. Verma, Central Potato Research Institute, Simla ; Dr. S. Chakrabarti, Kalyani University, Kalyani, to whom the author is grateful.

Thanks are expressed to the authorities, Botanical Survey of India, Howrah for identification of plant samples. He is also indebted to Dr. B. K. Behura, Visiting Professor, Meerut University, Meerut, Dr. S. K. David, Madras Christian College, Madras ; Dr. M. R. Ghosh, Bidhan Chandra Krishi Viswabidyalaya and Dr. D. Raychaudhuri, Entomology Laboratory, University of Calcutta, for manifold helps.

Lastly, the author is thankful to his wife Mrs. Gayatri Ghosh, for her active co-operation.

LIST OF ABBREVIATIONS USED

Aptera	: Apterous viviparous female
Alata	: Alate viviparous female
a. s.	: Antennal segment
b. d. III	: Basal diameter of antennal segment III
coll.	: Collector
F. T. C.	: First tarsal chaetotaxy
H. P.	: Himachal Pradesh
h. t. 2	: 2nd segment of hind tarsus
1, 2, 3.... 8	: abdominal segments 1, 2, 3 8 respectively
1. a. t.	: lateral abdominal tubercle
M, Cu and A	: Media, Cubitus and Anal veins respectively
p. t.	: processus terminalis
u. r. s.	: Ultimate rostral segment
U. S. N. M.	: United States National Museum
Y. P. T.	: Yellow Pan Trap

SYSTEMATIC ACCOUNT

Classified list of Aphids of Himachal Pradesh

Family APHIDIDAE

Subfamily ANOECIINAE

Tribe Aiceonini

I. Genus *Aiceona* Takahashi

1. *Aiceona retipennis* David, Narayanan and Rajasingh

Tribe Anoeciini

II. Genus *Anoecia* Koch

2. *Anoecia corni* (Fabricius)
3. *Anoecia himalayaensis* Chakrabarti and Maity

Subfamily APHIDINAE

Tribe Aphidini

Subtribe Aphidina

III. Genus *Aphis* Linnaeus

4. *Aphis citricola* van der Goot
5. *Aphis clematidis simlaensis* Kumar and Burkhardt
6. *Aphis craccivora* Koch
7. *Aphis fabae solanella* Theobald
8. *Aphis gossypii* Glover
9. *Aphis kurosawai* Takahashi
10. *Aphis nasturtii* Kaltenbach
11. *Aphis nerii* Boyer de Fonscolombe
12. *Aphis paraverbasci* Chakrabarti
13. *Aphis pollinosa* Walker
14. *Aphis punicae* Passerini
15. *Aphis ruborum longisetosus* Basu
16. *Aphis verbasci* Schrank

IV. Genus *Toxoptera* Koch

17. *Toxoptera aurantii* (Boyer de Fonscolombe)
18. *Toxoptera citricidus* (Kirkaldy)

Subtribe **Rhopalosiphina**V. Genus **Hyalopterus** Koch

19. *Hyalopterus pruni* (Geoffroy)

VI. Genus **Hysteroneura** Davis

20. *Hysteroneura setariae* (Thomas)

VII. Genus **Melanaphis** van der Goot

21. *Melanaphis meghalayensis meghalayensis* Raychaudhuri and Banerjee

VIII. Genus **Rhopalosiphum** Koch

22. *Rhopalosiphum maidis* (Fitch)
23. *Rhopalosiphum nymphaeae* (Linnaeus)
24. *Rhopalosiphum padi* (Linnaeus)
25. *Rhopalosiphum rufiabdominalis* (Sasaki)

Tribe **Macrosiphini**IX. Genus **Acutosiphon** Basu, Ghosh and Raychaudhuri

26. *Acutosiphon obliquoris* Basu, Ghosh and Raychaudhuri

X. Genus **Acyrtosiphon** Mordvilko

27. *Acyrtosiphon malvae* (Mosley) Complex
28. *Acyrtosiphon phaseoli* Chakrabarti, Ghosh and Raychaudhuri
29. *Acyrtosiphon rubi* Narzikulov
30. *Acyrtosiphon sonchifoliae* Raychaudhuri, Ghosh and Das
31. *Acyrtosiphon* (*Metopolophium*) *graminum* Raychaudhuri, Ghosh and Das
32. *Acyrtosiphon* (*Metopolophium*) *ranunculum* sp. nov.
33. *Acyrtosiphon* (*Microlophium*) *rubifoliae* Raychaudhuri, Ghosh and Basu

XI. Genus **Amphicercidus** Oestlund

34. *Amphicercidus tuberculatus* David, Narayanan and Rajasingh

XII. Genus **Amphorophora** Buckton

35. *Amphorophora ampullata bengalensis* Hille Ris Lambers

XIII. Genus **Aspidophorodon** Verma

36. *Aspidophorodon harvensis* Verma

XIV. Genus **Aulacorthum** Mordvilko

- 37. *Aulacorthum delphinae* Das, Raychaudhuri and Raychaudhuri
- 38. *Aulacorthum magnoliae* (Essig and Kuwana)
- 39. *Aulacorthum nipponicum* (Essig and Kuwana)
- 40. *Aulacorthum rhamni* Ghosh, Ghosh and Raychaudhuri
- 41. *Aulacorthum sclerodorsi* (Kumar and Burkhardt)
- 42. *Aulacorthum solani* (Kaltenbach)
- 43. *Aulacorthum* (*Neomyzus*) *strobilantheae* sp. nov.
- 44. *Aulacorthum* (*Perillaphis*) *perillae* Shinji

XV. Genus **Brachycaudus** van der Goot

- 45. *Brachycaudus amygdalinus* (Schouteden)
- 46. *Brachycaudus helichrysi* (Kaltenbach)

XVI. Genus **Brevicoryne** van der Goot

- 47. *Brevicoryne barbareae* Nevsky
- 48. *Brevicoryne brassicae* (Linnaeus)

XVII. Genus **Capitophorus** van der Goot

- 49. *Capitophorus hippophaes javanicus* Hille Ris Lambers
- 50. *Capitophorus hippophaes mitegoni* Eastop

XVIII. Genus **Cavariella** del Guercio

- 51. *Cavariella aegopodi* (Scopoli)
- 52. *Cavariella himachali* sp. nov.
- 53. *Cavariella konoï* Takahashi
- 54. *Cavariella nigra* Basu
- 55. *Cavariella simlaensis* Chowdhuri, Basu and Raychaudhuri

XIX. Genus **Chaetomyzus** Ghosh and Raychaudhuri

- 56. *Chaetomyzus rhododendri* Ghosh and Raychaudhuri

XX. Genus **Chaetosiphon** Mordvilko

- 57. *Chaetosiphon glaber* David, Rajasingh and Narayanan
- 58. *Chaetosiphon gracilicornis* David, Rajasingh and Narayanan

XXI. Genus **Coloradoa** Wilson

- 59. *Coloradoa rufomaculata* (Wilson)

XXII. Genus **Cryptaphis** Hille Ris Lambers

60. *Cryptaphis rostrata* Chakrabarti and Raychaudhuri

XXIII. Genus **Cryptomyzus** Oestlund

61. *Cryptomyzus taoi* Hille Ris Lambers

XXIV. Genus **Diphorodon** Börner

62. *Diphorodon cannabis* (Passerini)

XXV. Genus **Dysaphis** Börner

63. *Dysaphis atinus* Ghosh, Basu and Raychaudhuri
64. *Dysaphis emicis* (Mimeur)
65. *Dysaphis foeniculus* (Theobald)
66. *Dysaphis ghanii* Stroyan
67. *Dysaphis stroyani* sp. nov.

XXVI. Genus **Eoessigia** David, Rajasingh and Narayanan

68. *Eoessigia indica* David, Rajasingh and Narayanan

XXVII. Genus **Himalayaphis** Ghosh and Verma

69. *Himalayaphis anemones* Ghosh and Verma

XXVIII. Genus **Hyadaphis** Kirkaldy

70. *Hyadaphis coriandri* (Das)

XXIX. Genus **Hyalomyzus** Richards

71. *Hyalomyzus fragaricola* sp. nov.
72. *Hyalomyzus scabripes* David and Narayanan

XXX. Genus **Hyperomyzus** Börner

73. *Hyperomyzus carduellinus* (Theobald)
74. *Hyperomyzus lactucae* (Linnaeus)

XXXI. Genus **Impatientinum** Mordvilko

75. *Impatientinum impatiensae dalhousiensis* Verma

XXXII. Genus **Indoidiopterus** Chakrabarti, Ghosh and Raychaudhuri

76. *Indoidiopterus geranii* (Chowdhuri, Basu, Chakrabarti and Raychaudhuri)

XXXIII. Genus **Indumasonaphis** Ghosh, Basu and Raychaudhuri

- 77. *Indumasonaphis inulae* (Ghosh and Raychaudhuri)
- 78. *Indumasonaphis tuberculatus* Chakrabarti, Mondal and Raha

XXXIV. Genus **Jacksonia** Theobald

- 79. *Jacksonia campanulata* Chakrabarti
- 80. *Jacksonia papillata* Theobald

XXXV. Genus **Liosomaphis** Walker

- 81. *Liosomaphis atra* Hille Ris Lambers
- 82. *Liosomaphis himalayensis* Basu

XXXVI. Genus **Lipaphis** Mordvilko

- 83. *Lipaphis erysimi* (Kaltenbach)

XXXVII. Genus **Longicaudus** van der Goot

- 84. *Longicaudus himalayensis* Hille Ris Lambers

XXXVIII. Genus **Macrosiphoniella** del Guercio

- 85. *Macrosiphoniella kalimpongense* Basu and Raychaudhuri
- 86. *Macrosiphoniella sanborni* (Gillette)
- 87. *Macrosiphoniella yomogifoliae* (Shinji)

XXXIX. Genus **Macrosiphum** Passerini

- 88. *Macrosiphum pachysiphon* Hille Ris Lambers
- 89. *Macrosiphum pseudogeranii* Chakrabarti and Raychaudhuri
- 90. *Macrosiphum rosae* (Linnaeus)
- 91. *Macrosiphum (Sitobion) bambusicola* sp. nov.
- 92. *Macrosiphum (Sitobion) himalayensis* sp. nov.
- 93. *Macrosiphum (Sitobionn) indicum* (Basu)
- 94. *Macrosiphum (Sitobion) miscanthi* Takahashi
- 95. *Macrosiphum (Sitobion) pseudoalpecuri* Chakrabarti
- 96. *Macrosiphum (Sitobion) rosaeiformis* Das
- 97. *Macrosiphum (Sitobion) sikkimensis* Ghosh and Raychaudhuri

XL. Genus **Matsumuraja** Schumacher

- 98. *Matsumuraja capitophoroides* Hille Ris Lambers

XLI. Genus **Micromyzodium** David

- 99. *Micromyzodium filicium* David
- 100. *Micromyzodium strobilanthes* Ghosh

XLII. Genus **Micromyzus** van der Goot

- 101. *Micromyzus nigrum* van der Goot

XLIII. Genus **Myzaphis** van der Goot

- 102. *Myzaphis rosarum* (Kaltenbach)
- 103. *Myzaphis turanica* Nevsky

XLIV. Genus **Myzus** Passerini

- 104. *Myzus ascalonicus* Doncaster
- 105. *Myzus cerasi* (Fabricius)
- 106. *Myzus dycei* Carver
- 107. *Myzus mumecola* Matsumura
- 108. *Myzus obtusirostris* David, Narayanan and Rajasingh
- 109. *Myzus ornatus* Laing
- 110. *Myzus persicae* (Sulzer)

XLV. Genus **Nasonovia** Mordvilko

- 111. *Nasonovia (Neokakimia) rostrata* David and Hameed

XLVI. Genus **Neoacyrthosiphon** Tao

- 112. *Neoacyrthosiphon indicum* Ghosh, Verma and Raychaudhuri

XLVII. Genus **Neomasonaphis** Ghosh and Raychaudhuri

- 113. *Neomasonaphis rhododendris* Chakrabarti, Mondal and Raha

XLVIII. Genus **Neomyzus** van der Goot

- 114. *Neomyzus circumflexus* (Buckton)

XLIX. Genus **Nudisiphon** Chakrabarti and Bhattacharya

- 115. *Nudisiphon chitinicauda* Chakrabarti and Bhattacharya

L. Genus **Raychaudhuriella** Chakrabarti

- 116. *Raychaudhuriella myzaphoides* Chakrabarti

LI. Genus **Rhopalosiphoninus** Baker

- 117. *Rhopalosiphoninus indicus* sp. nov.
- 118. *Rhopalosiphoninus latysiphon* (Davidson)
- 119. *Rhopalosiphoninus longisetosus* Chakrabarti and Ghosh
- 120. *Rhopalosiphoninus sensoriatus* Chakrabarti

LII. Genus **Senisetotarsaphis** Raychaudhuri, Ghosh and Das

- 121. *Senisetotarsaphis jakhuensis* Raychaudhuri, Ghosh and Das

LIII. Genus **Spinaphis** gen. nov.

- 122. *Spinaphis multisetosa* sp. nov.

LIV. Genus **Tricaudatus** Narzikulov

- 123. *Tricaudatus indicus* Ghosh, Basu and Raychaudhuri
- 124. *Tricaudatus polygoni* (Narzikulov)

LV. Genus **Uroleucon** Mordvilko

- 125. *Uroleucon fagopyri* (Chowdhuri, Basu, Chakrabarti and Raychaudhuri)
- 126. *Uroleucon himachali* Ghosh
- 127. *Uroleucon kashmiricus* (Verma)
- 128. *Uroleucon longisetosus* Chakrabarti and Verma
- 129. *Uroleucon minatii* Das, Raychaudhuri and Raychaudhuri
- 130. *Uroleucon simlaensis* Chakrabarti, Ghosh and Raychaudhuri
- 131. *Uroleucon sonchi* (Linnaeus)

LVI. Genus **Vesiculaphis** del Guercio

- 132. *Vesiculaphis pieridis* Basu
- 133. *Vesiculaphis verbasci* Chowdhuri, Basu, Chakrabarti and
Raychaudhuri

LVII. Genus **Xenosiphonaphis** Takahashi

- 134. *Xenosiphonaphis folisacculatus* Kumar and Burkhardt

Tribe **Pterocommatini**

LVIII. Genus **Pterocomma** Buckton

- 135. *Pterocomma populifoliae* (Fitch)

Subfamily CALLIPTERINAE

LIX. Genus **Chaitophorus** Koch

- 136. *Chaitophorus indicus* Ghosh, Ghosh and Raychaudhuri
- 137. *Chaitophorus kapuri* Hille Ris Lambers
- 138. *Chaitophorus manaliensis* Chakrabarti
- 139. *Chaitophorus salijaponicus niger* Mordvilko
- 140. *Chaitophorus pakistanicus* Hille Ris Lambers

LX. Genus **Chromaphis** Walker

- 141. *Chromaphis hirsutustibis* Kumar and Lavigna

LXI. Genus **Euceraphis** Walker

- 142. *Euceraphis chuansiensis* Tao

LXII. Genus **Myzocallis** Prsserini

- 143. *Myzocallis polychaetus* David
- 144. *Myzocallis* (*Hoplocallis*) ? *pictus* (Farrari)

LXIII. Genus **Neobetulaphis** Basu

- 145. *Neobetulaphis pusilla* Basu

LXIV. Genus **Periphyllus** van der Hoeven

- 146. *Periphyllus aesculi* Hille Ris Lambers
- 147. *Periphyllus himalayensis* Chakrabarti
- 148. *Periphyllus vandenboschi* Hille Ris Lambers

LXV. Genus **Shivaphis** Das

- 149. *Shivaphis celti* Das

LXVI. Genus **Sipha** Passerini

- 150. *Sipha maydis* Passerini

LXVII. Genus **Takecallis** Matsumura

- 151. *Takecallis affinis* sp. nov.
- 152. *Takecallis arundinariae* (Essig)

LXVIII. Genus **Tinocalloides** Basu

- 153. *Tinocalloides montanus* Basu

LXIX. Genus *Eutrichosiphum* Essig and Kuwana

- ### Subfamily HORMAPHIDINAE

160. *Astegopteryx minuta* (van der Goot)

161. *Ceratovacuna lanigera* Zehntner

162. *Pseudoregma bucktoni* Ghosh, Pal and Raychaudhuri

163. *Pseudothoracaphis himachali* Raychaudhuri, Ghosh and Das

164. *Reticulaphis distylli rotifera* Hille Ris Lambers and Takahashi

Tribe Cinarini

165. *Cinara confinis tenuipes* Chakrabarti and Ghosh

166. *Cinara chaetorostrata* Ghosh and Raychaudhuri
167. *Cinara maculipes* Hille Ris Lambers

168. *Indocinara hottesis* Ghosh, Basu and Raychaudhuri

Tribe **Lachnini**LXXVII. Genus **Lachnus** Burmeister

169. *Lachnus acutihirsutus* Kumar and Burkhardt
170. *Lachnus longirostrum* David and Ghosh
171. *Lachnus longisetosus* Ghosh
172. *Lachnus tropicalis* (van der Goot)

LXXVIII. Genus **Nippolachnus** Matsumura

173. *Nippolachnus bengalensis* Basu and Hille Ris Lambers
174. *Nippolachnus himalayensis* (van der Goot)
175. *Nippolachnus piri* Matsumura

LXXIX. Genus **Stomaphis** Walker

176. *Stomaphis* ? *longirostris* Fabricius

LXXX. Genus **Tuberolachnus** Mordvilko

177. *Tuberolachnus salignus* (Gmelin)

Tribe **Tramini**LXXXI. Genus **Protrama** Baker

178. *Protrama longitarsus sclerodensus* Kumar

Subfamily **PEMPHIGINAE**Tribe **Eriosomatini**LXXXII. Genus **Eriosoma**

179. *Eriosoma lanigerum* (Hausmann)

LXXXIII. Genus **Tetraneura** Hartig

180. *Tetraneura indica* sp. nov.

Tribe **Pemphigini**LXXXIV. Genus **Epipemphigus** Hille Ris Lambers

181. *Epipemphigus imaicus* (Cholodkovsky)

LXXXV. Genus **Prociphilus** Koch

182. *Prociphilus* (*Stagona*) *himalayaensis* Chakrabarti
183. *Prociphilus taxus* Ghosh, Chakrabarti, Chowdhuri and Raychaudhuri

LXXXVI. Genus *Thecabius* Koch

- 184.
- Thecabius affinis*
- (Kaltenbach)

Tribe **Fordini**LXXXVII. Genus *Kaburagia* Takagi

- 185.
- Kaburagia ailanthi*
- Chowdhuri, Basu, Chakrabarti and Raychaudhuri

LXXXVIII. Genus *Smynthuroides* Westwood

- 186.
- Smynthuroides betae*
- Westwood

Key to the subfamilies of the family APHIDIDAE

- | | | |
|-------|---|-------------|
| 1 (2) | First tarsal segments of adults with 9 or more ventral hairs at least on fore leg and sometimes with a pair of dorsal hairs ; head usually with a median longitudinal suture (Fig. 26) : eyes many-faceted : antennae short, usually 6-segmented, with p. t. less than 0.5 times as long as base of a. s. VI ; primary rhinaria without cilia ; lateral abdominal tubercles absent ; siphunculi usually appearing as hair-bearing cones (Fig. 69) or may be poriform ; empodial hair short and inconspicuous. Media of forewings once- or twice-branched, hindwings with two oblique veins ; cauda broadly rounded (Fig. 99) ; body and appendages usually with many long hairs ... | Lachninae |
| 2 (1) | First tarsal segments of adults always with less than 9 ventral hairs and sometimes with a pair of dorsal hairs ; head may or may not have a median suture ... | ... 3 |
| 3 (4) | Tergite 8 shortened ; head in apterae usually fused with pronotum ; dorsoapical hairs on 2nd tarsal segments usually with expanded apices, if otherwise, then head in apterae either completely or at least laterally free from pronotum ... | ... 5 |
| 4 (3) | Tegite 8 usually normal ; head in apterae usually distinct from pronotum, if rarely fused, then eyes 3-faceted ... | ... 9 |
| 5 (6) | Head in apterae free from pronotum either completely or atleast laterally ; dorsoapical hairs on 2nd tarsal segment fine ; siphunculi, if present, appear either as chitinized rings (Fig. 67) or as slightly truncate cones with chitinized apical rim and siphunculi surrounded by a ring of hairs ; eyes in apterae 3-faceted ; Cu and A in forewing usually placed closely at base, sometimes these may even arise from a common stalk ... | Pomphiginae |

- 6 (5) Head in apterae fused with pronotum ; one or more of apical hairs arising dorsally or dorsolaterally from second tarsal segment of at least apterae with swollen apices ... 7
- 7 (8) First tarsal segments usually with 5 or 7 ventral hairs ; siphunculi usually long and sometimes may appear as short truncate hair—bearing cones ; sometimes posterior abdominal segments with long hair—bearing processes ; secondary rhinaria in alate round or oval to transversely elongate, Cu and A in the forewing placed apart basally ... Greenidocinae
- (7) First tarsal segments usually with less than 5 ventral hairs ; siphunculi never more than truncated cone ; posterior abdominal process never present ; secondary rhinaria in alatae nearly ring-like or transversely oval ; Cu and A in the forewing placed close basally ; eyes in apterae always 3-faceted ... Hormaphidinae
- 9 (10) Empodial hairs usually strap-like, if hair-like, then in apterae head fused with pronotum and eyes 3-faceted ; subanal plate slightly to distinctly indented or bilobed, or very seldom entire ; cauda usually knobbed (Fig. 116) though sometimes knobbed portion may be slightly to distinctly elongate or seldom transversely oval ; siphunculi usually truncate ; head in apterae usually distinct from pronotum but may sometimes be fused ; eyes usually multifaceted, sometimes 3-faceted also ; body sometimes with process ... Callipterinae
- 10 (9) Empodial hairs always fine and head and pronotum in apterae usually separate ; subanal plate never indented or bilobed ... 11
- 11 (12) Processus terminalis usually longer than base or last antennal segment, if rarely shorter, then even siphunculi elongate ; head and pronotum in apterae usually free ; eyes always multifaceted ; siphunculi and cauda usually elongate, sometimes shortened ; body sometimes with process ; secondary rhinaria never subannular or ring-like ; eyes of all forms always multifaceted ; first tarsal segment bearing 2, 3, 4 or 5 ventral hairs and without dorsal hairs ... Aphidinae
- 12 (11) Processus terminalis never longer than base or last antennal segment and usually up to half as long as base of last antennal segment ; siphunculi always cone-shaped with the apical rim not chitinized and with many long hairs ; eyes in apterae 3- or multifaceted ; Cu and A in forewing much apart at base ; all body hairs at least in apterae long and flagellate ... Anoeciinae

Subfamily ANOECIINAE

Following Eastop and van Emden (1972), the subfamily Anoeciinae is divided into two tribes, Anoeciini and Aiceonini which are separated by the following key.

Key to the tribes of the subfamily ANOECIINAE

- | | | | |
|-------|---|-----|-----------|
| 1 (2) | Media of forewing in alatae once-branched, wings not with dark reticulation and without any cell-like scales ; abdomen with large sclerites reaching margin | ... | Anoeciini |
| 2 (1) | Media of forewing twice-branched ; wings with dark reticulation and with numerous cell-like scales ; abdomen usually without such large sclerites reaching margin | ... | Aiceonini |

The tribe Anoecini is represented by the genus, *Anoecia* Koch and the tribe Aiceonini by *Aiceona* Takahashi.

Tribe Aiceonini

I. Genus *Aiceona* Takahashi

1921. *Aiceona* Takahashi, *Spec. Rep. Formosa agric. Exp. Stn.*, 20 : 85.

Type-species : *Aiceona actinodaphnis* Takahashi, 1921.

Body elongate, pale to pale brown. Head pale, with a median suture, frons flat to slightly convex, without lateral frontal tubercle, with numerous long and fine dosal hairs. Antennae concolourous with head, usually 6-segmented in both apterae and alatae, rarely 5-segmented, about 0.3-0.6 times as long as body, also densely covered with long and fine hairs ; flagellar segments usually with spinular imbrications, these are dense apically ; p. t. short, about 0.2-0.9 times as long as base of last antennal segment, bearing 5-14 hairs ; secondary rhinaria large, round to oval, protuberant, nonciliated, a few small and round slightly protuberant accessory rhinaria present singly or in clusters, and placad either far from or close to primary rhinaria on last segment. Eyes 3-faceted in apterae but in alatae multifaceted with reduced triommatidia. Rostrum usually extends up to hind coxae, u. r. s. short, smooth, stiletto-shaped, with 2-6 secondary hairs longer than primary ones and shorter to longer than h. t. 2. Abdomen pale with segmentation usually indistinct, covered with long hairs which are usually with acute apices, dorsal hairs rarely on sclerotic bases ; alatae sometimes with segmentally arranged distinct dorsal sclerites which are longer caudad ; each of segments 1-6 marginally with a cluster of hairs ; each of tergites 7 and 8 with 12-16 long and stout hairs. Siphunculi on pale to brown cones and surrounded by long hairs. Cauda usually pale, broadly rounded with numerous long hairs. Subanal

plate indistinct. Legs pale brown to brown ; trochanters indistinctly fused with femora ; first tarsal segments with 5-8 hairs. Wings pale to smoky with short pterostigmata. Media of forewings twice-branched, hindwings with two oblique veins.

The genus is restricted to Southeast Asia. Takahashi (1921, 1960 and 1963) dealt with Japanese species. Ghosh, M. R. and Raychaudhuri, D. N. (1973) have given detailed account of the genus.

Distribution : India ; Japan ; Malaysia, Taiwan and Thailand.

Tribe Aiceonini

1. *Aiceona retipennis* David, Narayanan and Rajasingh

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

Aiceona retipennis David *et al.* ; 1972. Ghosh, L. K. *Oriental Ins.*, **6** (2) : 195.

Material examined : 4 apterae and 4 alatae, on undetermined plant of Minispermaceae, Gleen, 30.v.1969, Coll. L. K. Ghosh.

Biological notes : The specimens were collected from the surface of the young leaves and shoots of the host plant. No attendant ant was found in association with the aphids.

Remark : Ghosh, M. R. and Raychaudhuri, D. N. (1973) gave comments on the species from India.

Tribe Anoeciini

II. Genus *Anoecia* Koch

1857. *Anoecia* Koch, *Die Pflanzen. Aphiden, Nurnberg*, **3** : 275.

Type-species : *Aphis corni* Fabricius, 1775.

Body broadly oval. Head smooth and dark ; frons smooth and convex ; dorsal cephalic hairs fine. Antennae 6-segmented, dark, densely covered with fine hairs ; p. t. about 0.3 times as long as base of a. s. VI ; large, elongate to oval, protuberant secondary rhinaria present on a. s. III, IV and V in alatae. Eyes 3-faceted in apterae but in alatae multifaceted with distinct triommatidia. Rostrum reaching base of midcoxae ; u. r. s. about 0.8 times as long as h.t.2 and with 7-10 secondary hairs. Abdominal dorsum pale with sclerotic pigmentation besides scattered marginal sclerites and transverse sclerotic bands on segments 7 and 8 ; dorsal hairs numerous with fine, incrassate or fan-shaped apices, arranged irregularly upto segment 6, those on segments 7 and 8 arranged more or less in transverse rows, alatae with a sclerotic patch over segments 3-6. Siphunculi ring-like, on

dark brown cones surrounded by numerous short and fine hairs. Cauda dark brown, broadly rounded with numerous short and fine hairs. Subanal plate entire. Subgenital plate indistinct. Legs brown with numerous fine hairs ; first tarsal segment of fore and mid legs, each with 5 or 6 hairs, that of hind leg with 5, 6 or 7 hairs ; second tarsal segment not imbricated, with many long flagellate hairs and a pair of short, thick and blunt hairs dorsoapically. Wings pale with short pterostigma. Media of forewing once-branched, hindwing with two oblique veins.

Palmer (1952) discussed north American species. Shaposhnikov (1964) dealt with European Russian species ; Stroyan (1964) gave an account of the species from Britain and Szelegiewicz (1968a) made contributions on European species.

The genus shows close resemblance to *Aiceona* Takahashi which according to Eastop and van Emden (1972) belongs to the subfamily Anoeciinae but under a separate tribe Aiceonini. Takahashi (1960) has mentioned the difference between *Anoecia* and *Aiceona*.

Distribution : Cosmopolitan.

Key to the species of the genus Anoecia Koch

Alate viviparous female :

Hairs on tergite 5-7 spatulate ; abdominal hairs 2.0-2.1 times as long as b. d. III ; u. r. s. about 0.81 times as long as h. t. 2 ... *corni* (Fabricius)

— Hairs on tergite 5-7 mostly with flagellate apices and not spatulate ; abdominal hairs 3.1-3.6 times as long as b. d. III ; u. r. s. about 0.68-0.75 times as long as h. t. 2 ... *himalayensis* Chakrabarti and Maity

2. *Anoecia corni* (Fabricius)

(Fig. 190)

1775. *Aphis corni* Fabricius, *Syst. Entom.*, : 832.

1857. *Aphis corni* (Fabricius) ; Koch, *Die Pflanzen. Aphiden*, Nurnberg, 3 ; 275.

1970. *Anoecia corni* (Fabricius) ; Chakrabarti, Ghosh, A. K. and Raychaudhuri, D. N. *Oriental Ins.* 4 (4) ; 447.

Material examined : 1 alata, on *Cornus* sp., Simla, 3.iv.1967, coll. K. D. Verma ; 1 alata, on undetermined tree, Simla, 11.viii.1966, coll. R. Kumar ; 3 alatae, on snow, Kufri, 15.xii.1973, coll. L. K. Ghosh.

Distribution : Cosmopolitan.

3. *Anoecia himalayensis* Chakrabarti and Maity1978. *Anoecia himalayensis* Chakrabarti and Maity, *Entomon*, **3** (2) ; 265.*Material examined* : 1 alata, on undet. Grass root, Simla, 26.xi.1972, coll. S. Chakrabarti.*Remarks* : The species is characterised by its having abdominal sclerotisation and absence of spatulate hairs on anterior abdominal tergites.*Distribution* : India : Himachal Pradesh, Uttar Pradesh.

Subfamily APHIDINAE

Key to the Tribes of the subfamily APHIDINAE

1. Spiracles of abdominal segments 1 and 2 usually placed close together, these may be so close that their pigmented areas touch each other ; lateral abdominal tubercles variably present on segments 2-5 or these may be altogether absent, if such tubercles present on segments 1 and 7, then these not larger than those present on other segments ; lateral frontal tubercles usually moderately to well-developed, sometimes these are nearly absent ; apterae with or without secondary rhinaria ; siphunculi with or without reticulation and hair ; alatae often with a dorsal abdominal black patch ; antennal hairs usually with somewhat expanded apices even when the hairs are very small and inconspicuous, very rarely with fine apices ...

Macrosiphini

Spiracles of abdominal segments 1 and 2 placed far apart ; abdominal segments 1 and 7 usually with lateral tubercles, if lateral abdominal tubercles present on segments 2-6, then these smaller than those on 1 and 7, lateral frontal tubercles not or hardly developed ; antennae and body usually with hairs of normal length, sometimes antennal hairs long but never with expanded apices ; aptera without secondary rhinaria ; alatae usually without a solid black dorsal abdominal patch ...

Aphidini

Tribe Aphidini

Key to the subtribes

- 1 (2) Lateral tubercles on abdominal segments 1 and 7 posterodorsal to the spiracles of those segments ; frons with a 'rhopalosiphine' type of small projection just inner to the antennal sockets ...
- 2 (1) Lateral tubercles on abdominal segments 1 and 7 posteroventral to the spiracles of those segments ; frons normal and without any projection as above ...

Rhopalosiphina

Aphidina

Key to the genera of the subtribe Aphidina

- | | |
|---|-----------------------|
| 1 (2) Hind tibiae with a series of peg-like projections (Fig. 225) along with normal hairs ; venter of abdominal segments 5 and 6 with dense spinules arranged in rows ; F. T. C. 3, 3, 3 or 3, 3, 2 ; M of forewing usually twice-branched or sometimes once-branched... | <i>Toxoptera</i> Koch |
| 2 (1) Hind tibiae without any peg-like structure ; abdominal venter never with dense rows of spinules as above ; F. T. C. usually 3, 3, 2 ; M of forewing twice-branched ... | <i>Aphis</i> Linnaeus |

III. Genus *Aphis* Linnaeus

1758. *Aphis* Linnaeus, *Syst. Nat.*, 1 (10 ed.) : 451.

Type-species : *Aphis sambuci* Linnaeus, 1758.

Aphis Linn. ; Raychaudhuri, D. N. (ed.) 1980. Aphids of North East India and Bhutan : 49.

Body broadly oval to elongate. Head smooth and without lateral frontal tubercles ; frons straight or slightly convex, smooth. Antennae 6-segmented (sometimes 5-segmented), shorter to longer than body ; flagellum faintly to distinctly imbricated, pale or pigmented ; p. t. slightly to distinctly longer than base of a. s. VI ; apterae without secondary rhinaria ; alatae with roundish secondary rhinaria on segment III, sometimes also on segments IV and V. Ultimate rostral segment with 2-9 secondary hairs (usually 2-4). Mid-thoracic furca in apterae usually sessile. Abdomen pale or with a dorsal patch in apterae, in alatae usually with scattered segmental sclerites on dorsum. Spiracles normal ; lateral tubercles on abdominal segment 1 placed between 1st and 2nd spiracles. Siphunculi cylindrical, tapering, imbricated, usually longer than elongate, pale or dark cauda usually with a basal constriction and bearing 4-12 hairs. F. T. C. 3, 3, 3 or 3, 3, 2. Wing venation normal.

The genus includes large group of species. Palmer (1952) discussed north American species. European Russian species have been dealt with by Shaposhnikov (1964) and Japanese species by Takahashi (1966).

Distribution : Cosmopolitan.

Key to the species of the genus Aphis Linnaeus

Apterae viviparae :

- | | |
|--|----------------------------|
| 1 (4) Ultimate rostral segment stiletto-shaped ... | ... 2 |
| 2 (3) First tarsal chaetotaxy 3, 3, 2 ; p. t. about 1.8 times as long as base of a. s. VI ; u. r. s. about 1.6 times as long as h. t. 2 ; life colour greenish ... | <i>kurosawai</i> Takahashi |

3 (2)	First tarsal chaetotaxy 3, 3, 3 ; p. t. about 1.08-1.45 times as long as base of segment VI ; u. r. s. about 1.9-2.2 times as long as h. t. 2 ; life colour unknown...	<i>paraverbasci</i> Chakrabarti	
4 (1)	Ultimate rostral segment not stiletto-shaped ...	...	5
5 (6)	First segment of hind tarsus with 3 hairs ; second tarsal segment with both dorsal and ventral secondary hairs ; siphunculi and cauda blackish ; siphunculi about twice as long as cauda with 10-12 hairs ; yellowish to dark yellow in life ...	<i>nerii</i> Boyer de Fonscolombe	
6 (5)	First segment of hind tarsus with 2 hairs ...	...	7
7 (8)	8th tergite with 3-5 hairs ; cauda dark, bearing 12-15 hairs ; blackish in life ...	<i>fabae solanella</i> Theobald	
8 (7)	8th tergite usually with 2 hairs ; cauda pale or darker ...	...	9
9 (10)	Dorsum of abdomen usually completely sclerotic, having a pale area around the siphunculi and with distinct 'aphidine' polygonal reticulation ; cauda elongate, somewhat pointed apically, with 5-7 hairs ; p. t. about 1.6-2.5 times as long as base of a. s. VI ; u. r. s. about 0.8-1.0 times as long as h. t. 2 ; siphunculi about 1.4-2.0 times as long as cauda ; shiny-black in life ...	<i>craccivora</i> Koch	
10 (9)	Abdominal dorsum not pigmented ; colour in life various, but never shiny-black ...	...	11
11 (12)	Dorsal hairs on abdomen long, those on anterior tergites about 2.0-2.5 times as long as b. d. III ; u. r. s. about 1.3-1.5 times as long as h. t. 2 which is about 100 μ long ; p. t. about 2.5 times as long as base of a. s. VI ; pale whitish in life ...	<i>ruborum longisetosus</i> Basu	
12 (11)	Dorsal abdominal hairs mostly shorter, longest one on anterior tergites less than twice (1.4-1.6 times) as long as b. d. III ...	...	13
13 (14)	Siphunculi pale, dusky only near apices ; cauda pale to blackish ; p. t. about 2.5-3.1 times as long as body ; u. r. s. about 1.2-1.4 times as long as h. t. 2 ; greenish in life ...	<i>punicae</i> Passerini	
14 (13)	Siphunculi brown to blackish ...	...	15
15 (16)	Longest femoral hair as long as or longer than maximum width of femora ; cauda blackish, bearing 9-14 hairs ; yellowish in life. ...	<i>citricola</i> van der Goot	
16 (15)	Longest femoral hair appreciably shorter than maximum width of femora ; cauda pale to dusky ...	...	17
17 (18)	Antennae usually 5-segmented ; secondary hairs on u. r. s. variable, may be up to 9 ; life colour unknown	<i>pollinosa</i> Walker	

18 (17)	Antennae usually 6-segmented ; secondary hairs on u. r. s. usually with only 2 hairs	...	...	19
19 (20)	Cauda blackish with more than 8 hairs (10-16) ; yellowish brown in life	...	<i>verbasci</i> Schrank	
20 (19)	Cauda pale to dusky but never black ; caudal hairs always less than 8	...	...	21
21 (22)	Second tarsal segments with only three pairs of primary hairs ; siphunculi as long as or a little longer (1.2 times) than cauda bearing 4-5 hairs ; brownish in life	...	<i>nasturtii</i> Kaltenbach	
22 (21)	Second tarsal segments with secondary hairs in addition to primary hairs	...	...	23
23 (24)	Siphunculi pigmented on distal 0.3-0.4 portion ; u. r. s. about 1.5 times as long as h.t. 2 ; cauda dusky, with 5 hairs ; life colour unknown	...	<i>clematidis simlaensis</i> Kumar & Burkhardt	
24 (23)	Siphunculi not as above ; u. r. s. as long as or a little longer than h. t. 2 ; cauda pale to dusky, with 4-7 hairs ; life colour variable	...	<i>gossypii</i> Glover	

4. *Aphis citricola* van der Goot

1912. *Aphis citricola* van der Goot, *Rec. Indian Mus.*, 13 : 175.

1969. *Aphis spiraeicola* Patch ; Chowdhuri, Basu, R. C., Chakrabarti and Raychaudhuri, D. N., *Oriental Ins.*, 3 (1) : 84.

1984. *Aphis citricola* van der Goot ; Agarwala and Ghosh, A. K. occ. paper No. 50, *Rec. zool. Surv. India* : 4.

Material examined : 2 apterae, on *Amaranthus viridis*, Mashobra, 12.xii.1973, coll. L. K. Ghosh ; 1 aptera and 2 alatae, on *Spiraea chanoidri*, Phagli, 14.xii.1973, coll. L. K. Ghosh ; 1 aptera, on *Anaphalis contorta*, Simla, 20.x.1968 ; 1 aptera and 6 alatae, on *Cosmos* sp., Simla, 29.x.1969 ; 1 alata on *Bidens wallichii*, Simla, September, 1966 ; 2 apterae, Simla, July, 1966, coll. A. N. Chowdhuri.

Biological notes : The specimens were collected from the undersurface of the leaves of host plant. No ant was found to attend the aphids but many syrphid larvae were found devouring the aphids vigorously.

Distribution : India : all over ; Africa ; America ; Australia ; Bermuda Is. ; China ; Nepal ; New Zealand ; Pakistan ; Sri Lanka and Syria.

5. *Aphis clematidis simlaensis* Kumar and Burkhardt

1970. *Aphis clematidis simlaensis* Kumar and Burkhardt, *J. Kans. ent. Soc.*, 43 (4) : 463.

Material examined : 1 aptera, 3 alatoid males and 2 oviparae, on *Veronica agrestis*, Kalpa, 26.x.1975, coll. A. N. Chowdhuri.

Apterous Oviparous Female : Body oval, about 1.14-1.23 mm long with 0.54-0.84 mm as maximum width. Head pale brown. Antennae 6-segmented, about 0.48-0.50 times as long as body ; flagellar hairs about 6-9 μ long, the longest hair on a. s. III about 2.0-2.5 times as long as b. d. III ; p. t. about 2.0 or a little more than 2.0 times the base of a. s. VI. Rostrum short, reaching up to mid coxae ; u. r. s. about 1.4 times as long as h. t. 2 and with 2 secondary hairs. Abdominal dorsum pale ; dorsal hairs about 9 μ long and about as long as longest hair on a. s. III ; 4 hairs on 8th tergite up to about 30 μ long and the longest hair about 2.0-3.1 times as long as longest hair on a. s. III. Siphunculi cylindrical, imbricated on distal 0.3-0.4 portion, pigmented, about 2.0 times as long as bluntish, dusky cauda bearing 5 hairs. Subgenital plate with many small and fine hairs. Hind tibiae swollen, with many pseudosensoria (shrunk) and with maximum width about twice the mid-width of other tibiae. Other characters as in apterous viviparous female.

Measurements (in mm) of an ovipara : Length of body 1.23 ; width of body 0.84 ; antenna 0.71 ; a. s. III 0.19 ; IV 0.10, V 0.11, VI (0.07+0.19) ; u. r. s. 0.09 ; h. t. 2 0.06 ; siphunculus 0.19 ; cauda 0.10.

Biological notes : The yellowish aphids were found scattered on the undersurface of the leaf of the host plant. No ant was noticed to attend the aphids.

Note : The oviparous morph is described for the first time. Kumar and Burkhardt (1970) did not mention about the number of hairs on u. r. s., which are two in the material examined.

A perusal of literature reveals that there exists no record of true apterous male of any *Aphis* species, except that by Kumar and Burkhardt (*op. cit.*) for this subspecies. The material, however, was not available for examination. The author has collected some alatoid males of this subspecies from the same locality from where Kumar and Burkhardt reported it.

Distribution : India : Himachal Pradesh.

6. *Aphis craccivora* Koch

1854. *Aphis craccivora* Koch, *Die Pflanzen. Aphiden, Nurnberg*, 1 : 124-125.

1968. *Aphis craccivora* Koch ; Chowdhuri, Basu, R. C., Chakrabarti and Raychaudhuri, D. N., *Sci. Cult.*, 34 : 133.

Material examined : 6 apterae and 1 alata, on *Phaseolus* sp., Saproon, 2.ix.1969, coll. O. B. Chhotani.

Biological notes : Brown to blackish brown or shiny black aphids infest the aerial parts of the host plants. Black ants and a few Coccinellid beetles were found to attend or predate the aphids.

Distribution : Cosmopolitan.

7. *Aphis fabae solanella* Theobald

1914. *Aphis fabae solanella* Theobald, *Bull. ent. Res.*, 4 : 325.

1969. *Aphis polygonaceae* Matsumura ; Chowdhuri, Basu, R. C., Chakrabarti, and Raychaudhuri, D. N., *Oriental Ins.*, 3 (1) : 83.

Material examined : Many apterae and alatae, on undetermined plant of Compositae ; Solan, 2.vi.1969, coll. L. K. Ghosh ; many apterae and 1 alata, on *Sonchus* sp., Simla Hills, 1.vi.1969, coll. L. K. Ghosh ; 4 apterae, on *Rumex acetocella*, Simla, April, 1966, coll. A. N. Chowdhuri.

Biological notes : The dark brown aphids were collected from the under-surface of the leaves of the host plants. Infestation was heavy and leaves appeared curled. Coccinellid and syrphid larvae were found to prey the aphids.

Remarks : Chowdhuri *et al.* (1969) recorded *Aphis polygonaceae* Matsumura from Himachal Pradesh. Re-examination of the material reveals that it is *Aphis fabae solanella* Theobald because of presence of 4 hairs on 8th abdominal tergite, and these are about 2.4 times as long as b. d. III and a. s. IV and V together rather longer than a. s. VI.

Distribution : Virtually cosmopolitan.

8. *Aphis gossypii* Glover

1877. *Aphis gossypii* Glover, *Rept. Corn. Agr. Operations Dept. for 1876* : 36.

1975. *Aphis gossypii* Glover ; David and Hameed, *Oriental Ins.*, 9 (2) : 215.

Material examined : Many apterae and nymphs, on undetermined plant of Malvaceae, Solan, 1.vi.1969 ; many apterte, on undetermined Creeper, Solan, 1.vi.1969 ; 4 apterae, 5 nymphs and 1 alata on undetermined plant, 2.vi.1969 ; 5 apterae, on *Urtica parviflora* ; Simla, 7.i.1970 ; 4 apterae on *Bidens bipinnata*, Mashobra, 13.xii.1973 ; 4 apterae on *Verbena officinalis* Mashobra, 12.xii.1973 ; many apterae and nymphs on wild Palak, Mashobra, 13.xii.1973, all L. K. Ghosh coll.

Biological notes : It is highly polyphagous species having much variable colour and size even in the same colony. Dense colonies are found on the tender shoot and undersurface of tender leaves. In case of severe attack, in the susceptible varieties due to sucking of cell sap the leaves get curled and the colour of the leaves gradually fades out. The plant finally dries up. Black sooty mould develops on the honey dew given out by the aphid on the leaves.

Remarks : This is the commonest species of aphid found abundantly in the plains and hills almost throughout the year.

Distribution : Cosmopolitan.

9. *Aphis kurosawai* Takahashi

1921. *Aphis kurosawai* Takahashi, *Aphididae of Formosa*, pt. 1 : 53.

1972. *Aphis kurosawai* Takahashi ; Ghosh, L. K. *Oriental Ins.*, 6 (2) : 169.

Material examined : 1 aptera, 2 alatae and many nymphs, on *Rhododendron* sp., Solan, 2.vi.1969, coll. L. K. Ghosh.

Biological notes : The brownish yellow aphids were collected from the apical tender shoots of the host plants. Ants were found in association with the aphids.

Distribution : India : Assam, Himachal Pradesh, Sikkim, Uttar Pradesh, West Bengal ; China ; Formosa ; Japan and Taiwan

10. *Aphis nasturtii* Kaltenbach

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

1969. *Aphis nasturtii* Kaltenbach ; Chowdhuri, Basu, R. C., Chakrabarti and Raychaudhuri, D. N. *Oriental. Ins.*, 3 (1) : 83.

Material examined : 5 apterae, 3 alatae, 2 nymphs, on *Mentha arvensis*, Simla, ix.1966 ; 2 apterae, on *Clematis* sp., Simla, 30.x.1969 ; alate male on indet. thorny shrub ; Khadrula, 30.xi.1968, coll. A. N. Chowdhuri.

Biological notes : The yellowish to blackish aphids were collected from the tender shoots and undersurface of the leaves of the host plants. Ants were found to attend this aphid.

Remarks : Ghosh, A. K., Chakrabarti, Chowdhuri and Raychaudhuri, D. N. (1969) described alate male taken on thorny shrub at Khadrula, Himachal Pradesh. The discovery of the alate male in the colony of viviparae on the host plant suggests that the species may lead holocyclic life-cycle in the area.

Distribution : India : Arunachal Pradesh, Haryana, Himachal Pradesh, Meghalaya, Nagaland, Nepal, Sikkim, West Bengal ; America ; Europe ; Middle East ; Pakistan and Taiwan.

11. *Aphis nerii* Boyer de Fonscolombe

1841. *Aphis nerii* Boyer de Fonscolombe, *Annls. Soc. Ent. Fr.*, 10 : 179.

1974. *Aphis nerii* Boyer de Fonscolombe ; Chakrabarti, Chowdhuri and Raychaudhuri, D. N., *Sci. Cult.*, 40 : 461.

Material examined : 8 apterae and 1 nymph, host unidentified, Mashobra, 28.iv. 1970, coll. A. N. Chowdhuri.

Misra and Behura (1969) have studied detailed morphology of the species which is attended by *Crematogaster contempta* (Mayr) and *Acantholepis frauenfeldi* (Mayr).

Distribution : India : all over ; Africa ; America ; Australia ; Burma ; British Guinea ; China ; Europe ; Fiji, Indo China ; Japan ; Java ; Korea ; Malaysia ; Middle East ; Nepal ; New Zealand ; Sri Lanka and Solomon Is.

12. *Aphis paraverbasci* Chakrabarti

1976. *Aphis paraverbasci* Chakrabarti, *Entomon*, 1 (2) : 171.

Material examined : 10 apterae, on a plant of Labiatae ; Simla, Kufri, 27.xii.1972, coll. S. Chakrabarti.

Remark : Chakrabarti (1976) described the species from apterous viviparous female collected at Simla. S. K. Das *et al.* (1981) described apterous females collected at Manali, H. P. Sexual male is yet to be discovered.

Distribution : India : Himachal Pradesh.

13. *Aphis pollinosa* Walker

1849. *Aphis pollinosa* Walker, *Zoologist*, 7. Lii : 217.

Material examined : 1 aptera, 2 alatae and 3 apterae oviparae ; Simla Hills, on *Epilobium hirsutum*, 30.v.1969, coll. L. K. Ghosh.

Apterous Oviparous Female : Body 1.50-1.80 mm long with 0.72-0.81 mm as maximum width. Head brown with the front sinuous, smooth ; dorsal cephalic hairs about 2.0 times as long as b. d. III. Antennae 5-segmented, about 0.40-0.45 times as long as body ; a. s. III faintly imbricated, rest of the flagellum more distinctly imbricated from base towards apex ; flagellar hairs sparse, acute, up to about 25 μ long, longest one on a. s. III about as long as basal diameter of the segment ; p. t. 2.1-3.2 times as long as base of a. s. VI. Eyes with distinct triommatida. Rostrum reaches base of 3rd coxae ; u. r. s. with straight sides, about 1.4 times as long as h. t. 2 and bearing usually 2 secondary hairs (one specimen with 9 secondary hairs). Abdomen pale, smooth ; dorsal hairs acute, up to about 35 μ long, longest one on anterior tergites about 1.6 times as long as b. d. III ; 8th tergite with 2 long hairs, these being up to about 48 μ long and 2.1 times as long as b. d. III. Siphunculi cylindrical, imbricated, about 0.90-0.13 times as long as body and about 1.0-1.6 times as long as cauda. Cauda dusky with very base somewhat constricted and apex rounded, bearing 12 hairs. Hind tibiae swollen with maximum width about 2.3 times as long as middle diameter of other tibiae, with numerous small round pseudosensoria distributed irregularly along entire length except on apical 0.16 portion. F. T. C. 3, 3, 2. Genital plate brown, with many small pointed hairs.

Biological notes : The aphids were found in colony on the growing shoots of the host plant. No ant was found in association.

Notes : So far, no report of sexuales of this species is known to the author.

Recently, a few oviparae were discovered in a colony of alatae and apterae occurring on *Epilobium hirsutum*. The morph is, therefore, described for the first time. The find of both apterae, alatae and oviparae on the above host plant suggests that the species possibly enjoys holocyclic life cycle in the north west Himalaya. The species of the genus *Aphis* usually have 2-4 secondary hairs on u. r. s. But while examining the oviparae, it was found that one specimen had 9 secondary hairs on u. r. s. which is unusual in *Aphis* Linnaeus. In this context, mention should be made that Eastop (1966) asserts in the generic description that the hairs on u. r. s. vary from 2-4 and rarely up to 7. The present observation, however, extends the number of such hairs to 9.

The species including oviparous morph is hitherto reported for the first time from India.

Distribution : India : Himachal Pradesh.

14. *Aphis punicae* Passerini

1868. *Aphis punicae* Passerini, *Arch. zool. Anat. Fisiol. (Modena)*, 2 : 32.

1969. *Aphis punicae* Passerini ; Chowdhuri, Basu, R. C. and Raychaudhuri, D. N. *Sci. Cult.*, 35 : 335.

Material examined : Many apterae, on *Punica granatum*, Nagwain, Kulu, 12.xi.1968, coll. A. N. Chowdhuri.

Distribution : India : Meghalaya, Himachal Pradesh, West Bengal ; Africa ; Europe and Middle East.

15. *Aphis ruborum longisetosus* Basu

1969. *Aphis ruborum longisetosus* Basu, A. N., *Oriental Ins.*, 3 (4) : 356.

1969. *Aphis? ruborum* (Börner) ; Chowdhuri, Basu, R. C. and Raychaudhuri, D. N., *Sci. Cult.*, 35 : 336.

Material examined : Many apterae and nymphs, on *Rubus ellipticus*, Simla, 12.xii.1973, coll. L. K. Ghosh.

Biological notes : The brown to reddish-brown aphids were collected from the stems and the undersurface of young leaves of the host plant. No attendant ant was found.

Distribution : India : Arunachal Pradesh, Himachal Pradesh, Manipur, Meghalaya, Nagaland, Sikkim, Uttar Pradesh and West Bengal.

16. *Aphis verbasci* Schrank

1801. *Aphis verbasci* Schrank, *Fauna Boica* II. *Inglostadt*, 2 : 106.

1969. *Aphis verbasci* Schrank ; Chowdhuri, Basu, R. C., Chakrabarti and Raychaudhuri, D. N. *Oriental Ins.*, 3 (1) : 84.

Material examined : 1 aptera, on *Verbascum thapsus*, Simla, Bagrata, 22.xii.1968 ; 1 aptera, on *Polygonum alatum*, Simla, September, 1966 ; 1 aptera, on *Cedrum deodara*, Simla, August, 1966 ; 1 alata, on *Buddleia paniculata*, Simla, April 1966, coll. A. N. Chowdhuri.

Distribution : India : Himachal Pradesh, Uttar Pradesh ; Europe and Middle East.

IV. Genus *Toxoptera* Koch

1856. *Toxoptera* Koch, *Die Pflanzen. Aphiden*, 3 : 253.

Type-species : *Toxoptera aurantiae* Koch, 1856

= *Aphis aurantii* Boyer de Fonscolombe, 1841.

Body broadly oval, pale to brown in colour. Head smooth, without lateral frontal tubercles. Antennae 6-segmented, shorter to a little longer than body ; flagellum gradually more distinctly imbricated from base towards apex ; apterae without secondary rhinaria, alatae with secondary rhinaria on a. s. III, sometimes also on a. s. IV ; p. t. 2-6 times as long as base of a. s. VI ; flageller hairs short with acute or slightly blunt apices. Rostrum extends up to hindcoxae ; u. r. s. nearly as long as or slightly longer than h. t. 2, bearing usually 2 secondary hairs. Dorsum of abdomen in apterae pale, with polygonal reticulations and with large post-siphuncular patch, in alatae also pale with segmentally arranged spinopleural patches, postsiphuncular patch and transverse bars on 7th and 8th tergites ; dorsal hairs like flagellar hairs. Siphunculi brown to dark brown, imbricated, cylindrical with ill-developed flange at tip. Cauda elongate with many hairs. Legs pale except femora, base and apex of tibiae and tarsi which are darker. F. T. C. 3, 3, 3 or 3, 3, 2. Media of forewings once- or twice-branched and hindwings with two oblique veins.

The genus is characterized by the dark spinular striae on abdominal venter and short, thick, peg-like structures on hind tibiae (Fig. 225) which together with striae form stridulatory apparatus.

Mondal *et al.* (1976) have given an account of the genus from Eastern India. Stroyan (1961), Tao (1961), Eastop (1966) have also dealt with the genus.

Distribution : Cosmopolitan.

Key to the species of the genus Toxoptera Koch

Apterae viviparae :

Longest hair on antennal segment III shorter than

b. d. III ; siphunculi sparsely imbricated ; cauda with

9-17 hairs ; black in life

... *aurantii* (Boyer de Fonscolombe)

- Longest hair on antennal segment III about 1.25-1.5 times as long as b. d. III ; siphunculi heavily imbricated, black ; cauda with 25-36 hairs ; dark brown in life ... *citricidus* (Kirkaldy)

17. *Toxoptera aurantii* (Boyer de Fonscolombe) (Fig. 225)

1841. *Aphis aurantii* Boyer de Fonscolombe, *Ann. ent. Soc. Fr.*, **10** : 178.
1975. *Toxoptera aurantii* Boyer de Fonscolombe ; Hameed, Sud Giamzo, *Indian J. Ent.*, **37** (2) : 204.

Material examined : 3 apterae and 2 nymphs, on *Prunus* sp., Simla, 10.xii.1971, coll. L. K. Ghosh.

Biological notes : Shiny brownish black to black aphids infest the tender shoots of the host plants. Nymphs are reddish brown in life.

Remarks : *T. aurantii* (Boyer de Fonscolombe) is biologically very different from *T. citricidus* (Kirkaldy) attacking a very large number of host plants besides those of Rutaceae. It is far less common than *T. citricidus* (Kirkaldy).

Distribution : India : widely distributed ; virtually cosmopolitan.

18. *Toxoptera citricidus* (Kirkaldy)

1907. *Myzus citricidus* Kirkaldy, *Proc. Hawaii ent. Soc.*, **1** : 100.
1958. *Toxoptera citricidus* (Kirkaldy) ; Eastop, A study of Aphididae (Homoptera) of East Africa : 77.
1909. *Toxoptera citricidus* (Kirkaldy) ; Bindra and Sekhon, *Bull. Ent.*, **10** (1) : 104.

Material examined : 1 aptera, 3 apterous nymphs and 5 alatae ; on *Citrus* sp., Simla Hills, 15.x.1974, coll. L. K. Ghosh.

Biological notes : The shiny dark brown to black aphids were collected from the undersurface of the tender leaf of the host plant.

Distribution : Cosmopolitan.

Key to the genera of the subtribe Rhopalosiphina

- | | | |
|---|-----|---------------------------|
| 1 (2) Dorsum of abdomen with spinules in polygons and each polygon encloses a central group of spinules, cauda bears 4-12 (usually 4-5) hairs ; 8th tergite with 2-8 hairs | ... | <i>Rhopalosiphum</i> Koch |
| 2 (1) Dorsum of abdomen usually lacking spinules, if spinules present, then these never form polygons as above | ... | ... |
| 3 (4) Cauda with basal constriction and about 0.6 to 0.8 times as long as siphunculus ; hindwing with one oblique vein ; antennae 6-segmented ; siphunculi more than 1.5 times as long as its basal width | ... | <i>Hysteroneura</i> Davis |

- 4 (3) Cauda without basal constriction and about as long as to 2.0 times as long as siphunculus ; hindwing with both oblique veins ... 5
- 5 (6) Mid-thoracic furca in apterae with separate arms ; u. r. s. never less than 0.60 times as long as h. t. 2 ; head with typical small inwardly directed projections from the inner apex of ill-developed lateral frontal tubercles ; secondary rhinaria in alatae protuberant on a. s. III ; antennae 5- or 6- segmented ... *Melanaphis* van der Goot
- 6 (5) Mid-thoracic furca in apterae sessile ; u. r. s. atmost up to 0.60 times as long as h. t. 2 ; head without any projection as above ; secondary rhinaria in alatae not protuberant on a. s. III ; antennae usually 6-segmented ... *Hyalopterus* Koch

V. Genus *Hyalopterus* Koch

1854. *Hyalopterus* Koch, *Die Pflanzen-Aphiden*, Nurnberg, 1 ; 16.

Type-species : *Aphis pruni* Fabricius, 1775
 = *Aphis pruni* Geoffroy, 1762

Body elongate. Head smooth, with little developed lateral frontal projections ; dorsal cephalic hairs long and fine. Antennae 6-segmented, shorter than body ; flagellum imbricated excepting basal 0.5 portion of a.s. III which is smooth ; apterae without secondary rhinaria ; alatae with secondary rhinaria on a.s. III and IV ; p.t. longer than base of a.s. VI ; primary rhinaria ciliated ; eyes with ocular tubercles not emarginate. Rostrum reaches midcoxae ; u.r.s. shorter than h.t. 2 and with 2 secondary hairs ; abdominal dorsum pale excepting tergites 7 and 8 which are dark, alatae usually with pigmented bars ; dorsal abdominal hairs long and fine like flagellar ones. Siphunculi short, slightly imbricated, flangeless, about half as long as dark, elongate and distally blunt cauda bearing about 6 hairs. Femora and tibiae smooth, tarsi with normal imbrications. F.T.C. 3,3,2. Wing venation normal. Hind tibiae of nymphs smooth.

Distribution : Afganistan ; Africa ; Australia ; Cyprus ; India ; Iran ; Israel ; Italy ; Madagascar ; Pakistan ; Spain and United Kingdom.

19. *Hyalopterus pruni* (Geoffroy)

1762. *Aphis pruni* Geoffroy, *Histoire Abregee des Ins. Environs de Paris*, 1 ; 497.

1969. *Hyalopterus pruni* (Geoffroy) ; Biswas, Chakrabarti, Basu, R. C. and Ghosh, A. K., *Sci. Cult.*, 35 ; 640.

Material examined : 1 alata, on yellow Pan Trap ; Simla, 7.v.1970, coll. K. D. Verma.

Distribution : India : Arunachal Pradesh, Manipur, Meghalaya, Mysore, Nagaland ; Tamil Nadu ; Uttar Pradesh ; Africa ; Afganistan ; Cyprus ; Iraq ; Italy ; Pakistan ; Spain ; United Kingdom and Yugoslavia.

VI. Genus *Hysteroneura* Davis

1919. *Hysteroneura* Davis, *Can. Ent.*, **51** ; 263.

Type-species : *Siphonophora setaria* Thomas, 1878.

Hysteroneura Davis ; Raychaudhuri, D. N. (ed.) 1980. Aphids of North East India and Bhutan : 60.

Body oval. Head smooth, pale to brown in apterae, front slightly convex. Antennae 6-segmented, shorter to longer than body ; flagellum imbricated, apex of a.s. IV, V and VI darker in apterae, in alatae only half of a.s. III pale brown, rest dark ; flagellar hairs sparse, short, with blunt to acuminate apices ; apterae without secondary rhinaria, alatae with more or less roundish secondary rhinaria on a.s. III ; p.t. about 6 times as long as base of a.s. VI. Eyes with distinct ocular tubercles. Rostrum reaches passed midcoxae ; u.r.s. slightly longer than its basal width, about as long as h.t. 2 and bears 2 secondary hairs. Midthoracic furca sessile. Abdominal dorsum pale in apterae, in alatae with distinct marginal patches on segments 2-4, segment 8 with a pigmented bar ; dorsal hairs sparse, minute and blunt. Siphunculi brown, nearly subcylindrical, imbricated and without flange. Cauda elongate, paler with 4 lateral hairs placed medially. Legs pale brown except femora, apices of tibiae and whole tarsi which are darker ; coxae and femora imbricated. F.T.C. 3,3,2, Media of forewing twice-branched, hindwing with one oblique vein.

The genus is monotypic and is widely distributed in India.

Distribution : Africa ; America ; China (Hongkong) ; Japan ; Korea ; Nepal ; Philippines and Taiwan.

20. *Hysteroneura setariae* (Thomas)

1878. *Siphonophora setariae* Thomas, *Bull. Ill. St. Lab. nat. Hist.*, **1** (2) ; 5.

1968. *Hysteroneura setariae* (Thomas) ; Behura and Mahapatra, *Prakruti Utkal University Journal-Science*, **5** (2) ; 63.

Material examined : 1 aptera, on grass, Simla, 7.i.1970, 1 aptera and 3 alatae, on *Cynodon dactylon*, Simla Hills, 11.xii.1973 ; 1 alata, on Grass, Simla, 15.x.1974 ; 4 alatae and many nymphs, on *Setaria* sp. Simla, 15.x.1974 ; all L. K. Ghosh coll.

Biological notes : Greenish to brownish red aphids were found infesting the ventral surface of leaves and inflorescence of the host plants without

causing any noticeable injury to the host plants. Ants viz. *Camponotus* (*Tanaemyrmex*) *compressus* Latr., *Solenopsis geminata* Fabr. and *Crematogaster* sp. and coccinellid beetles (Indet.) were found in association with these insects.

Remarks : The species was first noticed in the Philippines in 1958 (Baltzar 1965) and later in Hong kong in 1962, South Africa in 1967 (van Heerden 1969). David, Rajasingh and Narayanan (1967) recorded the species for the first time from peninsular India and Ghosh, A. K., Ghosh, M. R. and Raychaudhuri, D. N. (1970) first reported this species from Northern India. It is now widely distributed in the country. Behura and Mahapatra (1968) have made a detailed morphological study of the species.

In North America, the males of *H. setariae* are described as apterous, though alate males have been found by Palmer (1952), Gillette and Palmer (1932) and Carver (1976).

Basu, R. C., Ghosh, A. K. and Raychaudhuri, D. N. (1970) and Ghosh, M. R., Ghosh, A. K. and Raychaudhuri, D. N. (1971) reported the oviparous females of this species. The alate male is described by Pal (1975) for the first time from India.

The species is recorded here for the first time from Himachal Pradesh.

Distribution : India : all over ; Africa ; America ; China ; Eastern Islands ; Fiji, Hawaii ; Japan ; Korea ; Malayasia ; Nepal ; New Guinea ; Philippines ; Solomon Is. ; Taiwan ; Thailand and Vietnam.

VII. Genus *Melanaphis* van der Goot

1917. *Melanaphis* van der Goot, *Contrib. Fauna Indes Neerl.*, 1 (3) ; 61.

Type-species : *Aphis bambusae* Fullaway, 1910. (Attributed to Kirkaldy in the original description of the genus.)

Head with ill-developed lateral frontal tubercles and median frontal prominence, smooth ; dorsal cephalic hairs in apterae with bluish or with finely drawn out apices. Antennae 5-or 6-segmented in apterae ; p. t. about 1.4-4.5 times as long as base of a. s. VI ; secondary rhinaria absent in apterae, in alatae more or less round and somewhat protuberant on a. s. III ; flagellar hairs with finely drawn out apices. Rostrum short, hardly reaching midcoxae ; u. r. s. blunt, shorter than h. t. 2. Abdominal dorsum pale ; abdominal spiracles somewhat reniform ; lateral abdominal tubercles on segments 2-6 variably developed ; dorsal abdominal hairs short with acuminate apices, 8th tergite with 2 hairs. Siphunculi weakly imbricated, longer than wide, without constriction before apex, as long as elongate, slightly medially constricted cauda bearing 4 hairs. Legs rather pale, femora smooth dorsally but with spinulose striae ventrally ; femoral hairs long. F. T. C. 3, 3, 2.

Distribution : Aden ; Africa ; Australia ; China ; Egypt ; Hawaii ; India ; Indonesia ; Iraq ; Japan ; Nepal ; Sri Lanka and Taiwan.

21. *Melanaphis meghalayensis meghalayensis* Raychaudhuri and Benerjee

1974. *Melanaphis meghalayensis meghalayensis* Raychaudhuri and Banerjee, *Oriental Ins.*, 8 (3) : 376.

Material examined : 1 aptera and a few nymphs, host unknown. Simla Hills, 14.xii.1973, coll. L. K. Ghosh.

Remarks : The subspecies has originally been described from Meghalaya in north east India and is being reported for the first time from north west India.

Distribution ; India : Himachal Pradesh, Meghalaya and West Bengal.

VIII. Genus *Rhopalosiphum* Koch

1854. *Rhopalosiphum* Koch, *Die Pflanzen. Aphiden*, 1 : 23.

Type-species : *Aphis nymphaeae* Linnaeus, 1761.

Body broadly oval to elongate. Head smooth and without prominent lateral frontal tubercles ; Antennae usually 6- sometimes 5- segmented, 0.2-0.8 times as long as body ; p.t. 2.0-6.2 times as long as base of last segment Apterae without secondary rhinaria, alatae with secondary rhinaria distributed on a.s. III, IV and V. Rostrum reaching midcoxae ; u.r.s. 0.8-1.2 times h.t. 2. Abdominal dorsum in apterae with well-developed polygonal spinular reticulations and each polygon enclosing a group of spinules ; 8th abdominal tergite usually with 2 hairs, sometimes with 4-8 (in *R. rufiabdominalis*) ; lateral abdominal tubercles present on segments 1-7. Siphunculi often dark, faintly to heavily imbricated, cylindrical to weakly clavate, with a distinct flange. Cauda short, about as long as siphunculi, with 4-5 hairs. F.T.C. 3,3,3. Wing venation normal, or M of forewing once-branched or with second fork near the margin.

Remark : Richards (1960) has made valuable contribution on *Rhopalosiphum* species of Canada.

Distribution : Cosmopolitan.

Key to the species of the genus Rhopalosiphum Koch

Apterae viviparae :

- 1 (2) Antennae usually 5-segmented ; 8th tergite with 4-8 hairs ; longest hair on a. s. III about 3-4 times as long as b. d. III ; p. t. at least 5 times as long as base of last segment ...

rufiabdominalis (Sasaki)

- 2 (1) Antennae usually 6-segmented ; 8th tergite with only 2 hairs ; longest hair on antennal segment III 0.5-1.0 times as long as b. d. III ; p. t. about 2-4 times as long as base of a. s. VI ... 3
- 3 (4) Processus terminalis about 1.9-2.5 times as long as base of a. s. VI ; u.r.s. 0.7-0.8 times as long as h. t. 2 ; siphunculi 0.08 times as long as body and about 1.0-1.5 times as long as Cauda ... *maidis* (Fitch)
- 4 (3) Processus terminalis at least 4 times as long as base of a. s. VI ; u. r. s. 1.0-1.2 times as long as h. t. 2 ; siphunculi 0.12-0.18 times as long as body ... 5
- 5 (6) Siphunculi distinctly clavate, 0.14 times as long as body and 1.5-2.5 times as long as cauda ; u. r. s. about as long as or a little longer (1.1) than h. t. 2 ... *nymphaeae* (Linnaeus)
- 6 (5) Siphunculi cylindrical, about 0.10 times as long as body and about 1.5 times as long as cauda ; u. r. s. nearly as long as h. t. 2 ... *padi* (Linnaeus)

Alate male :

- 8th tergite with 4 hairs ; p. t. 6-7 times as long as base of a. s. V ; u. r. s. about 1.7 times as long as h. t. 2 ; a. s. III with 29-39, IV with 25-26, V with 12-18 and base of a. s. VI with 0-1 secondary rhinaria ... *rufiabdominalis* (Sasaki)
- 8th tergite with 2 hairs ; p. t. 4 times as long as base of a. s. VI ; u. r. s. 1.2 times as long as h. t. 2 ; a. s. III with 36-38, IV with 16-20, V with 8-9 secondary rhinaria and base of a. s. VI without rhinaria ... *nymphaeae* (Linnaeus)

22. *Rhopalosiphum maidis* (Fitch)

1835. *Aphis maidis* Fitch, *Trans. N. Y. State Agr. Soc.*, **13** : 551.

1969. *Rhopalosiphum maidis* (Fitch) ; Chowdhuri, Basu, R. C., Chakrabarti and Raychaudhuri D. N., *Oriental Ins.*, **3** (1) ; 90.

Material examined : 3 apterae, on *Zea mays*, Simla, 18.x.1968, coll. A. N. Chowdhuri ; many apterae, alatae and nymphs, on *Triticum vulgare*, Solan, 4.ix.1969 ; many apterae, on *Triticum vulgare*, Solan, Saproon, 4.ix.1969 ; 9 apterae and many nymphs, on undet. Gramineae, Kandaghat, 7.ix.1967 ; many apterae, host unknown, Tottapani, Mandi distt., 18.ix.1969, all O. B. Chhotani coll. ; 1 aptera, on *Triticum vulgare*, Chini Bunglow, Kufri, 15.xii.1973, coll. L. K. Ghosh.

Biological notes : Colour in life is green to bluish green with purple tinge posteriorly on abdomen. This species forms large colonies on the under-surface of leaves and more commonly within the leaf sheaths. This is the

commonest aphid species on Maize. It causes appreciable injury by attacking the inflorescence.

Remarks : This corn leaf aphid is a well known pest of a large number of graminaceous crops. In India, it has been reported to infest various plants of Gramineae (Basu, A. N. and Banerjee, 1958 ; Joshi and Mathur 1967 ; David 1956, 1957 and Samuel 1940). Wadhi *et al.* (1973) recorded for the first time the species on Nepier or elephant grass (*Pennisetum purpureum*) a very high yielding variety of perennial grass.

Das, B. (1918) recorded alate males from Lahore (now in W. Pakistan) and made some assumptions on its possible life-history including sexual generation. Eastop (1954) recorded the alate males of this species in Kenya (Africa) during June-July.

Menon and Ghai (1969) for the first time recorded oviparae on wheat at Delhi, India.

Distribution : India : all over ; cosmopolitan.

23. *Rhopalosiphum nymphaeae* (Linnaeus)

1761. *Aphis nymphaeae* Linnaeus, *Fauna Suecica*, 2 : 260.

1958. *Rhopalosiphum nymphaeae* (Linnaeus) ; Ghosh, A. K. and Raychaudhuri, D. N. J. *Bombay nat. Hist. Soc.*, 56 (3) ; 660-664.

Material examined : 1 alata and 2 alate males, on Snow, Kufri, December, 1973, coll. L. K. Ghosh.

Alate male : Body about 1.50 mm long with 0.70 mm as maximum width. Antennae 6-segmented, about as long as body ; p. t. about 4.0 times as long as base of a. s. VI ; a. s. III with 34-40, IV with 16-20, and V with 8-10 secondary rhinaria. Rostrum reaching beyond midcoxae ; u. r. s. about 1.3 times as long as h. t. 2. Abdominal dorsum pigmented with dark marginal patches. Siphunculi dark, smooth, with basal cylindrical stem and distal clavate portion, about 1.5 times as long as cauda bearing 4-6 hairs. Other charactes as in alate viviparous female.

Measurements (in mm) of one alate male : Length of body 1.50 ; width of body 0.70 ; antenna 1.59 ; a. s. III 0.39, IV 0.28, V 0.20, VI (0.13+0.52) ; u.r.s. 0.14 ; h.t.2 0.11 ; siphunculus 0.26 ; cauda 0.19 ; secondary rhinaria on III 36 and 38, IV 18 and 20, V 8 and 9.

Remarks : David (1958) reported for the first time the alate males on *Eichhornia crassipes* from Coimbatore, South India. Later, Basu, R. C., Ghosh, A. K. and Raychaudhuri, D. N. (1970) recorded both oviparae and alate male from *Prunus* sp. at Shillong. David, Narayanan and Rajasingh (1970) reported alate males on Rose at Srinagar, India.

Note : The alate maies of the species are being reported as new to Himachal Pradesh. Theobald (1927) has provided descriptions of males and oviparae from Europe and Richards (1960) has described oviparae in details from Canada. Behura and Bohidar (1970) have provided detailed morphology of the species. In view of not having description of sexuales from Indian material a short description of alate male is provided here.

Distribution : Cosmopolitan.

24. *Rhopalosiphum padi* (Linnaeus)

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

1969. *Rhopalosiphum padi* (Linnaeus) ; Chowdhuri, Basu, R. C. and Raychaudhuri, D. N. *Sci. Cult.*, **35** ; 337.

Material examined : 1 aptera, on *Zea mays*, Simla, 18.x.1968 ; 1 aptera, on *Pharalis tuberosa*, Simla, 19.x.1968, coll. A. N. Chowdhuri.

Biological note : Brownish aphid was collected from the leaf of its host.

Distribution ; India : Arunachal Pradesh, Assam, Himachal Pradesh ; Meghalaya, West Bengal, Sikkim and virtually cosmopolitan.

25. *Rhopalosiphum rufiabdominalis* (Sasaki)

(Fig. 218)

1899. *Toxoptera rufiabdominalis* Sasaki, *Rep. Hokkaido agric. Exp. Sta.*, **17** ; 202.

1956. *Rhopalosiphum rufiabdominalis* (Sasaki) ; Doncaster, *Bull. Ent. Res.*, **47** ; 742.

1969. *Rhopalosiphum rufiabdominalis* (Sasaki) ; Bindra and Sekhon, *Bull. Ent.*, **10** (1) ; 103.

Material examined : 2 apterae and 1 alata, on Grass Roots, Solan, 1.vi.1969 ; 1 alata, on snow, Chini Bunglow, 15.xii.1973 ; 1 alata, on snow, Kufri, December 1973 ; 1 alate male, on snow, Jakhoo, 12.xii.1973, all. L. K. Ghosh coll.

Remarks : Tanaka (1961) described sexual morphs of the species from Japan for the first time. In India, alate male was reported and described for the first time from Nainipeak (c. 8, 563') in Uttar Pradesh by Ghosh, L. K. (1969a). Sexuales of the species are not apparently known from any other part of the country. However, the present record of alate male again from Simla Hills (c. 8, 050') suggests possibility of sexual life-cycle of this species in the north West Himalaya.

Young *et al.* (1971) reported this species from roots and underground stems in barley at Delhi. This is a first record of aphid from the roots of barley in India. According to them, the aphid colonies were present on the crop from first week of January to the end of February, 1971.

Distribution : India : all over ; Africa ; Japan ; Malaysia ; Middle East ; Nepal and Taiwan.

Key to the genera of the tribe Macrosiphini

- | | | | |
|---------|--|-----|---|
| 1 (8) | Dorsum of abdomen with spinal processes on posterior tergites | ... | 2 |
| 2 (9) | Siphuncular pore oblique; cauda with 4-6 hairs; u. r. s. with 2-4 secondary hairs | ... | <i>Eoessigia</i> David, Rajasingh and Narayanan |
| 3 (2) | Siphuncular pore not oblique | ... | 4 |
| 4 (7) | Spinal process present only on 8th abdominal tergite (Fig. 161); | ... | 5 |
| 5 (6) | Head with distinct median prominence; siphunculi narrow at middle, siphuncular pore obliterated; antennae 5-segmented | ... | <i>Raychaudhuriella</i> Chakrabarti |
| 6 (5) | Head without any median prominence; siphunculi variably shaped; antennae usually 6-segmented; hind tibiae of nymphs smooth | ... | <i>Cavariella</i> del Guercio |
| 7 (4) | Each of 7th and 8th abdominal tergites with a spinal process; siphunculi clavate; hind tibiae of nymphs with spinules | ... | <i>Tricaudatus</i> Marzikulov |
| 8 (1) | Dorsum of abdomen without any distinct spinal process on posterior tergites, atmost with variably developed tubercles | ... | 9 |
| 9 (18) | Cauda short, either as long as broad or broader than long | ... | 10 |
| 10 (11) | Apterae with secondary rhinaria on a. s. III, alatae with such rhinaria on a. s. III and sometimes also on a. s. IV and V; dorsal abdominal hairs very long and fine; h. t. 2 usually much longer than 2nd tarsal segment of fore-and midleg | ... | <i>Amphicercidus</i> Oestlund |
| 11 (10) | Apterae without secondary rhinaria; dorsal abdominal hairs shorter | ... | 12 |
| 12 (18) | Abdominal dorsum in apterae pigmented and with spinules (Fig. 178E); u. r. s. with 12-14 secondary hairs (Fig. 178C); cauda with many hairs (20) (Fig. 178D) | ... | <i>Spinaphis</i> gen. nov. |
| 13 (12) | Abdominal dorsum in apterae without spinules; u. r. s. and cauda with less hairs | ... | 14 |
| 14 (15) | Siphunculi barrel-shaped and shorter than cauda which is usually triangular; abdominal dorsum in both apterae and alatae with segmental transverse band | ... | <i>Brevicoryne</i> van der Goot |
| 15 (14) | Siphunculi not barrel-shaped; cauda subpentagonal to semilunar shape | ... | 16 |

- 16 (17) Abdominal dorsum in apterae with somewhat scabrous hexagonal pattern and usually with small spinal tubercles on segments 5-8, in alatae with spinopleural bands on segments 2-6 in addition to marginal patches (Fig. 195); a. s. III and sometimes a. s. IV with protuberant secondary rhinaria ... *Dysaphis* Börner
- 17 (16) Abdominal dorsum in apterae smooth, in alatae with a middorsal patch on segments 3-6 in addition to marginal spinular patches; alatae with secondary rhinaria on a. s. III and IV ... *Brachycaudus* van der Goot
- 18 (9) Cauda always longer than broad ... 19
- 19 (20) Siphunculi in apterae with a pointed apex (Fig. 86) and with its oblique pore shifted basad on outer margin, in alatae oblique pore placed at apex (Fig. 87) ... *Acutosiphon* Basu, Ghosh and Raychaudhuri
- 20 (19) Siphunculi never as above ... 21
- 21 (24) U. r. s. stiletto-shaped ... 22
- 22 (23) Dorsal abdominal hairs with apices like a partly opened fan; siphunculi slightly clavate near apex, not reticulated but sometimes a few interconnecting striae present near the apical flange; in alatae secondary rhinaria normal ... *Coloradoa* Wilson
- 23 (22) Dorsal abdominal hairs short to very long with acuminate, incrassate or spatulate apices; siphunculi calf-shaped (Fig. 79) without or with an indistinct flange and with isodiametrical hexagonal cells on distal part (Fig. 72); in alatae secondary rhinaria protuberant ... *Macrosiphoniella* del Guercio
- 24 (21) U. r. s. never stiletto-shaped; secondary hairs on u. r. s. shorter than primary hairs ... 25
- 25 (28) Siphunculi reticulated with isodiametrical hexagonal cells ... 26
- 26 (27) Secondary rhinaria protuberant; dorsal abdominal hairs in apterae usually on sclerotic bases; F. T. C. usually 5, 5, 5 but may be 4, 4, 4 or even 5, 3, 5 ... *Uroleucon* Mordvilko
- 27 (26) Secondary rhinaria never protuberant (Fig. 31); dorsal abdominal hairs usually not on sclerotic bases; F. T. C. usually 3, 3, 3 but may be 4, 4, 4 ... *Macrosiphum* Passerini
- 28 (25) Siphunculi never reticulated with isodiametrical hexagonal cells but may be with some interconnecting striae near apex and these sometimes forming transversely elongate or nearly isodiametrical polygonal cells ... 29
- 29 (40) Second tarsal segment with transverse rows of spinules ... 30

- 30 (31) Abdominal dorsum in apterae with small hair-bearing tubercles arranged spinally and pleurally (Fig. 192) ; in alatae such tubercles absent but with a brownish patch on segments 2-4 ; strongly protuberant and minutely ciliated secondary rhinaria present in alatae on a. s. III and IV ... *Chaetomyzus* Ghosh and Raychaudhuri
- 31 (30) Abdominal dorsum in apterae never with tubercles as above ... 32
- 32 (35) First tarsal Chaetotaxy 5, 5, 5 ; u. r. s. longer than h. t. 2 ; wing veins thick and dark ... 33
- 33 (34) Capitate dorsal hairs on tuberculate base ; abdominal dorsum usually not papillate ; u. r. s. with 7-18 secondary hairs ; 2nd tarsal segments with more or less distinct spinules often arranged in transverse rows ... *Indumasonaphis* Ghosh, Basu and Raychaudhuri
- 34 (33) Dorsal body hairs with incrassate to blunt apices and never on tuberculate base ; abdominal dorsum faintly papillate ; u. r. s. always with more (18-20) secondary hairs ; 2nd tarsal segments with smaller spinular imbrications ... *Neomasonaphis* Ghosh and Raychaudhuri
- 35 (32) First tarsal Chaetotaxy 3, 3, 3 ; ...
- 36 (37) Head in apterae with spinules on frons ; a. s. I and II also with spinules and former nearly twice as long as latter ; abdominal dorsum rugose ... *Himalayaphis* Ghosh and Verma
- 37 (36) Head in apterae smooth or slightly wrinkled but never with spinules as above ... 38
- 38 (39) Siphunculi nearly cylindrical ; apterae without secondary rhinaria ; a. s. I slightly projected on inner margin ; wing veins fuscous ; numerous secondary rhinaria arranged irregularly on a. s. III and IV in alatae ... *Neoacyrthosiphon* Tao
- 39 (38) Siphunculi swollen on distal half ; apterae with secondary rhinaria ; a. s. I much longer than broad ; wing veins faintly bordered brown ; secondary rhinaria present usually on a. s. III and sometimes also on a. s. I Δ ... *Amphorophora* Buckton
- 40 (29) Second tarsal segment without transverse rows of spinules but may be with normal imbrication ... 41
- 41 (42) Antennal segment I with anteriorly directed process (Fig. 213) ; lateral frontal tubercles not produced ; abdominal dorsum in apterae smooth ; wing veins not dark ... *Matsumuraja* Schumacher
- 42 (41) Antennal segment I without anteriorly directed process ... 43

- 43 (46) Siphunculi shorter than cauda (0.50-0.85 X cauda);
F. T. C. 5, 5, 5 or 6, 6, 6; lateral frontal tubercle
ill-developed ... 44
- 44 (45) Antennal segment III in alatae with strongly pro-
tuberant secondary rhinaria over entire length;
cauda elongate, triangular and without any constrict-
ion; F. T. C. 6, 6, 6; dorsal abdominal hairs mod-
erately long with fine apices ... *Senisetotarsaphis* Raychaudhuri,
Ghosh and Das
- 45 (44) Antennal segment III in alatae without such
rhinaria; cauda elongate and with a slight constrict-
ion near at the middle; F.T.C. usually 5, 5, 5 (some-
times 6, 6, 6); dorsal hairs with blunt to acuminate
apices ... *Longicaudus* van der Goot
- 46 (43) Siphunculi longer than Cauda ... 47
- 47 (48) Ultimate rostral segment (Fig. 173 c) with many
secondary hairs (20-25); a. s. III in apterae with
about 10 secondary rhinaria; dorsal abdominal hairs
spatulate ... *Nasonovia* Mordvilko
- 48 (47) Ultimate rostral segment with less (2-15) secondary
hairs ... 49
- 49 (50) Siphunculi "bag-pipe"-like (Figs 174, 175) with a few
interconnecting striae near well developed thick
apical flange ... *Rhopalosiphoninus* Baker
- 50 (49) Siphunculi variably shaped but never as above ... 51
- 51 (54) Frons with projection: lateral frontal tubercles
moderately developed ... 52
- 52 (53) Head in apterae with a broad median rectangular
hood-like projection; distinctly rugose; siphunculi
weakly clavate and with distinct apical flange;
F. T. C. 5, 5, 5; hind tibiae of nymphs smooth ... *Myzaphis* van der Goot
- 53 (52) Head in apterae without median process but with
prominent finger-like processi from the inner side of
the lateral frontal tubercles and processi much longer
than wide; head both dorsally and ventrally warty;
siphunculi not clavate; F. T. C. 3, 3, 2; hind tibiae
of nymphs with spinules ... *Diphorodon* Passerini
- 54 (51) Frons without projection ... 55
- 55 (58) Siphunculi characteristically shaped, narrow at
middle, somewhat broadened apically, without flange
and with typical pore which may be atrophied, porus
on inner margin or obliquely placed inwardly ... 56
- 56 (57) Lateral frontal tubercles well developed, antennae
5-segmented; F. T. C. 3, 3, 3; Cauda with basal and
median constriction, caudal hairs 3-6 ... *Aspidophorodon* Verma

- 57 (56) Lateral frontal tubercles absent ; antennae 6-segmented ; F. T. C. 2, 2, 2 ; Cauda triangular, apex chitinous and pointed, slightly curved in lateral view ; caudal hairs 7-9 ... *Nudisiphon* Chakrabarti and Bhattacharya
- 58 (55) Siphunculi cylindrical or clavate but never shaped as above ; siphuncular pore well developed ; lateral frontal tubercles moderately developed ... 59
- 59 (69) Thoracic and abdominal tergum in apterae with polygonal reticulation ; dorsal abdominal hairs in apterae very small and with somewhat swollen apices ; alatae with protuberant secondary rhinaria on a. s. III and sometimes also on a. s. IV and V ; with veins strongly bordered brown ... *Micromyzus* van der Goot
- 60 (59) Thoracic and abdominal tergum without polygonal reticulation ... 61
- 61 (70) Dorsal abdominal hairs in apterae with distinctly spatulate to capitate apices ... 62
- 62 (67) Apterae without secondary rhinaria ... 63
- 63 (64) First tarsal chaetotaxy 5, 5, 5 ; abdominal dorsum in apterae lightly wrinkled to deeply pitted ; siphunculi cylindrical and with or without hairs ... *Chaetosiphon* Mordvilko
- 64 (63) First tarsal chaetotaxy 3, 3, 3 or 3, 3, 2 ; abdominal dorsum in apterae not as above ... 65
- 65 (66) First tarsal chaetotaxy 3, 3, 2 ; abdominal dorsum in apterae smooth to distinctly reticulated ; siphunculi slightly clavate on distal half ; ultimate rostral segment with 6-7 secondary hairs ; Media of forewing once-branched, upper branch at its middle fused with radial sector, pterostigma extending almost up to basal 0.13 portion of radial sector ; hind wing with two oblique veins ; veins strongly bordered brown ... *Indoidiopterus* Chakrabarti, Ghosh and Raychaudhuri
- 66 (65) First tarsal chaetotaxy 3, 3, 3 ; abdominal dorsum in apterae somewhat smooth ; siphunculi usually cylindrical or swollen on distal half ; ultimate rostral segment with usually 2 but sometimes 4 secondary hairs ; wing-venation normal but veins thick and brown ... *Capitophorus* van der Goot
- 67 (62) Apterae with secondary rhinaria ... 68
- 68 (69) Abdominal dorsum in apterae uniformly sclerotic ; first tarsal chaetotaxy 3,3,3 ; siphunculi subcylindrical and with well developed flange ; cauda tongue-shaped and bearing 4 hairs ... *Cryptaphis* Hille Ris Lambers

69 (61) Abdominal dorsum in apterae rather pale ; first tarsal chaetotaxy variable (3, 3, 2 or 3, 3, 3) ; siphunculi cylindrical to weakly clavate and with weakly developed flange ; cauda elongate and bearing 5-7 hairs ...	<i>Cryptomyzus</i> Oestlund	
70 (61) Dorsal abdominal hairs in apterae not with capitate or spatulate apices ...	...	71
71 (80) Dorsum of head in apterae smooth ...	...	72
72 (77) Head in apterae without median frontal prominence...	...	73
73 (74) Siphunculi cylindrical, sometimes with a few inter-connecting striae near apex ; abdominal dorsum in alatae with only spinulose marginal sclerites, in apterae always pale ...	<i>Acyrthosiphon</i> Mordvilko	
74 (73) Siphunculi not cylindrical ...	...	75
75 (76) Siphunculi calf-shaped, with well developed apical flange and with a few rows of irregularly shaped polygonal cells with thick margin ; head in apterae with spinules on venter ; abdominal dorsum in apterae completely dark (Fig. 200) ; in alatae either like apterae or variably pigmented ...	<i>Impatiensium</i> Mordvilko	
76 (75) Siphunculi strongly clavate, siphuncular flange weakly developed, with a preapical circumcission ...	<i>Hyadaphis</i> Kirkaldy	
77 (72) Head in apterae with median frontal prominence ...	...	78
78 (79) Siphunculi gently clavate near apex with distinct circumcission just before well developed flange ; alatae always with mid dorsal pigmented patch on abdomen ; apterae always with secondary rhinaria on a. s. III ; u. r. s. with 6-12 secondary hairs ...	<i>Hyperomyzus</i> Börner	
79 (78) Siphunculi slender with slight swelling near apex but lacking preapical circumcission ; alatae with brown segmental patches on abdominal dorsum ; secondary rhinaria absent in apterae ; u. r. s. usually with 4 secondary hairs ...	<i>Lipaphis</i> Mordvilko	
80 (71) Dorsum of head in apterae not smooth, rather variously ornamented ...	...	81
81 (84) Dorsum of head wrinkled or sparsely spinulose ...	...	82
82 (83) Siphunculi cylindrical, sometimes with a few inter-connecting striae near apex ; apterae usually with a few (0-3) secondary rhinaria near the base of a. s. III ; in alatae nonprotuberant circular secondary rhinaria only on a. s. III ; u. r. s. with 4-8 secondary hairs ...	<i>Anlacorthum</i> Mordvilko	
83 (82) Siphunculi distinctly clavate on distal 0.5 portion (Figs. 85, 170) with 4-5 rows of preapical spinulose striae ; apterae without secondary rhinaria, in alatae circular, flat secondary rhinaria on a.s. III, IV and V, u. r. s. bears 2-3 secondary hairs ...	<i>Liosomaphis</i> Walker	

84 (81) Dorsum of head distinctly spinulose or warty	...	85
85 (86) Head warty ; siphunculi in apterae also warty ; dorsum of abdomen in apterae rugose (Fig. 226), in alatae smooth with only ill-developed marginal patches ; alatae with circular, protuberant secondary rhinaria on a.s. III, IV and sometimes also on a.s.v...	<i>Vesiculaphis</i> del Guercio	
86 (85) Head distinctly spinulose	...	87
87 (90) Siphunculi obliquely truncated at apex and without flange	...	85
88 (89) Lateral frontal tubercles with convergent inner margin ; mid thoracic furca sessile, abdominal dorsum in alatae variably pigmented	<i>Jacksonia</i> Theobald	
89 (88) Lateral frontal tubercles broad with parallel inner margins ; mid thoracic furca with a short basal stem ; abdominal dorsum in alatae with only marginal patches (Fig. 227)	<i>Xenosiphonaphis</i> Takahashi	
90 (87) Siphunculi not obliquely truncated at apex	...	91
91 (92) Dorsal abdominal hairs in apterae never longer than b.d. III	...	93
92 (91) Dorsal abdominal hairs in apterae long (3-4 times as long as b. d. III) and stout, abdominal dorsum completely dark	<i>Micromyzodium</i> David	
93 (94) Dorsum of abdomen in apterae usually with a broad horse-shoe shaped patch with arms extending upto thoracic region ; secondary rhinaria in alatae not protuberant ; inner side of antennal tubercles parallel	<i>Neomyzus</i> van der Goot	
94 (93) Dorsum of abdomen in apterae not as above	...	95
95 (96) Antennal segment I in apterae with inner apices scabrous and strongly angulated inward (fig. 199) ; abdominal dorsum in apterae wrinkled ; siphunculi swollen on inner margin at about its middle and with a preapical circumcission and well developed flange ; alatae usually with non-protuberant second- ary rhinaria	<i>Hyalomyzus</i> Richards	
96 (95) Antennal segment I in apterae with inner apices not as above ; abdominal dorsum in apterae smooth or very seldom wrinkled ; siphunculi variable in shape but not usually with preapical circumcission and without or at best with weakly developed flange ; secondary rhinaria in alatae somewhat protuberant	<i>Myzus</i> Passerini	

IX. Genus *Acutosiphon* Basu, Ghosh and Raychaudhuri

1970. *Acutosiphon* Basu, R. C., Ghosh, A. K. and Raychaudhuri, D. N. *Proc. zool. Soc., Calcutta*, **23** : 84.

Type-species ; *Acutosiphon obliquoris* Basu, Ghosh and Raychaudhuri, 1970.

Body oval. Head in apterae rugose, in alatae smooth ; lateral frontal tubercles and median frontal prominence ill-developed ; dorsal cephalic hairs minute. In apterae, antennae 5-or 6-segmented, about 0.3 times as long as body, without any secondary rhinaria ; flagellum scabrous on inner margin, nearly smooth on outer margin ; p. t. about 0.5-0.9 times as long as last antennal segment ; flagellar hairs minute with bluntish apices ; primary rhinaria ciliated ; in alatae antennae always 6-segmented, about 0.6 times as long as body ; a. s. III weakly warty and imbricated near base, rest almost smooth ; flagellar hairs slightly longer than in apterae, with fine apices ; strongly protuberant secondary rhinaria present on a. s. III and IV besides a few on a. s. V. Rostrum just reaching midcoxae ; u. r. s. blunt and thick, about as long as its basal width, slightly shorter than h. t. 2 and with 3-4 secondary hairs. Tergum sclerotic, corrugated and wrinkled ; meso-, metathorax and abdominal segments 1-6 mutually fused ; fused portion strongly warty, such warts sometimes compressed to form honey-comb pattern ; dorsum of abdomen with paired spinupleural brownish patches on segments 1-6, each of segments 7 and 8 with transverse band ; dorsal abdominal hairs in apterae minute and with somewhat bluntish apices, in alatae, longer with acute apices. Siphunculi (Fig. 87) in apterae with a very broad base and pointed apex, densely warty with siphuncular openings obliquely placed on its outer margin near apical 0.2 portion, in alatae (Fig. 88) with less prominent warty imbrications than in apterae with the oblique pore placed near tip. Cauda thumb-shaped, constricted at its very base, 1.5 times as long as its basal width and with 4 hairs. Subgenital plate with a semioval posterior margin touching almost the base of cauda. Legs in apterae with warty imbrications ; femoral and tibial hairs stouter. F. T. C. 5, 5, 5. Nymphs with hind tibiae spinulose.

Hille Ris Lambers (1973) discussed about the position of the genus.

Distribution : India.

26. *Acutosiphon obliquoris* Basu, Ghosh and Raychaudhuri

(Figs. 158, 182, 183)

1970. *Acutosiphon obliquoris* Basu, R. C., Ghosh, A. K. and Raychaudhuri, D. N. *Proc. zool. Soc., Calcutta*, **23** : 84.

1973. *Acutosiphon obliquoris* Basu et al. ; Hille Ris Lambers, *Oriental Ins.* **7** (2) : 239-258.

Material examined : 3 apterae, on *Cyperus* sp., Gleen forest, 30.v.1969,

coll. L. K. Ghosh ; many apterae, 2 alatae and a few nymphs, on *Carex filicina*, Mashobra, 17.x.1974, coll. L. K. Ghosh.

Biological notes : The dark brown aphids were collected from undersurface of the leaves of host plants. No ant or predator was noticed in association with the aphids.

Remarks : This species was originally described with apterae from *Cotula* sp. (Compositae) taken at Cherapunji (Assam) [Basu, R. C. *et al.* 1970]. Subsequently, Ghosh, M. R., Ghosh, A. K. and Raychaudhuri, D. N. (1971) described alata vivipara and alate male collected from plant of N. O. Cyperaceae at Gangtok, Sikkim. Later, Chakrabarti, Ghosh, A. K. and Raychaudhuri D. N. (1972) while reporting the species from Kumaon Himalayas, India, mentioned *Carex filicina*, *Prageria nilgiriensis* and *Geranium* sp. as host plants. Hille Ris Lambers (1973) while describing ovipara and embryo, found *Pieridis ovalifolia* as host plant belonging to N. O. Ericaceae which, according to him, is the presumable primary host of this curious aphid.

Distribution : India : Himachal Pradesh, Meghalaya, Sikkim and West Bengal.

X. Genus *Acyrtosiphon* Mordvilko

1914. *Acyrtosiphon* Mordvilko, *Faune de la Russie*, 1 : 75.

Type-species : *Aphis pisi* Kaltenbach, 1843
(= *Aphis pisum* Harris, 1776)

Body elongate. Head smooth in both apterae and alatae, sometimes with a very few indistinct spinules ventrally near the base of antennal sockets, lateral frontal tubercles well developed, the frontal sinus at least in apterae usually V-shaped (Fig. 15), in alatae the middle of frontal sinus might be slightly raised and the head is provided with a pair of small tubercles somewhat pleurally placed just inner to the eyes, dorsal hairs short with bluntish to incrassate apices. Antennae 6-segmented, 1.2-1.5 times as long as body, imbricated, a. s. III in apterae with a few secondary rhinaria near the base (Fig. 28), in alatae many secondary rhinaria arranged more or less in a row at most on basal 0.7 portion ; p. t. about 3-5 times as long as base of a. s. VI, flagellar hairs with incrassate apices and about 0.5 times as long as b. d. III. Rostrum reaching hindcoxae ; u. r. s. shorter than h. t. 2. Midthoracic furca sessile. Abdominal dorsum pale and smooth, sometimes rugose and sclerotic in apterae, with short to medium sized hairs, in alatae only with faint spinulose marginal sclerites. Siphunculi cylindrical with a wide base, slightly to distinctly imbricated, with 1-3 rows of interconnected striae before the well-developed apical flange, longer than cauda. Cauda thumb-

shaped to elongate. Subgenital plate with short blunt hairs on posterior margin. F. T. C. 3, 3, 3. Femora nearly smooth, hind tibiae of nymphs smooth. Wing venation normal.

Distribution : Cosmopolitan.

Key to the species of the genus Acyrthosiphon Mordvilko

Apterae viviparae :

- | | | | |
|-------|--|---|-----------------------------|
| 1 (2) | Cauda short, thumb-shaped and about 0.5 times as long as siphunculi ; u. r. s. just longer than h. t. 2 ; p. t. about 5 times as long as base VI ; apterae with 2-3 secondary rhinaria | ... | <i>malvae</i> Complex |
| 2 (1) | Cauda elongate with somewhat narrow apex and about 0.38-0.44 times as long as siphunculi | ... | 3 |
| 3 (6) | Dorsum of abdomen rugose | ... | 4 |
| 4 (5) | Ultimate rostral segment with 8-10 secondary hairs ; siphunculi about 2.50 times as long as cauda constricted at middle | ... <i>sonchifoliae</i> Raychaudhuri, Ghosh and Das | |
| 5 (4) | Ultimate rostral segment with never more than 4 secondary hairs ; siphunculi about 2.30 times as long as cauda bearing 10 hairs | ... | <i>rubi</i> Narzikulov |
| 6 (3) | Abdominal dorsum not rugose ; u. r. s. with 6 secondary hairs ; a. s. III without or with at most 3 secondary rhinaria ; cauda with 6-7 hairs | ... | <i>phaseoli</i> Chakrabarti |

27. *Acyrthosiphon malvae* Complex

1841. *Acyrthosiphon malvae* Mosley, *Gard. Chronicle*, 1 : 684.

1961. *Acyrthosiphon malvae* Mosley ; Basu, A. N., *Curr. Sci.*, 30 (10) : 390.

Material examined : 1 aptera and 2 nymphs, on *Salvia glandulosa*, Kufri, Chini Bunglow, 15.xii.1973, coll. L. K. Ghosh.

Remarks : Due to paucity of material subspecific identity could not be ascertained and since a number of subspecies exists under *malvae*, the term complex is used here.

Distribution : Europe ; India and America.

28. *Acyrthosiphon phaseoli* Chakrabarti, Ghosh and Raychaudhuri

1971. *Acyrthosiphon phaseoli* Chakrabarti, Ghosh, A. K. and Raychaudhuri, D. N. *Kontyu*, 39 (4) : 368.

Material examined : 2 apterae, on *Phaseolus* sp., Mashobra. 24.ix.1969, coll. A. N. Chowdhuri.

Distribution : India : Himachal Pradesh.

29. *Acyrtosiphon rubi* Narzikulov1957. *Acyrtosiphon rubi* Narzikulov, *Ent. Obozr.*, **36** : 673.1975. *Acyrtosiphon rubi* Narzikulov, David and Hameed, *Oriental Ins.*, **9** (3) : 214.

Material examined : Many apterae viviparae, 3 apterae oviparae and 1 alate male, Kalpa, on *Rubus ellipticus*, 26.x.1976, coll. A. N. Chowdhuri ; 1 aptera, on *Rubus* sp., Simla Hills, 18.v.1970, coll. K. Narayanan ; 1 aptera, on *Fagopyrum tartaricum*, Lahaul & spiti (11,000), coll. Hameed.

Remarks : The species is distinct from *Acyrtosiphon rubi elliptici* Stroyan and Nagaich in having antennae longer than body, u.r.s. as long as h.t. 2 and less secondary rhinaria on a.s. III. Sexuales of the species have been described by Raychaudhuri, D. N., Ghosh, L. K. and Das, S. K. (1980).

Distribution : India : Sikkim, West Bengal ; Bhutan and U.S.S.R.

30. *Acyrtosiphon sonchifoliae* Raychaudhuri, Ghosh and Das1980. *Acyrtosiphon sonchifoliae* Raychaudhuri, D. N., Ghosh, L. K. and Das, S. K., *Ins. matsum.*, n. s. **20** : 24.

Material examined : 3 apterae and 1 alata, Simla, on *Sonchus* sp., 31.v.1969, coll. L. K. Ghosh.

Biological notes : The greenish specimens were collected from under-surface of the leaves of the host plant. No attendant ant was found.

Distribution : India : Himachal Pradesh.

Key to the subgenera of the genus Acyrtosiphon

Median frontal prominence (Fig. 159A) developed ; abdominal tergum always sclerotic though usually not pigmented. On Rosaceae and Gramineae ...	<i>Metopolophium</i> Mordvilko
Median frontal prominence (Fig. 15) entirely absent ; abdominal tergum not or hardly sclerotic. On various plants ...	<i>Acyrtosiphon</i> Mordvilko

Key to the species of Metopolophium Mordvilko

Apterae viviparae

- | | |
|---|--|
| 1 (2) Siphunculi dark and about 2.5-3.0 times as long as
cauda ; on <i>Thalictrum</i> ... | <i>ranunculum</i> sp. nov. |
| 2 (1) Siphunculi pale and not more than 2.1 times as long
as cauda ... | ... 3 |
| 3 (4) Processus terminalis always longer than a. s. III ;
antennae always longer (1.2-1.4 times) than body ;
siphunculi more than 2.0 times as long as cauda ;
on <i>spiraee</i> ... | <i>spiraee canescentis</i> Chakrabarti
and Raychaudhuri |

- 4 (3) Processus terminalis distinctly shorter than to at most as long as a. s. III ; antennae always shorter than body (at most 0.8 times) ; siphunculi 1.4-1.9 times as long as cauda ... 5
- 5 (6) Ultimate rostral segment with about 8 secondary hairs ; a. s. III with 7-14 secondary rhinaria ; on undetermined plant ... *simlaensis* Chakrabarti and Raychaudhuri
- 6 (5) Ultimate rostral segment with at most 4 secondary hairs ; a. s. III with only 0-8 secondary rhinaria ... 7
- 7 (8) 8th abdominal tergite with 2 hairs ; p. t. distinctly shorter than a. s. III ; u. r. s. with 2-4 secondary hairs ; cauda with 7 hairs ; siphunculi 1.4-1.7 times as long as cauda ; on Grass ... *graminum* Raychaudhuri *et al.*
- 8 (7) 8th abdominal tergite with 4 hairs ; p. t. about as long as a.s. III ; u.r.s. with 2 (sometimes 3) secondary hairs ; cauda with 6 hairs ; siphunculi longer, about twice as long as cauda ; on *Poa*, *Bromas* ... *chandrani* David and Narayanan

31. *Acyrthosiphon* (*Metopolophium*) *graminum*

Raychaudhuri, Ghosh and Das

(Figs. 159, 184)

1980. *Metopolophium graninum* Raychaudhuri, D. N., Ghosh, L. K. and Das, S. K., *Ins. matsum.*, n. s. 20 : 20.

Material examined : 4 apterae, Simla Hills, on Grass, 13.xii.1973, coll. L. K. Ghosh.

Biological notes : Colony of greenish aphids was found on the apical inflorescence of the host plant. No attendant ant was noticed in association with the insects.

32. *Acyrthosiphon* (*Metopolophium*) *ranunculum*, sp. nov.

(Fig. 185)

Apterous viviparous female : Body elongate and pale, about 2.25-2.55 mm long with 0.96-1.26 mm as its maximum width at the middle of abdomen. Hairs on vertex 36 μ -46 μ long with rather blunt apices ; frontal tubercles well developed and median frontal prominence low. Antennae about 0.9-1.4 times as long as body, with very apices of segments III, IV and apical portion of segment V and whole of segment VI black, rest pale ; a.s. I, II and III smooth, IV indistinctly imbricated at pigmented apex, rest of flagellum progressively more distinctly imbricated ; segment III with 0-2 small round secondary rhinaria up to basal 0.2 portion ; p.t. about 0.38-0.39 times as long as base VI and subequal to segment III ; hairs on flagellum sparse, with

acuminate apices, longest one on segment III about 0.6-0.8 times as long as basal diameter of the segment. Rostrum reaches near midcoxae, u. r. s. about 0.8-0.9 times as long as h. t. 2 and bears 6-8 secondary hairs. Tergum pale except of somewhat pigmented dorsum of abdomen. Anterior hairs on abdominal dorsum about $30\ \mu$ long, about as long as or distinctly shorter than b.d. III ; 8th tergite with 4 hairs, these are $60\ \mu$ - $70\ \mu$ long with acuminate apices and about twice as long as the mentioned diameter. Siphunculi dark brown to black except the very pale base, cylindrical, imbricated, with a few interconnecting striae before distinct apical flange, about 0.26-0.30 times as long as body and 2.4-3.0 times as long as cauda. Cauda pale like tergum, elongate, with a slight constriction near its basal half and bears 6-9 hairs. Legs pale except apices of femora, tibiae and whole of tarsi which are darker ; femora nearly smooth, F.T.C. 3,3,3.

Alate viviparous female : Body 1.95-2.25 mm long with 0.75-0.90 mm as its maximum width. Head dark. Antennal segments I and II concolourous with head and scabrous on inner side ; flagellum dark brown except the very pale base of segment III ; a. s. III with 17-20 round secondary rhinaria arranged in a row and distributed along its entire length except the very base and apex. Abdominal dorsum with scattered sclerotic patches on abdominal segments 1-5, 6th and 7th abdominal segments with spinal paired sclerites, those on 6th larger ; 8th segment without any sclerotic area. Legs pale except distal half of femora, apical 0.18 portion of tibiae and whole of tarsi which are dark brown to blackish. Wing venation normal. Other characters as in apterae.

Material examined : Holotype, apterous viviparous female, Baghi (c 2636 m), on *Thalictrum panciflorum*, 5.x.1974, coll. L. K. Ghosh ; paratypes : 3 apterous viviparous females and 3 alate viviparous females, data same as for holotype.

Biological notes : The apterae (yellowish white) and alatae (greenish white) forming colony were collected from small branches, leaf stalk and undersurface of leaves of the host plant belonging to N. O. Ranunculaceae and these were not in association with other insects.

Remarks : The ratio of ultimate rostral segment to the second joint of hind tarsus, number of hairs on cauda and on 8th tergite take the new species near *Acyrtosiphon* (*Metopolophium*) *simlaensis* Chakrabarti *et al.* but the former differs from the latter in having lesser number of (0-1) secondary rhinaria on antennal segment III ; in the ratio of ultimate rostral segment to second joint of hind tarsi, ratio of antennal segment III to processus terminalis and in the shape and dark pigmented siphunculi.

The new species also comes near *Metopolophium festucae* Theobald in the nature of siphunculi and in the number of caudal hairs and also in some other morphological characters but it can be easily separated by pale and shorter cauda, less hairs on tergite VIII and by darker siphunculi.

Host plant association is also different. The new species infests the plant belonging to N. O. Ranunculaceae.

Distribution : India : Himachal Pradesh.

33. *Acyrtosiphon* (*Microlophium*) *rubifoliae* Raychaudhuri *et al.*

1975. *Metopolophium* (*Microlophium*) *rubifoliae* Raychaudhuri, D. N., Ghosh, M. R. and Basu, R. C., *Proc. zool. Soc., Calcutta*, 28 : 126.

1980. *Metopolophium* (*Microlophium*) *rubifoliae* Raychaudhuri *et al.* ; Raychaudhuri, D. N., Ghosh, L. K. and Das, S. K., *Ins. matsum., n. s.* 20 : 25.

Material examined : 2 apterae viviparae, on *Potentilla nepalensis*, Kufri (C 2700 m), 26.x.1978, coll. M. R. G. and P. K. M.

Distribution : India : Himachal Pradesh, Nagaland and Sikkim.

XI. Genus *Amphicercidus* Oestlund

1922. *Amphicercidus* Oestlund, *Rept. St. Ent. Minnesota*, 19 : 126.

Type-species : *Aphis pulverulens* Gillette, 1911.

Head smooth with weakly developed diverging lateral frontal tubercles ; frons hardly or not convex at middle ; dorsal and ventral cephalic hairs long and fine. Antennae 6-segmented, shorter than body ; flagellum faintly imbricated on a.s. III and progressively more imbricated towards apex, apterae with secondary rhinaria on as. III, alatae with many such rhinaria on a.s. III and sometimes also on a.s. IV and V ; flagellar hairs long with very fine apices ; p.t. longer than base of a.s. VI. Ultimate rostral segment shorter than h.t. 2, with a number of secondary hairs. Dorsum of abdomen in apterae smooth, in alatae variably pigmented ; dorsal hairs very long and fine. Siphunculi (Fig. 186) cylindrical and stout, usually faintly imbricated, with an inconspicuous flange and with 2-3 rows of interconnecting preapical striae. Cauda subpentagonal, somewhat rounded at apex, bearing numerous hairs. Subgenital plate with about 10-16 hairs in 2 groups on posterior margin ; tarsal segments usually long with normal imbrications ; F.T.C. 3.3,3 ; wing venation normal.

Distribution : India and Japan.

34. *Amphicercidus tuberculatus* David, Narayanan, Rajasingh

(Fig. 186)

1970. *Amphicercidus tuberculatus* David, Narayanan and Rajasingh, *Oriental Ins.*, 4 (4) : 419.

Material examined : 1 aptera, Manali, 22.v.1970, coll. K. Narayanan ; 6 apterae oviparae and a few nymphs, Simla, on *Buxus wallichiana* ; 11.xii. 1973, coll. L. K. Ghosh.

Apterous oviparous female (Fig. 186) : Body oval, about 2.25-3.06 mm long with 1.20-1.56 mm as its maximum width. Head brown, smooth, flat without any tubercle. Antennae 6-segmented, pale brown, slender, about 0.80-1.0 times as long as body ; a.s. III smooth, with 7-13 small secondary rhinaria distributed over basal 0.5 portion ; flagellum progressively more distinctly imbricated ; p.t. about 3.0-4.6 times as long as base of a.s. VI ; flagellar hairs short, the longest one about as long as or a little longer than b.d. III. Eyes with distinct triommatidia. Rostrum reaches beyond midcoxae ; u.r.s. about 0.6-0.7 times as long as h.t. 2, with 4-6 secondary hairs. Abdomen pale, smooth ; dorsal hairs about as long as b.d. III ; 7th and 8th tergites without tubercles ; 8th tergite with 8-10 hairs, these are upto 51 μ long about 1.2-1.4 times as long as b.d. III. Abdomen with eggs about 0.78-0.84 mm long and 1.3-1.5 times as long as its middle diameter. Siphunculi about 0.13-0.16 times as long as body, finely imbricated, without distinct flange, about 5.4-7.4 times as long as cauda. Cauda about 2.0 times as long as its basal width, bearing about 10 hairs. Subgenital plate dark-brown, with small fine hairs. Rudimentary gonapophyses 3. Legs concolourous with head, with apices of tibiae darker, hind tibiae swollen with about 14-24 small round pseudo-sensoria distributed on basal half ; F.T.C. 3,3,3. Other characters as in apterous viviparous female.

Biological notes : In life, the aphids were covered with wooly secretion over the body and found colonising the host plant just near soil level. Some were seen in parasitized condition. No alate form and attendant ants could be found.

Note : So far 6 species, 3 from North America (Palmer, 1952), 1 from Japan (Narzykulov, 1957) and 2 from India (Hille Ris Lambers *et* Basu, A. N. 1966 and David *et al.*, 1970) are known. But apparently, for none of the species, sexual forms are known. David, Narayanan and Rajasingh (1970) described *Amphicercidus tuberculatus* as a new species collected on unidentified plant from Simla. The description was based only on apterous viviparous females. Later, David, Rajasingh and Narayanan (1972) described alate virginoparae collected on *Lonicera quinquelocularis* (N. O. Caprifoliaceae) from Manali, Himachal Pradesh. Thus, sexuales of the species were hitherto unknown. Therefore, description of ovipara is provided here. The male is yet to be known.

Some oviparae were collected from Simla and these evidently belong to the genus *Amphicercidus*. Since David *et al.* described *A. tuberculatus* from same locality as above and in view of oviparae showing good resemblance

to viviparae, the oviparae have been tentatively determined as those of *A. tuberculatus* David *et al.*

Distribution : India : Himachal Pradesh.

XII. Genus *Amphorophora* Buckton

1876. *Amphorophora* Buckton, *Monograph of the British Aphides*, 1 : 187.

Type species : *Amphorophora ampullata* Buckton, 1876.

Body broadly oval. Head smooth ; lateral frontal tubercles diverging, smooth to slightly scabrous on inner margin ; median frontal prominence conspicuous ; dorsal cephalic hairs moderately long with blunt to incrassate apices. Antennae 6-segmented, as long as to a little longer than body ; secondary rhinaria non-protuberant, in apterae these are present on a.s. III, in alatae such rhinaria present only on a. s. III or on both a. s. III and IV ; flagellar hairs with incrassate apices ; p. t. much longer than base of a. s. VI. Rostrum reaching 2nd or 3rd coxae ; u. r. s. hairy, longer (about 1.2-1.5 times) than h. t. 2. Thoracic tergites somewhat corrugated, venter spinulose particularly laterally ; midthoracic furca stalked. Abdominal dorsum pale, smooth or sometimes faintly wrinkled with ante- and post-siphuncular areas always scabrous. Siphunculi clavate, distally smooth or faintly imbricated, pale basally and then brown, with well-developed flange. Cauda pale, short or elongate with blunt apex, bearing numerous hairs, always shorter than siphunculi. Subgenital plate with short blunt hairs on posterior margin and with a row of longer hairs on anterior margin. Femora smooth or faintly imbricated with spinules on venter at least of hind femora ; tibiae smooth or faintly imbricated with apices sparsely spinulose ; second tarsal segments with spinules. F. T. C. 3, 3, 3. Wing venation normal, veins faintly bordered brown.

The genus has been used in the sense of Hille Ris Lambers (1949).

Distribution : America ; China ; Europe ; India ; Japan ; Nepal and Korea.

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

1966. *Amphorophora ampullata bengalensis* Hille Ris Lambers and Basu, A. N., *Ent. Ber.*, 26 : 14.

1971. *Amphorophora ampullata* Buckton ; Ghosh, L. K., *Oriental Ins.*, 5 (1) : 131.

Material examined : 2 apterae, on Fern, Thanedhar, 2.x.1974 ; 3 apterae oviparae, on Fern, Simla, 6.i. 1970 ; 2 apterae oviparae, on Fern, Thanedhar, 27.ix.1974 ; 1 aptera ovipara, on unidentified Umbelliferae, Thanedhar, 2.x.1974 ; 2 apterae oviparae, on Fern, Simla, December, 1973 ; 2 apterae and 1 alata, on Fern, Thanedhar 2.x.1974, all L. K. Ghosh coll.

Distribution : India : Arunachal Pradesh, Himachal Pradesh, Manipur, Meghalaya, Nagaland, Sikkim, West Bengal and Nepal.

XIII. Genus *Aspidophorodon* Verma

1966. *Aspidophorodon* Verma, *Indian J. Ent.* 28 : 507.

Type-species : *Aspidophorodon harvensis* Verma, 1966.

Head in apterae brown, in alatae black with a rectangular median frontal process. The dorsal cephalic hairs very few and conspicuous. Frontal tubercles in apterae prolonged in the form of finger-like horns light yellow in colour, in alatae frontal tubercles not well developed. Antennae 5-segmented, a. s I with medially projecting process, without secondary rhinaria in apterae ; in alatae a. s III with 18-19 small and round secondary rhinaria ; a. s. IV with 0-1 rhinarium ; antennal hairs inconspicuous ; p. t. as long as or a little longer than the base of the segment. Eyes with hardly discernible ocular tubercles. Rostrum reaching the middle of 1st coxae, about as long as second joint of hind tarsus. Tergum sclerotic, pitted-reticulate, 8th tergite with 2 hairs, dorsal body hairs very small and inconspicuous. Siphunculi light yellow, elongate, with rounded tip and atrophied porus on inner side. Cauda yellowish brown, imbricated, with basal and median constriction and bears 3-6 hairs. Legs light brown and slender. F. T. C. 3, 3, 3. Hind tibiae with spinulose imbrications. Wings without bordered veins, media once-branched and radial sector normal in forewings, hind wings with both media and cubitus.

Distribution : India : Himachal Pradesh ; Jammu and Kashmir.

36. *Aspidophorodon harvensis* Verma

1966. *Aspidophorodon harvensis* Verma, *Indian J. Ent.*, 28 : 507.

1980. *Aspidophordon harvensis* Verma ; Raychaudhuri, D. N., Ghosh, L. K. and Das, S. K. *Ins. matsum.*, n. s. 20 : 12.

Material examined : 1 aptera, on indet. host, Kufri (c 2700m), 26.x.78. coll. M. R. G. and P. K. M.

Distribution : India : Himachal Pradesh and Jammu and Kashmir State.

XIV. Genus *Aulacorthum* Mordvilko

1914. *Aulacorthum* Mordvilko, *Faune de la Russie*, 1 : 68.

Type-species : *Aphis solani* Kaltenbach, 1843.

Body elongate. Head always spinulose on under surface, dorsally such spinules sparse and then these are usually found anterolaterally ; lateral frontal tubercles scabrous with nearly parallel inner margin and diverging apically, low but distinct median frontal prominence always present.

(fig. 14) ; dorsal cephalic hairs short to moderately long and of 'myzine' type, ventral cephalic hairs longer than the dorsal ones. Antennae 6-segmented, shorter to longer than body ; basal 2 segments scabrous ; flagellum imbricated ; flageller hairs like dorsal cephalic hairs ; apterae usually with 0-4 secondary rhinaria near base of a. s. III, in alatae such rhinaria found only on a. s. III ; primary rhinaria ciliated ; p. t. about 5-6 times as long as base of a. s. VI ; u. r. s. shorter to longer than h. t. 2 and bearing 4-8 secondary hairs. Midthoracic furca in apterae with a short basal stem. In apterae abdominal dorsum usually pale, sometimes smoky middorsally and marginally on segments 2-4, smooth excepting post-siphuncular segments which are with spinular imbrications, in alatae with segmentally arranged spinal, pleural and marginal patches, sometimes spinal and pleural patches coalescing. Siphunculi either cylindrical or slightly swollen distally on inner margin, much longer than the cauda, imbricated, with distinct flange and a few preapical interconnected striae which sometimes form a few transversely elongate cells. Cauda elongate, sometimes with a constriction on basal half, with 4-8 hairs including a preapical one. Subgenital plate with 12-14 short, thick, blunt hairs in groups on posterior margin and two rather long hairs on anterior 0.50 portion. Femora sparsely to densely imbricated, these imbrications may be spinular, tibiae smooth but sometimes with apical imbrications ; second tarsal segment with normal imbrications ; F. T. C. 4, 4, 4 or 3, 3, 3. Wing venation normal, the basal 2 veins of the forewing sometimes bordered brown.

Remarks : Here, *Aulacorthum* has been used as a distinct genus in the sense of Hille Ris Lambers (1947). Takahashi (1965) has provided a key to subgenera and species of Japan.

Distribution : Cosmopolitan.

Key to the subgenera of Aulacorthum Mordvilko

- | | | |
|--|-----|------------------------------|
| 1 (2) Tergal hairs long, at least 2.0 times as long as b. d. III | ... | <i>Perillaphis</i> Takahashi |
| 2 (1) Tergal hairs considerably shorter than b. d. III | ... | 3 |
| 3 (4) Median frontal prominence absent ; thoracic and abdominal dorsum of apterae ornamented with rather large pigmented patches which may sometimes fuse to form a horse-shoe shaped patch ; alatae with secondary rhinaria on a. s. III and IV | ... | <i>Neomyzus</i> van der Goot |
| 4 (3) Median frontal prominence present ; dorsum in apterae usually without marked pigmented pattern, secondary rhinaria in alatae confined to a. s. III only | ... | <i>Aulacorthum</i> Mordvilko |

*Key to the species of the genus Aulacorthum Mordvilko***Apterae viviparae :**

- | | | | | |
|--------|---|-----|--|---|
| 1 (4) | Dorsum of abdomen either completely or partially sclerotic | ... | ... | 2 |
| 2 (3) | Abdominal dorsum completely sclerotic ; u. r. s. about as long as h. t. 2 | ... | <i>sclerodorsi</i> Kumar and Burkhardt | |
| 3 (2) | Abdominal dorsum with scattered sclerotic inter-segmental patches ; u. r. s. longer than h. t. 2 | ... | <i>nipponicum</i> (Essig and Kuwana) | |
| 4 (1) | Dorsum of abdomen pale | ... | ... | 5 |
| 5 (6) | Siphunculi expanded near tip and usually less than twice (1.6-1.8) as long as cauda ; antennae black ; u. r. s. with 2 pairs of secondary hairs | ... | <i>magnoliae</i> (Essig and Kuwana) | |
| 6 (5) | Siphunculi not swollen and 2-3 times as long as cauda | ... | ... | 7 |
| 7 (8) | Antennal segment III without secondary rhinaria ; p. t. about 3.2-3.3 times as long as base of a. s. VI | ... | <i>rharni</i> Ghosh <i>et al.</i> | |
| 8 (7) | Antennal segment III with secondary rhinaria ; p. t. about 4.0-9.0 times as long as base of a. s. VI | ... | ... | 9 |
| 9 (10) | Antennal segment III with 1-2 nonprotuberant secondary rhinaria near the base ; p. t. about 4.0-4.5 times as long as base of a. s. VI | ... | <i>solani</i> (Kaltenbach) | |
| 10 (9) | Antennal segment III with more than 2 protuberant secondary rhinaria on basal half ; p. t. about 9 times as long as base of a. s. VI | ... | <i>delphinae</i> Das <i>et al.</i> | |

37. *Aulacorthum delphinae* Das *et al.*

1981. *Aulacorthum delphinae* Das, S. K., Raychaudhuri, D. and Raychaudhuri, D. N., *Entomon*, 6 (1) : 47.

Material examined : 7 apterae, on *Delphinium ajacis*, Mashobra (c 2149 m), 22.VI.1979, coll. S. K. Das.

Remark : The species is characterised by its many protuberant secondary rhinaria on basal 0.3-0.4 portion in apterae.

Distribution : India : Himachal Pradesh.

38. *Aulacorthum magnoliae* (Essig and Kuwana)

(Fig. 189)

1918. *Rhopalosiphum magnoliae* Essig and Kuwana, *Proc. California Acad. Sci., 4th Ser.*, 8 : 59.

1965. *Aulacorthum magnoliae* (Essig and Kuwana) ; Takahashi, *Ins. matsum.*, 27 (2) : 109.

1971. *Acyrtosiphon spinicaudatus* Kumar and Burkhardt, *J. Kans. ent. Soc.*, 44 : 179.

Material examined : 2 apterae, on *Cucumis sativus*, Simla, 10.x.1972, coll. K. D. Verma ; 2 apterae, on *Cucumis sativus*, Simla ; coll. Rabinder Kumar.

Remarks : Kumar and Burkhardt (1971) while describing *Acyrtosiphon* (*Aulacorthum*) *spinacaudatus* as new to science from Simla, collected on *Cucumis sativus* (N. O. Cucurbitaceae), distinguished from its allied species, *A. magnoliae* (Essig and Kuwana) by the cauda being constricted and bearing 5 spiny hairs. Examination of a paratype of *A. spinacaudatus* from United States National Museum, Smithsonian Institute, Washington and a slide of *A. magnoliae* from Dr. K. D. Verma, Simla, the material being collected on *Cucumis sativus* at Simla reveals that *A. spinacaudatus* and *A. magnoliae* are conspecific.

Distribution : India : Himachal Pradesh, Meghalaya, Sikkim and West Bengal ; Japan ; Korea and Taiwan.

39. *Aulacorthum nipponicum* (Essig and Kuwana)

1918. *Macrosiphum nipponicum* Essig and Kuwana, *Proc. California Acad. Sci.*, 8 : 48.

1973. *Aulacorthum nipponicum* (Essig and Kurana) ; Basu, R. C., Ghosh, A. K. and Raychaudhuri, D. N. *Proc. zool. Soc., Calcutta*, 26 : 90.

Material examined : 1 aptera, on *Polygonum* sp., Simla, 18.vii.1971, coll. K. D. Verma.

Remark : The species is a new record from Himachal Pradesh.

Distribution : Arunachal Pradesh, Himachal Pradesh, Meghalaya. Nagaland, Sikkim, West Bengal ; China ; Japan ; Korea and Taiwan.

40. *Aulacorthum rhamni* Ghosh, Ghosh and Raychaudhuri

1970. *Aulacorthum rhamni* Ghosh, M. R., Ghosh, A. K. and Raychaudhuri, D. N., *Oriental. Ins.*, 4 (4) : 379.

1971. *Aulacorthum rhamni* Ghosh *et al.* ; Ghosh, A. K., Banerjee and Raychaudhuri, D. N., *Proc. zool. Soc., Calcutta*, 24 : 101.

Material examined : 10 apterae, on Undet. Compositae, Simla Hills, November 1971 ; 7 apterae, host Undet. Simla Hills, December, 1973, all L. K. Ghosh coll.

Remark : The species is newly recorded from Himachal Pradesh.

Biological notes : The specimens were collected from the undersurface of the leaves of the host plants. No noticeable injury was found in the host plants. Attendant ants were not found.

Distribution : India : Himachal Pradesh, Meghalaya, Sikkim and West Bengal.

41. *Aulacorthum sclerodorsi* (Kumar and Burkhardt)

(Fig. 188)

1971. *Acyrtosiphon* (*Aulacorthum*) *sclerodorsi* Kumar and Burkhardt, *J. Kans. ent. Soc.*, 44 (2) : 175.

Material examined : 1 aptera and 1 alata, on *Nepeta* sp., Simla, 1.x.1966, coll. R. Kumar (U. S. N. M. Loan).

Additional characters (aptera : from 1 paratype) : Ultimate rostral segment with 4 secondary hairs. 8th abdominal tergite with 4 hairs up to 42μ long and about 2.5 times the longest hair on a. s. III. Caudal hairs 7. Legs nearly smooth with short hairs (up to 25μ long). F. T. C. 3, 3, 3. Other characters as in original description (Kumar & Burkhardt, 1971).

Distribution : India : Himachal Pradesh.

42. *Aulacorthum solani* (Kaltenbach)

1843. *Aphis solani* Kaltenbach, *Mon der Fam. Pflanzen.* : 15.

1969. *Aulacorthum solani* (Kaltenbach) ; Chowdhuri, Basu, R. C. and Raychaudhuri, D. N., *Sci. Cult.*, 35 : 336.

Material examined : Many apterae and 3 alatae, on *Cardamine hirsuta*, Simla Hills, 7.i.1970 ; 2 apterae, on *Rosa* sp., Simla Hills, 7.i.1970 ; 3 apterae, on *Viola* sp., Simla Hills, 7.i.1970 ; 3 apterae on Undet. plant, Simla Hills, 14.xii.1973 ; 2 apterae, on Undet. host, Simla Hills, 29.ix.1974, all L. K. Ghosh coll.

Biological notes : Brownish aphids were collected from tender leaves and apical shoots of the host plant. No ant was found to attend the aphids.

Distribution : Cosmopolitan (Kumar & Burkhardt, 1971).

43. *Aulacorthum* (Neomyzus) *strobilantheae* sp. nov.

(Fig. 160)

Apterous viviparous female : Body rather elongate, 2.10-2.40 mm long with 1.02-1.35 mm as maximum width at the middle of abdomen. Head (Fig. 160A) brown, with distinct diverging frontal tubercles ; median frontal prominence not developed ; dorsum of head spinulose. Antennae 6-segmented, pale brown except apices of segments III, IV, V and whole of VI which are dark brown (Fig. 160B), 1.1-1.2 times as long as body ; segment I dark brownish, spinulosely imbricated, segment II slightly rugose on inner margin ; segment III almost smooth with 1-4 secondary rhinaria near base, rest of flagellum gradually distinctly imbricated ; p. t. about 5.1-6.8 times as long as base of a. s. VI, always longer than segment III ; hairs on flagellum short with slightly incrassate apices, about 0.33-0.42 times as long as b. d. III. Rostrum reaching midcoxae ; u. r. s. 1.0-1.3 times as long as h. t. 2, bearing 2 secondary hairs on basal half. Abdominal dorsum pale with distinct brownish sclerotic patches variably developed on anterior tergites (Fig. 160C), pigmented patches on anterior tergites often giving pitted appearance, 7th tergite with a transverse sclerotic band ; hairs on dorsum about 0.3 times as long as b.d. III ; 8th tergite with 4 hairs, longest one

being about 1.0-1.2 times as long as b.d. III. Siphunculi (Fig. 160 D) yellowish brown with dark brown apex, 0.24-0.26 times as long as body, 3.0-3.5 times as long as cauda, sparsely imbricated, slightly to distinctly swollen towards apex, about 7.3-7.5 times as long as the maximum diameter at apex and 5.0-5.6 times as long as base, with 1-2 rows of interconnected striae just before the broad apical flange at dark tip. Cauda (Fig. 160E) darker than siphunculi, pointed at apex and with 2 pairs of lateral hairs and a preapical one. Legs light brown excepting tibiae and tarsi which are darker; femora and tibiae smooth dorsally; hind tibiae of nymphs smooth. F. T. C. 3, 3, 3.

Measurements (in mm) of the Holotype : Length of body 2.25; width of body 1.20; antenna 2.70; a.s. III 0.62, IV 0.46, V 0.44, VI (0.16+0.88); u.r.s. 0.11; h.t. 20.09; siphunculus 0.54; cauda 0.18.

Material examined : Holotype, aptera, from *Strobilanthes atropurpurens*, Mashobra, December 1973, coll. L. K. Ghosh; paratypes, 7 apterous viviparous females, same data as for holotype.

Biological notes : The colony of apterae was found on the young shoot of the host plant, without showing any noticeable injury to the plant. No ant was found to attend the aphids.

Remarks : The new species agrees well with *Aulacorthum* (*Neomyzus*) *primulum* Ghosh, A. K., Banerjee and Raychaudhuri, D. N. (1971) in having spinules over dorsum of head, secondary rhinarium on antennal segment III in apterae, ratio of p.t. to base of a.s. VI and also in the number of hairs on 8th tergite but the new species can easily be differentiated from *primulum* by smooth and clavate siphunculi and the pattern of ornamentation on abdominal dorsum. By the clavate siphunculi the new species comes close to *A. (N.) dendrobi* Basu, A. N., 1969 but the former can be separated by the pattern of ornamentation on the abdominal dorsum and by shorter cauda. Biologically, the species is quite distinct infesting *Strobilanthes atropurpurens* (N. O. Acanthaceae) since no species under the genus is known to occur on Acanthaceae at least in Indian subcontinent.

Distribution : India : Himachal Pradesh.

44. *Aulacorthum* (*Perillaphis*) *perillae* Shinji

1924. *Macrosiphum perillae* Shinji, *Zool. Mag.*, **36** (431) : 363.

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

Material examined : 4 apterae, 1 alata (damaged) and a few nymphs, on *Prunus* sp., Simla Hills, November 1971; many apterae and nymphs, on an unidentified plant belonging to N. O. Labiatae, Simla, Rohroo, 21.x.1970, coll. A. N. Chowdhuri.

Remarks : The specimens collected in Himachal Pradesh show some variations, viz., shorter hairs on 8th abdominal tergite ; more secondary rhinaria distributed almost over entire length of a.s. III except the very base and longer siphunculi in comparison to cauda.

In spite of these variations, the specimens are considered as those of *Periliaphis perillae* until more material are available for study.

Distribution : India : Arunachal Pradesh, Himachal Pradesh, Meghalaya, West Bengal ; China ; Japan and Taiwan.

XV. Genus *Brachycaudus* van der Goot

1913. *Brachycaudus* van der Goot, *Tijdschr. Ent.*, 56 : 97.

Type-species : *Aphis myostidis* Koch, 1854.

(= *Aphis helichrysi* Kaltenbach, 1843)

Head smooth, without or with ill-developed lateral frontal tubercles. Antennae 6-segmented, shorter than body ; flagellum imbricated ; apterae without secondary rhinaria, alatae with secondary rhinaria on a.s. III and sometimes on a.s. IV also ; flagellar hairs with acute to acuminate apices ; p.t. a little longer than to about 5 times as long as base of a.s. VI. Ultimate rostral segment with blunt apex, as long as to nearly twice as long as h.t. 2. Abdominal dorsum sclerotic, with or without pigmentation in apterae, in alatae with a broad dark patch ; spiracles rounded ; dorsal hairs like flagellar ones. Siphunculi short, cylindrical or tapering with an annular constriction just before the flange and longer than cauda. Cauda semicircular or pentagonal, with about 8 hairs. F.T.C. 3,3,3 or 3,3,2. Wing venation normal. Hindtibiae of nymphs smooth.

Distribution : Cosmopolitan.

Key to the species of the genus Brachycaudus van der Goot

Apterae viviparae :

- | | |
|--|---------------------------------|
| Hairs on 8th abdominal tergite long (about 100 μ long) ; u. r. s. longer than h. t. 2 ; cauda about as long as its basal width ; usually on Compositae ... | <i>helichrysi</i> (Kaltenbach) |
| Hairs on 8th abdominal tergite much shorter (only about 40 μ long) ; u. r. s. shorter than h. t. 2 ; cauda about 0.33 times its basal width ; on Polygonaceae .. | <i>amygdalinus</i> (Schouteden) |

45. *Brachycaudus amygdalinus* (Schouteden)

1905. *Aphis amygdalinus* Schouteden, *Broteria*, 4 : 163.

1958. *Brachycaudus amygdalinus* (Schouteden) ; Eastop, A study of the Aphididae (Homoptera) of East Africa (H. M. S. O., London) : 25.

1972. *Brachycaudus* (*Thuleaphis*) *rumexicolens* (Patch) ; Ghosh, L. K. *Oriental Ins.*, 6 (2) 170.

Material examined : Apterae, on *Rumex hastatus* and *R. nepalensis*, Simla, 6.i.1970, coll. L. K. Ghosh.

Biological notes : Severe infestation was noticed on the tender leaves and twigs of the host plants. No attendant ant or predator was found.

Distribution : India : Himachal Pradesh ; America ; Crimea, Central Asia ; Europe ; France ; Italy ; Middle East ; Portugal ; Spain and Switzerland.

46. *Brachycaudus helichrysi* (Kaltenbach)

1842. *Aphis helichrysi* Kaltenbach, *Mon. der Fam. Pflanzen.*, : 102.

1913. *Brachycaudus helichrysi* (Kaltenbach) ; van der Goot, *Tidschr. Ent.*, 56 : 97 (in Cottier 1953)

1975. *Brachycaudus helichrysi* (Kaltenbach) ; David and Hameed, *Oriental Ins.*, 9 (2) : 216.

Material examined : Many apterae and alatae, on Undet. Compositae, Solan, 1.iv.1969 ; 3 apterae oviparae, on *Jatropha* sp. Phagli, 14.xii.1973 ; 2 alate males, Vagrant, Kufri Hills, December, 1973 ; many apterae and nymphs, on *Prunus persica*, Simla Hills, September, 1974 ; many apterae and alatae, on *Artemisia vestita*, Simla Hills, September, 1974, all L. K. Ghosh coll.

Apterous oviparous female : Body oval, 1.20-1.29 mm long with 0.72-0.75 mm as maximum width near middle of abdomen. Head dark brown, smooth, dorsal cephalic hairs about 15 μ long. Antennae short, about 0.45 times as long as body, pale except a. s. V and VI which are darker ; p. t. 1.6-1.8 times as long as base VI. Rostrum dark brown, reaches midcoxae ; u. r. s. about 1.4 times as long as h. t. 2. Abdominal dorsum pale ; dorsal hairs up to about 15 μ long and just shorter than b. d. III. Siphunculi dark, 0.09 times as long as body, about 1.1-1.3 times its basal width and nearly 2.0 times as long as cauda which is broad and about as long as width at base and bears 6 hairs. Hind tibiae dark brown, swollen, nearly 2.0 times as thick as mid diameter of other tibiae, with numerous small round pseudosensoria distributed over entire length except the very base and apex. Otherwise as in apterae viviparae.

Measurements (in mm) of an ovipara : Length of body 1.29 ; width of body 0.72 ; antenna 0.51 ; a. s. III 0.09 ; IV 0.07, V 0.07, VI (0.06+0.11) ; u. r. s. 0.10 ; h. t. 2 0.07 siphunculus 0.07 ; cauda 0.03.

Alate male (Fig. 11) : Body elongate, about 1.2-1.23 mm long with 0.51-0.54 mm as maximum width. Dorsal cephalic hairs up to 12 μ long. Antennae 0.9-1.0 times as long as body, brown, longest hair on a. s. III

nearly 0.8 times as long as b. d. III ; a. s. III with 36-41 small round secondary rhinaria distributed almost along entire length, a. s. IV with 14-19 similar rhinaria throughout length and a. s. V with 4-6 secondary rhinaria towards distal end. Hairs on anterior abdominal tergites about $15\ \mu$ long, those on 8th tergite up to about $36\ \mu$ long and nearly 2.0 times as long as b. d. III. Genitalia well developed, claspers dark brown. Otherwise as in alate viviparous female.

Measurements (in mm) of an alate male : Length of body 1.23 ; width of body 0.51 ; antenna 1.17 ; a. s. III 0.37, IV 0.22, V 0.14, VI (0.06+0.26) ; u. r. s. 0.11 ; h. t. 2 0.07 ; siphunculus 0.07 ; cauda 0.06.

Biological notes : Light brown viviparae were collected from the under surface of the leaves of the host plants. The oviparous morph along with viviparae was collected from undersurface of the leaves of the host plant *Jatropha* sp. (Euphorbiaceae). Heavy infestation was also noticed in *Artemisia vestita* (Fig. 1) and *Prunus persica* (Fig. 5).

Note : Basu, R. C., Ghosh, A. K. and Raychaudhuri, D. N. (1970) reported apterous ovipara from *Prunus* sp. and 13 alate males collected in Y. P. T. at Shillong. Later, Ghosh, A. K., Ghosh, M. R. and Raychaudhuri, D. N. (1971) again recorded alate male from *Prunus* sp. at Kalimpong. From Himachal Pradesh, only alate male on *Lycopersicum esculentum* was known (Chowdhuri, Ghosh, A. K., Banerjee and Raychaudhuri, D. N. 1970). Although sexuales were known earlier in India, no description of the same was given. As such, the descriptions of both oviparous female and alate male are provided. The oviparous morph is being reported for the first time from North West Himalaya.

Distribution : Cosmopolitan.

XVI. Genus *Brevicoryne* van der Goot

1915. *Brevicoryne* van der Goot. *Bietr. Z. Kenntider Holland, Blattlause* : 245.

Type-species : *Aphis brassicae* Linnaeus, 1758.

Body rather oval. Head smooth or slightly wrinkled and pigmented. Lateral frontal tubercles low and median frontal prominence well developed. Antennae 6-segmented, about 0.40-0.95 times as long as body. Antennal segment I imbricated, shorter than wide, segment II as long as segment I and flagellum strongly imbricated. Apteræ without secondary rhinaria, alatae with numerous such rhinaria distributed irregularly on a.s. III, a.s. IV with 7-15, V with 5-19 and VI with 0-2 secondary rhinaria ; primary rhinaria ciliated ; flagellar hairs sparse, short with acute to acuminate apices ; p.t. 2.0-6.5 times as long as base of segment VI. Rostrum reaches midcoxae ; u.r.s. shorter than h.t. 2 and bears 4 secondary hairs. Prothorax in apteræ with

marginal brown patches and in alatae with a transverse pigmented band ; meso- and metathorax in apterae with such marginal patches in addition to other scattered pigmented patches and muscle-plates arranged pleurally ; midthoracic furca with separate arms. Abdominal dorsum in apterae with pigmented, irregular shaped wrinkled pleural patches showing various degrees of coalescence with those occurring spinally on segments 1-7 and segment 8 with a spinopleural band and scattered muscle-plates present on antesiphuncular segments, in alatae with spinopleural segmental bars on each segment, sometimes these on anterior segments being broken and marginal spinular pigmented patches on segments 2-5 along with muscle-plates ; dorsal hairs in apterae thick with blunt apices and in alatae with acuminate apices and placed on slightly raised bases. Siphunculi (Fig. 76) about 0.05 to 0.14 times as long as body, usually barrel-shaped, in alatae basal portion much constricted and wrinkled, faintly imbricated, without any apical flange. Cauda dark, triangular to elongate, longer than siphunculi and bearing 5-7 hairs. Subgenital plate broadly oval, with 10 hairs in two groups posteriorly and 2 hairs anteriorly. Legs smooth with hairs having acute to sub-acute apices, faintly imbricated, tarsi with normal imbrications. F.T.C. 3,3,3 or 3,3,2. Wing venation normal. Nymphs with smooth hindtibiae.

This genus is mostly restricted to the plants of Cruciferae.

Remark : Ghosh, L. K. *et al.* (1980) have reviewed the genus from India.

Distribution : Cosmopolitan.

Key to the species of Brevicoryne van dar Goot

Apterae viviparae :

- | | | |
|--|-----|--------------------------|
| Siphunculi typically barrel-shaped ; cauda triangular and bearing 5-7 hairs ; abdominal dorsum with pleural irregular wrinkled sclerites | ... | <i>brassicae</i> (Linn.) |
| Siphunculi not as above but cylindrical to slightly swollen near at the middle ; cauda elongate, with 7-9 hairs ; dorsum of abdomen with broad separated spinopleural and marginal sclerites | ... | <i>barbareae</i> Nevsky |

47. *Brevicoryne barbareae* Nevsky

1929. *Brevicoryne barbareae* Nevsky, *Zool. Anz.*, **82** : 210.

1975. *Brevicoryne barbareae* ; David and Hameed, *Oriental Ins.*, **9** (2) : 216.

Material examined : 4 apterae, on *Nasturtium* sp., Keylong, viii, 1972, coll. S. F. Hameed.

Remark : Ghosh, L. K. *et al.* (1980) described alate male for the first time in India.

Distribution : India : Himachal Pradesh and Uttar Pradesh ; Turkestan.

48. *Brevicoryne brassicae* (Linnaeus)

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

1918. *Brevicoryne brassicae* ; Das, B., *Mem. Indian Mus.*, **6** (4) : 187-188.

Material examined : Many apterae and alatae, on *Brassica oleracea*, Simla, Kusumti, 10.i.1969, coll. *A. N. Chowdhuri* ; many apterae, on *Veronia agrestis*, Kalpa, 26.x.1975, coll. *L. K. Ghosh*.

Distribution : India : Himachal Pradesh, Nagaland, Punjab, Uttar Pradesh, West Bengal, South India and virtually cosmopolitan.

XVII. Genus *Capitophorus* van der Goot

1913. *Capitophorus* van der Goot, *Tijdschr. Ent.*, **56** : 84.

Type-species : *Aphis carduina* Walker, 1850.

Body elongate. Head smooth with strongly diverging lateral frontal tubercles ; median frontal prominence ill-developed ; dorsal cephalic hairs long and capitate. Antennae 6-segmented, usually longer or sometimes a little shorter than body ; apterae without secondary rhinaria, alatae with secondary rhinaria on a. s. III, IV and also on a. s. V ; p. t. about 5.0-11.0 times as long as base of a. s. VI. Ultimate rostral segment rostrate, shorter to longer than h. t.2 and usually with 2 secondary hairs. Dorsum of abdomen in apterae usually pale and rather smooth, and in alatae with dark median patches besides marginal ones ; in apterae dorsal abdominal hairs much too variable in length (0.12-4.5 times as long as b. d. III), with strongly capitate, globular or even depressed ellipsoid apices, placed on strong tubercles and usually arranged in 6 longitudinal rows, sometimes some of these hairs duplicated or triplicated, in alatae such hairs much shorter, usually on nearly normal bases and with acuminate, blunt to slightly capitate apices. Mid-thoracic furca sessile. Siphunculi slender, cylindrical, swollen distally, flanged apically, imbricated, about 0.2-0.3 times as long as body. Cauda in apterae pale to dusky, triangular, about 0.4-0.5 times as long as siphunculi, in alatae sometimes dusky and much shorter than siphunculi (0.2-0.5 times) and bearing 5-10 hairs. Legs usually imbricated and with hairs having capitate apices or with acute to acuminate apices, F. T. C. 3, 3, 3. Wing venation normal with veins rather dusky. Nymphs with tibiae smooth.

Hille Ris Lambers (1953) and Shaposhnikov (1964) made valuable contribution on European species and Takahashi (1961) on Japanese species. Basu, R. C. and Raychaudhuri, D. N. (1976) have dealt with Indian species,

Distribution : Cosmopolitan.

Key to the subspecies of the genus Capitophorus van der Goot

Apterae viviparae :

Longest hair on anterior abdominal dorsum much shorter, about 0.15-0.20 times as long as b. d. III and that on a. s. III about 0.12-0.23 times as long as b. d. III ; u. r. s. usually shorter, about 0.8 times h. t. 2 ... *hippophaes javanicus* Hille Ris Lambers

Longest hair on anterior abdominal dorsum rather long, about 0.75-1.08 times as long as b. d. III and that on a. s. III about 0.30 times as long as b. d. III ; u. r. s. about as long as or a little longer than h. t. 2... *hippophaes mitegoni* Eastop

49. *Capitophorus hippophaes javanicus* Hille Ris Lambers

1953. *Capitophorus hippophaes javanicus* Hille Ris Lambers, *Temminckia*, 9 : 156.

1980. *Capitophorus hippophaes javanicus*, Raychaudhuri, D. N., Ghosh, L. K. and Das, S. K., *Ins. matsum.*, n. ser. 20 : 15.

Material examined : 1 aptera and 4 nymphs, on *Polygonum* sp. Sandhupul, 27.x.1978, coll. M. R. Ghosh.

Distribution : India : Arunachal Pradesh, Himachal Pradesh, Manipur, Meghalaya, Sikkim, Uttar Pradesh, West Bengal ; Australia ; China ; Europe ; Indonesia ; Japan ; Korea ; New Zealand ; Pakistan and Taiwan.

50. *Capitophorus hippophaes mitegoni* Eastop

1956. *Capitophorus hippophaes mitegoni* Eastop, *Entomologist*, 89 : 9.

1978. *Capitophorus hippophaes mitegoni* Eastop ; Basu, R. C, Ghosh, A. K. and Raychaudhuri, D. N. *Proc. zool. Soc. Calcutta*, 26 : 90.

Material examined : 6 apterae and 2 alatae, on *Polygonum* sp., Phagli, 14.xii.1973, coll. L. K. Ghosh.

Distribution : India : Himachal Pradesh, Meghalaya, Sikkim, West Bengal ; Africa and Australia.

XVIII. Genus *Cavariella* del Guercio

1911. *Cavariella* del Guercio, *Redia*, 7 : 323.

Type-species : *Aphis pastinaceae* Linnaeus, 1758.

Body broadly pear-shaped. Head smooth, without distinct lateral frontal tubercles, median frontal prominence present. Antennae 5- or 6-segmented, shorter than body ; p.t. as long as or a little longer than base of last segment ; apterae without secondary rhinaria but sometimes a.s. V with a rhinarium, alatae with secondary rhinaria on a.s. III, sometimes on a.s. IV. Rostrum reaching past base of forecoxae ; u.r.s. shorter to a little longer than

h.t.2, with or without secondary hairs. Abdominal dorsum pale, rugose or pitted in apterae, in alatae with a brown dorsal patch ; dorsal hairs small and sparse ; 8th abdominal tergite with well-developed supracaudal process in apterae (Fig. 138), in alatae process reduced. Siphunculi cylindrical or clavate, about 0.2-0.3 times as long as body, twice or more than twice cauda bearing 5-10 hairs. Legs pale to brown with apices of tibiae and whole of tarsi darker. Hind tibia without spinules ; F.T.C. 3,3,2 or 3,3,3. Wing venation normal.

Takahashi (1931) has given key to Formosan species. Japanese species have been dealt with by Takahashi (1961) and Miyazaki (1971). Palmer (1952) has discussed the species of Rocky Mountain region, America while Hille Ris Lambers (1947), Heinze (1960) and Shaposhnikov (1964) have made contribution on European species. Also Hille Ris Lambers (1969) has described some new species from Israel, Iran, U.S.A., Netherlands, Belgium and England. Stroyan (1969) has discussed on the affinity of the genus and provided a key to the species of United State and Canada.

Distribution : Cosmopolitan.

Key to the species of the genus Cavariella del Guercio

Apterae viviparae :

1 (2)	Tergum blackish ; a. s. V with secondary rhinaria ...	<i>nigra</i> Basu	
2 (1)	Tergum not blackish ; a. s. V never with secondary rhinaria ...	...	3
3 (6)	Supracaudal process at most half (0.3-0.4 times) as long as cauda ...	...	4
4 (5)	Siphunculi without distinct flange at apex ; u. r. s. as long as to a little longer than h. t. 2 ; antennae more than 0.3 times (0.34-0.59) as long as body ; caudal hairs 8-10 ...	<i>himachali</i> sp. nov.	
5 (4)	Siphunculi with distinct apical flange ; u. r. s. always longer than h. t. 2 ; antennae less than 0.3 times as long as body ; caudal hairs 6-7 ...	<i>simlaensis</i> Chowdhuri, Basu and Raychaudhuri	
6 (3)	Supracaudal process always more than half (0.6-0.9 times) as long as cauda ...	...	7
7 (8)	Ultimate rostral segment with a pair of secondary hair ; supracaudal process usually shorter than cauda or seldom as long as cauda ; caudal hairs 5 ; p.t. about 1.2-1.3 times as long as base of a. s. VI ; green in life ...	<i>konoii</i> Takahashi	

- 8 (7) Ultimate rostral segment without secondary hair ;
 supracaudal process usually as long as (0.8-1.0 times)
 or seldom a little longer (1.1-1.2 times) than cauda ;
 caudal hairs 4 ; p. t. usually more than 1.3 times as
 long as base of a. s. VI ; yellowish-green in life ... *aegopodii* (Scopoli)

Key to the species of Cavariella del Guercio

Apterae oviparae :

- Siphunculi about 0.20 times as long as body and with
 distinct apical flange ; caudal hairs 4 ; body pale ... *aegopodii* (Scopoli)
- Siphunculi about 0.15 times as long as body and with
 weakly developed apical flange ; caudal hairs 6 ;
 body dark ... *nigra* Basu

51. *Cavariella aegopodii* (Scopoli)

(Figs. 161, 190)

1763. *Aphis aegopodii* Scopoli, *Ent. Carn.* : 137.

1975. *Cavariella aegopodii* (Scopoli) ; Chakrabarti and Raychaudhuri, D. N., *Oriental Ins.*,
 9 (2) : 199.

Material examined : 10 apterae, on *Pimpinella diversifolia* ; Hatu peak,
 29.ix.1974, coll. L. K. Ghosh ; 1 alate male, on Y. P. T. Simla, 1.xii.1970,
 coll. K. D. Verma ; 1 apterous ovipara, on *Geranium* sp., Simla Hills, xi.1971,
 coll. L. K. Ghosh.

Alate male (Fig. 190) : Body elongate, 1.92 mm long with 0.75 mm as its
 maximum width. Head dark, sclerotic ; front smooth ; dorsal cephalic hairs
 small up to about 15 μ long. Antennae 6-segmented, dark, 0.62 times as
 long as body ; flagellar hairs minute, longest hair on a. s. III about 0.55
 times b.d. III, a.s. III with 31-35 tuberculate secondary rhinaria distributed
 over entire length except the very base, a. s. IV with 5-9, a. s. V with
 9-10 similar rhinaria over entire length, a. s. VI with 3-4 secondary rhinaria
 on basal part ; p. t. about 1.4 times as long as base of a. s. VI. Dorsum
 of the abdomen with segmental spinal and marginal sclerites besides a
 few small ones distributed irregularly ; dorsal hairs about 15 μ long and
 about 0.55 times as long as b. d. III. Siphunculi distinctly clavate towards
 distal half, imbricated, 0.15 times as long as body and about 2.5 times as
 long as cauda. Genitalia dark-brown, claspers well developed. Otherwise
 as in alate viviparous female.

Remark : The alate male was so far undescribed from India.

Distribution : India : Arunachal Pradesh, Himachal Pradesh, Jammu and
 Kashmir, Manipur, Meghalaya, Uttar Pradesh, West Bengal ; America ;
 Australia ; Europe ; Japan ; Korea ; Middle East ; New Zealand and
 Rhodesia.

52. *Cavariella himachali*, sp. nov.

(Fig. 162)

Apterous viviparous female : Body spindle-shaped, about 1.50-2.10 mm long with about 0.90-1.11 mm as maximum width. Head (Fig. 162A) brown, a little wrinkled and with median frontal prominence. Antennae (Fig. 162B) 6-segmented, about 0.34-0.50 times as long as body ; a.s. I and II concolourous with head, flagellum brownish excepting a.s. V and VI which are dark brown ; segment III nearly smooth, without secondary rhinaria and very faintly imbricated, rest of flagellum gradually more distinctly imbricated from base towards the apex ; p.t. about 1.0-1.4 times as long as base of a.s. VI and a little less to a little more than half of a.s. III ; flagellar hairs short, about 0.4-0.6 times as long as b.d. III. Rostrum reaching midcoxae ; u.r.s. (Fig. 162C) blunt, about as long as or a little longer than h.t.2 with one pair of secondary hairs. Thorax brown. Abdominal dorsum (Fig. 165D) pale brown and papillate, anterior abdominal tergites with small blunt hairs, these hairs about 12μ long and about 0.5-0.8 times as long as b.d. III ; 8th abdominal tergite with a thumb-shaped supracaudal process which is about 0.4 times as long as cauda and bears a pair of long hairs with slightly acuminate apices. Siphunculi (Fig. 162E) dark brown, cigar-shaped, about 0.10-0.14 times as long as body, about 1.1-1.3 times as long as cauda and with weakly developed flange at tip. Cauda (Fig. 162F) concolourous with siphunculi, elongated, slightly constricted towards base and with 8-10 hairs. Legs coloured like head excepting the apices of tibiae and whole of tarsi (Fig. 162G) which are darker ; hairs on femora shorter than tibial hairs and with acuminate apices ; F.T.C. 3,3,3.

Measurements (in mm) of the holotype : Length of body 2.10 ; width of body 0.90 ; antenna 0.75 ; a. s. III 0.19, IV 0.09, V 0.11, VI (0.10+0.13) ; u.r.s. 0.10 ; h. t.2 0.07 ; siphunculus 0.24 ; cauda 0.20.

Material examined : Holotype, apterous viviparous female, on *Spiraea canescens* (Rosaceae), Narkanda, 27.ix.1974, coll. L. K. Ghosh ; paratypes, 3 apterous viviparous females, same data as for holotype ; 2 apterous viviparous females, on *Indigofera gerardiana* Wall (Leguminosae), Baghi, 3.x.1974, coll. L. K. Ghosh.

Biological notes : The greenish aphids had two deep green streaks along the two sides of the abdomen. The aphids infested the apical shoot without any noticeable injury to the host plants. No ant could be found in association.

Remarks : *Cavariella himachali* sp. nov. resembles *C. japonica* (Essig and Kuwana, 1918) in having darker apical part of flagellum, pigmented tergum and 2 secondary hairs on ultimate rostral segment but can be distinguished

from the latter by the ultimate rostral segment being only a little longer than the second joint of hind tarsus, presence of more caudal hairs and different shape of siphunculi.

The new species is also different from *japonica* in host association as the former species infests plants of Rosaceae and Leguminosae and the latter plants of Umbelliferae.

The new species can be separated also from another allied species, *C. simlaensis* Chowdhuri, Basu, R. C. and Raychaudhuri, D. N. described from Simla by lesser number of secondary hairs on ultimate rostral segment and more caudal hairs.

Distribution : India : Himachal Pradesh.

53. *Cavariella konoi* Takahashi

1939. *Cavariella konoi* Takahashi, *Ins. matsum.*, **13** (4) ; 117.

1971. *Cavariella konoi* Takahashi ; Miyazaki, *Ibid.*, **34** (1) ; 176.

Material examined : 5 apterae, on *Geranium lucidum*, Simla Hills, November, 1971 ; many apterae, on *Pimpinella umbellata* and *Pimpinella diversifolia*, Mashobra, October, 1974, all L. K. Ghosh coll.

Biological notes : The greenish specimens were collected from the under surface of the leaves of the host plants. Small black ants were found to attend the aphids.

Remark : The species was first described from Japan by Takahashi (1939). This species is a new record for Indian subcontinent.

Distribution : India : Himachal Pradesh ; America ; Europe and Japan.

54. *Cavariella nigra* Basu

1964. *Cavariella nigra* Basu, A. N., *J. Linn. Soc. (Zool.)*, **45** (305) ; 240.

1974. *Cavariella nigra* Basu ; Chakrabarti, Chowdhuri and Raychaudhuri, D. N., *Sci. Cult.*, **40** : 461.

Material examined : 2 apterae, 4 alatae, 1 apterous ovipara and many nymphs ; on undet. Umbelliferae, Simla, 8.ix.1970, coll. A. N. Chowdhuri.

Apterous oviparous female (Fig. 191) : Body broadly pear-shaped, about 1.83 mm long with 0.99 mm as its maximum width. Head brown sclerotic, wrinkled ; frons wavy and somewhat convex at middle ; dorsal cephalic hairs long, about 36 μ long with acuminate apices. Antennae about 0.4 times as long as body, paler than head, without secondary rhinaria ; a. s. I and II wrinkled, flagellum progressively more distinctly imbricated ; longest hair on a. s. III about 0.5 times as long as b. d. III ; p. t. about 1.1 times as long as base of a. s. VI. Thorax dark. Rostrum reaching beyond midcoxae ;

u. r. s. about 1.1 times as long as h. t. 2. Abdominal dorsum wrinkled, with paired small spinal sclerites ; abdominal margin with larger sclerites ; dorsal hairs about $38\ \mu$ long and just longer than b. d. III ; 8th tergite with a pitted transverse sclerotic band and with 4 fine hairs which are about 1.4 times as long as b. d. III ; supracaudal process on 8th tergite dark with 2 terminal hairs. Siphunculus dark, about 0.15 times as long as body and 1.8 times as long as cauda bearing 6 hairs. Subgenital plate transversely oval, brownish with many long and fine hairs. Hind tibiae swollen with numerous small round pseudosensoria (a few protuberant), scattered irregularly along the whole length except the very base and apex, about 7.5 times as long as its maximum width near middle and with shorter basal and longer apical hairs having finely drawn out apices. Otherwise, as in apterous viviparous female.

Measurements (in mm) of the ovipara : Length of body 1.83 ; width of body 0.99 ; antenna 0.72 ; a. s. III 0.22, IV 0.10 ; V 0.10, VI (0.09+0.10) ; u. r. s. 0.13 ; h. t. 2 0.11 ; siphunculus 0.28, cauda 0.15.

Remarks : The species was originally described from both apterae and alatae collected on *Salix elegans* at Darjeeling, West Bengal. Subsequently, Chakrabarti, Chowdhuri and Raychaudhuri, D. N. (1974) reported the viviparae of the species from Simla taken on unidentified Umbelliferae but sexuales were unknown. As such, oviparous female is described for the first time.

55. *Cavariella simlaensis* Chowdhuri, Basu and Raychaudhuri

1969. *Cavariella simlaensis* Chowdhuri, Basu, R. C. and Raychaudhuri, D. N., *Sci. Cult.*, 35 ; 334.

Material examined : 1 aptera (paratype) and a few nymphs, on *Sanicula europea*, Simla, 19.viii.1968, coll. A. N. Chowdhuri.

Distribution : India : Himachal Pradesh.

XIX. Genus *Chaetomyzus* Ghosh and Raychaudhuri

1962. *Chaetomyzus* Ghosh, A. K. and Raychaudhuri, D. N., *Jour. Asiatic Soc. Bengal*, 4 (3 & 5) ; 104-106.

Type-species : *Chaetomyzus rhododendri* Ghosh and Raychaudhuri, 1962.

Body elongate. Head with low, rounded median frontal prominence ; lateral frontal tubercles distinct and diverging, bearing short and long hairs with slightly acuminate apices. Antennae 6-segmented, about 0.5 times as long as body, in apterae, secondary rhinaria absent in a. s. III ; in alatae a. s. III with about 45 small and large tuberculate rhinaria distributed over its entire length, 6-7 rhinaria on a. s. IV ; flagellar hairs spiny, longest one on a. s. III about 0.5 times as long as b. d. III ; p. t. about 1.6 times as long as base VI. Rostrum reaching 3rd coxae ; u. r. s. 1.5-2.0 times as long as h. t. 2

and with about 12 fine hairs. Dorsum of the abdomen with a number of spinal and pleural tubercles bearing acute to acuminate hairs. Siphunculi cylindrical near base and apex, rest swollen, with a few spinulose striae at apex. Cauda elongate, with 4 hairs. Apical portion of tibiae and second segment of tarsi with spinules in transverse rows. F. T. C. 3, 3, 3. Wing venation normal.

Distribution : India.

56. *Chaetomyzus rhododendri* Ghosh and Raychaudhuri (Fig. 192)

1962. *Chaetomyzus rhododendri* Ghosh, A. K. and Raychaudhuri, D. N., *Jour. Asiatic. Soc. Bengal*, **4** (3 & 4) ; 104.

1970. *Chaetomyzus rhododendri* Ghosh and Raychaudhuri ; Chakrabarti, Ghosh, A. K. and Raychaudhuri, D. N., *Oriental Ins.*, **4** (4) ; 447.

Material examined : 3 apterae and a few nymphs, on *Rhododendron* sp., Joko Hills, Simla, 25.viii.1969, coll. A. N. Chowdhuri.

Measurements (in mm) of an aptera : Length of body 2.10 ; width 0.90 ; antenna 1.25 ; a. s. III 0.40, IV 0.20, V 0.15, VI (0.10+0.23) ; u. r. s. 0.12 ; h. t.2 0.08 ; siphunculus 0.41 ; cauda 0.25.

Distribution : India : Himachal Pradesh and Meghalaya.

XX. Genus *Chaetosiphon* Mordvilko

1914. *Chaetosiphon* Mordvilko, *Fauna de La Russie*, **1** (1) ; 71.

Type-species : *Capitophorus chaetosiphon* Nevsky, 1928 (fixed by Nevsky 1924)

Body elongate. Head with moderately to well-developed lateral frontal tubercles which may be smooth or may bear some pustules on vertex appearing as spinules ; dorsal cephalic hairs with capitate apices in apterae and with acuminate apices in alatae. Antennae 6-segmented, shorter to a little longer than body ; p.t. about 2.0-5.0 times as long as base of a.s. VI ; flagellar hairs with capitate to expanded apices in apterae and with acuminate to incrassate apices in alatae ; apterae without secondary rhinaria, alatae with secondary rhinaria at least on segment III. Ultimate rostral segment 0.08-1.1 times as long as h.t.2. Abdomen pale ; dorsum in apterae sclerotic with obsolete segmentation, lightly wrinkled to distinctly pitted, in alatae pale with dark brown spino-pleural transverse bands ; hairs on dorsum of abdomen with capitate apices in apterae and with acuminate apices in alatae, spinal hairs arranged in single or double rows. Siphunculi cylindrical, with or without hairs, about 0.12-0.25 times as long as body and about 1.1-3.3 times as long as cauda bearing 5-6 hairs. Wing venation normal. Hind tibiae of nymphs smooth. F.T.C. 5,5,5 or 4,4,4.

Hille Ris Lambers (1953) has given an account of the European species. Richards (1963) has dealt with the north American species. Eastop (1958 and 1966) has made valuable contributions to East African and Australian species respectively. David, Rajasingh and Narayanan (1970) have worked out Indian species.

Distribution : Cosmopolitan.

Key to the speciss of Chaetosiphon Mordvilko

Apterae viviparae :

Siphunculi without hairs ; p. t. at most 2.0 times as long as base of a. s. VI ; hairs on head and antennae bluntish	---	<i>glaber</i> David, Rajasingh and Narayanan
Siphunculi with a few capitate hairs ; p. t. more than 2.0 times as long as base of a. s. VI ; hairs on head and antennae capitate	...	<i>gracilicornis</i> David, Rajasingh and Narayanan

57. *Chaetosiphon glaber* David, Rajasingh and Narayanan

1970. *Chaetosiphon glaber* David, Rajasingh and Narayanan, *Oriental Ins.*, 4 (4) ; 400.

Material examined : 1 aptera, on wild rose, Simla ; 10.xi.1968, coll. K. Narayanan ; 1 alata, on wild Rose, Simla, 18.v.1970, coll. K. Narayanan ; many apterae, on *Rosa* sp., Narkanda, 30.ix. 1974, coll. L. K. Ghosh.

Biological notes : The brownish aphids were found to form colony on the undersurface of leaves and on young shoots of the host plant. No ant was found to attend the aphids.

Note : Examination of Dr. S. Kanakaraj David's authentic material of single alata (labelled as *S. K. David* coll., Wild Rose, 10.xi.1968, Simla, K. Narayanan) revealed that the first tarsal segments were found to have only 4 hairs instead of usual 5. Moreover, secondary rhinaria on antennal segment III were found to be 15-21 instead of 23 as in the original description and caudal hairs were 7 instead of 5.

Distribution : India : Himachal Pradesh.

58. *Chaetosiphon gracilicornis* David, Rajasingh and Narayanan

1970. *Chaetosiphon gracilicornis* David, Rajasingh and Narayanan, *Oriental Ins.*, 4 (4) : 402.

Material examined : 3 apterae, on *Rosa macrophylla*, Manali, 22.v.1970, coll. K. Narayanan.

Remarks : David *et al.* (1970) while describing the new species, mentioned "absence of capitate hairs on a.s. III and V and on the tibiae" as one

of the distinguishing features of the new species. But careful examination of authentic material of 3 apterae received from Dr. S. Kanakaraj David, Madras, reveals that capitate hairs are present on antennal segments IV and V and also on tibiae although some pointed hairs are present along with the capitate ones. Moreover, ultimate rostral segment is as long as h.t. 2 and not shorter than h.t. 2 as in the original description. However, comments on the status of the species is reserved till more material is available for study.

XXI. Genus *Coloradoa* Wilson

1910. *Coloradoa* Wilson, *Ann. ent. Soc. Am.*, 3 : 328.

Type-species : *Aphis rufomaculata* Wilson, 1908.

Body broadly oval. Head slightly wrinkled, without lateral frontal tubercles ; frons convex ; dorsal cephalic hairs with blunt apices anteriorly, posteriorly such hairs with somewhat fan-shaped apices. Antennae 6-segmented, shorter than body, a.s. I and II slightly scabrous ; flagellum distinctly imbricated ; flagellar hairs short with acuminate apices ; secondary rhinaria absent in apterae ; primary rhinaria ciliated ; p.t. longer than base of VI. Eyes with triommatidia. Ultimate rostral segment stiletto-shaped, as long as to longer than h.t. 2, usually with 4 secondary hairs. Midthoracic furca with a short stalk. Abdominal dorsum pale, nearly smooth. Siphunculi slightly clavate near apex, imbricated, with or without well developed apical flange and with preapical striate circumcission. Cauda dusky, elongately tongue-shaped, about half as long as siphunculi ; usually bearing 5 hairs. Subgenital plate with fan-shaped hairs in 2 groups on posterior margin and only 2 hairs similar on anterior portion. Both femora and tibiae smooth excepting the tips of tibiae which are with a few striations ; femoral hairs blunt to slightly expanded apices, tibial hairs with acuminate to slightly swollen apices. F.T.C. 3,3,2.

Remark : The characteristic feature of the genus is the typical somewhat fan-shaped body hairs.

Distribution : Cosmopolitan.

59. *Coloradoa rufomaculata* (Wilson)

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

1910. *Coloradoa rufomaculata* Wilson, *Ann. ent. Soc. Am.*, 3 : 323.

1980. *Coloradoa rufomaculata* Raychaudhuri, D. N., Ghosh, L. K. and Das, S. K., *Ins. matsum.*, 20 : 13.

Material examined : 4 apterae, on *Chrysanthemum* sp., Sadhupul, 27.x.1978, coll, M. R. Ghosh,

Biological notes : The species usually feeds on *Chrysanthemums* and often is found associated with *Macrosiphoniella sanborni* (Gillette).

Remarks : Rao and Kulkarni (1977) described oviparous female collected on *Chrysanthemum* at Aurangabad during January.

Distribution : India : Arunachal Pradesh, Assam, Himachal Pradesh, Maharashtra, Meghalaya, Nagaland, Uttar Pradesh, West Bengal ; and virtually Cosmopolitan.

XXII. Genus *Cryptaphis* Hille Ris Lambers

1947. *Cryptaphis* Hille Ris Lambers, *Temminckia*, 3 : 296.

Type-species : *Cryptaphis setiger* Hille Ris Lambers, 1947 (= *Aphis poae* Hardy, 1850).

Body oval, pale brown, about 1.20-1.50 mm long. Head sparsely spinulose dorsally and ventrally. Front with well-developed median prominence and with capitate hairs. Dorsal cephalic hairs with expanded apices, about 50 μ -56 μ long and arising from low but distinct tuberculate bases, longest hair nearly 3.6 times as long as b. d. III. Antennae 6-segmented, about 0.54-0.80 times as long as body. Apteræ viviparæ with a few rhinaria on basal part of a. s. III ; p. t. about 3.1-3.6 times as long as base VI ; flagellar hairs thick and knobbed, arising from distinct raised bases, longest one on a. s. III about twice as long as basal diameter of the segment. Ultimate rostral segment rostrate, about 1.6-1.7 times as long as h. t. 2. Abdominal dorsum uniformly sclerotic, bearing long, thick hairs with expanded to knobbed apices. Siphunculi subcylindrical with basal half pale and rest brownish, about 0.10-0.13 times as long as body, with faint spinulose imbrications and with 3-4 connecting striae near well-developed flange. Cauda pale, tongue-shaped, about 0.63-0.82 times as long as siphunculi and bears 4 hairs. Legs light brown, excepting about basal 0.5 portion which is pale, femoral margin with scattered spinules on distal half of ventral surface. F. T. C. 3, 3, 3.

The allied genera are *Cryptomyzus* Oestlund, *Pleotrichophorus* Börner, *Pentatrichopus* Börner, *Rhopalomyzus* Mordvilko and *Capitophorus* v. d. Goot which have capitate hairs at least in apteræ viviparæ.

Distribution : China ; England ; India ; Japan and The Netherlands.

60. *Cryptaphis rostrata* Chakrabarti and Raychaudhuri

1974. *Cryptaphis rostrata* Chakrabarti and Raychaudhuri, D. N., *Oriental Ins.*, 8 (3) : 524.

Material examined : Apteræ (Holotype) : 8 apteræ and 7 nymphs (paratypes) ; on undet. Labiatae, Rohroo, Simla, 21.x.1970, coll. A. N. Chowdhuri.

Distribution : India : Himachal Pradesh.

XXIII. Genus **Cryptomyzus** Oestlund

1922. *Cryptomyzus* Oestlund, *Rept. St. Ent. Minnesota*, 19 : 159.

Type-species : *Aphis relis* Linnaeus, 1758.

Body elongate to spindle-shaped. Head smooth ; median frontal prominence low but distinct ; lateral frontal tubercles diverging ; dorsal cephalic hairs long and stiff in apterae, much shorter and thinner with normal apices in alatae. Antennae long and slender, about 1.2-1.5 times as long as body ; a. s. III of apterae with secondary rhinaria on its incrassate part near base of the segment ; in alatae secondary rhinaria present on a. s. III, IV and V ; p. t. about 12 times as long as base of a. s. VI, much longer than a. s. III ; flagellar hairs shorter and thinner than dorsal cephalic hairs. Prothorax normally with two spinal hairs and four marginal hairs. Rostrum reaching near base of hind-coxae ; u. r. s. about 1.4 times as long as h. t. 2, with several secondary hairs. Abdominal tergum pale in apterae ; dorsal hairs placed on strong papillae, thick, long, stiff and with swollen apices ; abdominal dorsum in alatae with well developed sclerotic pattern consisting of intersegmental sclerotic bars which sometimes form complete central sclerotic patch, small marginal sclerites also present. Siphunculi smooth, cylindrical or with a slight swelling on distal half and flanged apically. Cauda triangular, elongated or semioval, bearing 5-7 hairs. Legs frequently with capitate hairs on femora ; proximal portion of tibiae pale in apterae, partly black in alatae. F. T. C. 3, 3, 3 or 3, 3, 2. Wing venation normal, veins dark brown.

Hille Ris Lambers (1953) has discussed the affinity of this genus.

Distribution : America ; China ; Europe ; India and Japan.

61. **Cryptomyzus taoi** Hille Ris Lambers

1965. *Cryptomyzus taoi* Hille Ris Lambers, *Tidschr. Ent.*, 108 (7) : 199.

1973. *Cryptomyzus taoi* Hille Ris Lambers : Kumar, *Oriental Ins.*, 7 (1) : 11.

Material examined : 1 alata (Trapped), Simla, August 1960, coll. R. Kumar.

Remarks : The material has siphunculi slightly smaller and a. s. III, IV and V are more than what is given in the original description.

Distribution : India : Himachal Pradesh ; China and Japan.

XXIV. Genus **Diphorodon** Börner

1939. *Diphorodon* Börner, *Arb. physiol. angew. Ent. Berl.*, 6 (1) : 79.

Type-species : *Phorodon cannabis* Passerini, 1860

Head with lateral frontal tubercle bearing prominent finger-like warty projection on inner side ; median frontal prominence not well developed ; dorsal cephalic hairs on high sockets and with swollen apices. Antennae

6-segmented, shorter than to about as long as body ; a. s. I with an inwardly directed scabrous projection on inner margin at apex ; a. s. II slightly scabrous on inner margin ; a. s. III without any secondary rhinaria in apterae, in alatae secondary rhinaria present on a. s. III and IV ; p. t. longer than base of a. s. VI ; flagellar hairs in apterae stout with distinctly swollen apices on inner side ; in alatae flagellar hairs more or less similar as in apterae. Rostrum extends upto mid coxae ; u. r. s. longer than h. t. 2. Dorsal abdominal hairs like those on dorsum of head ; in alatae interrupted dorsal patch present over spinopleural area from 3rd to 7th tergites, 8th tergite with a spinal transverse band. Siphunculi gradually tapering apicad and slightly curved outward near apex, distinctly imbricated, with an apical flange and with a few preapical striae, about twice as long as cauda bearing 6-8 hairs. Legs smooth, hairs on legs of two types, some with blunt to swollen apices and rest with acute to acuminate apices ; F. T. C. 3, 3, 2. Wing venation normal.

Distribution : Africa ; Central Asia ; China ; India ; Japan and Pakistan.

62. *Diphorodon cannabis* (Passerini)

1860. *Diphorodon cannabis* Passerini, *Gli Aphidi*, Parma : 36.

1981. *Diphorodon cannabis* ; Das, S. K., Raychaudhuri, D. and Raychaudhuri, D. N., *Entomon*, 6 (1) : 54.

Material examined : 6 apterae and 9 alatae, on undet. host, Manali, 27.x.79, coll. S. K. Das.

Distribution : India : Himachal Pradesh, Kashmir, Manipur, Meghalaya, Nagaland, South India, West Bengal ; Europe ; Japan and Pakistan.

XXV. Genus *Dysaphis* Börner

1931. *Dysaphis* Börner, *Anz. Schädlingssk.*, 7 : 9.

Type-species : *Aphis angelicae* Koch, 1854.

Body broadly oval to elongate. Head usually with a pair of spinal tubercles ; lateral frontal tubercles absent. Antennae 6-segmented, about half as long as body ; apterae without secondary rhinaria, alatae with secondary rhinaria on a. s. III and sometimes also on a. s. IV and V ; p. t. about 2.1-2.6 times as long as base of a. s. VI. In apterae abdominal dorsum pale or with scattered sclerotic patches and muscle-plates, each of 7th and 8th tergites usually with a light brown to brown dorsal band ; in alatae spinopleural bands present on the dorsum of abdominal segments 2-6 in addition to marginal sclerites, sometimes these bands mutually fuse to form an entire patch ; spinal tubercles usually present on prothorax, tergites 7 and 8 (Fig. 164A), sometimes also on other thoracic and abdominal segments 1-6, small to large lateral tubercles present on segments 1-5 but on

other segments these are variably present ; dorsal hairs rather thick and stout and on raised sockets and with acute to acuminate apices, usually arising from sclerotic bases, normally longer than b. d. III ; 8th tergite bearing 3-8 hairs. Spiracles normal, with reniform aperture. Siphunculi short to moderately long, flanged at tip, about 0.5-0.7 times as long as cauda and with 1-2 rows of connecting striae near the flange. Cauda conical or pentagonal, dark, bearing 5-7 hairs. Subgenital plate broadly oval with numerous hairs in 2 rows on posterior margin and with a pair of long hairs anteriorly. F. T. C. 3, 3, 2 or 3, 3, 3. Hind-tibiae of nymphs smooth. Wing venation normal.

Eastop (1961) has dealt with west African species of the genus. Shaposhnikov (1964) has provided a key to the species from European part of U. S. S. R. Stroyan (1957, 1958, 1963) has made valuable contribution on the British species.

Distribution : Cosmopolitan.

Key to the species of the genus Dysaphis Börner

Apterae viviparae :

- | | | |
|---|-----|--|
| 1 (2) First tarsal chaetotaxy 3, 3, 3 ; dorsal hairs at most 30 μ long | ... | <i>atinus</i> Ghosh, Basu and Raychaudhuri |
| 2 (1) First tarsal chaetotaxy 3, 3, 2 ; dorsal hairs always longer than 30 μ long | ... | ... 3 |
| 3 (4) Hairs on 8th abdominal tergite 6-8 ; midthoracic furca with united arms ; dorsal hairs 48 μ -54 μ long ; antennae about 0.4-0.5 times as long as body ; u. r. s. as long as or a little longer than h. t. 2 | ... | <i>stroyani</i> sp. nov. |
| 4 (3) Hairs on 8th abdominal tergite less than 8 (usually 4) ; midthoracic furca with separate arms | ... | ... 5 |
| 5 (6) Ultimate rostral segment about 1.6 times as long as h. t. 2 ; siphunculi about twice as long as cauda | ... | <i>emicis</i> (Mimeur) |
| 6 (5) Ultimate rostral segment only a little longer (about 1.2 times) than h. t. 2 ; siphunculi 1.4-1.6 times as long as cauda | ... | <i>foeniculus</i> (Theobald) |

Alate viviparae :

- | | | |
|---|-----|------------------------|
| Spinal tubercles absent excepting on vertex of head ; secondary rhinaria on a. s. III 37, on a. s. IV 17-20, on a. s. V 3-5 | ... | <i>ghanii</i> Stroyan |
| Spinal tubercles present including vertex of head ; secondary rhinaria on a. s. III 31, IV 14, V 0 | ... | <i>emicis</i> (Mimeur) |

63. *Dysaphis atinus* Ghosh, Basu and Raychaudhuri

(Figs. 164, 194)

1969. *Dysaphis atinus* Ghosh, A. K., Basu, R. C. and Raychaudhuri, D. N., *Oriental Ins.*, 3 (3) : 246.

1969. *Dysaphis* sp. ; Chowdhuri, Basu, R. C. and Raychaudhuri, D. N., *Sci. Cult.*, 35 : 894.

Material examined : Apter (Holotype), on *Cnicus wallichii*, Simla, 12.vi.1968, coll. A. N. Chowdhuri ; 2 apterae (paratypes), data as above ; many apterae, on *Cnicus wallichii*, Narkanda, 26.ix.1974, coll. L. K. Ghosh.

Biological notes : The dull brown aphids were found on young shoots of the host plant without any noticeable injury. No attendant ant could be found.

Note : Ghosh, A. K. *et al.* (1969) while describing the species did not provide any diagram of the species. As such, illustrations are given here.

Distribution : India : Himachal Pradesh.

64. *Dysaphis emicis* (Mimeur)

1985. *Anuraphis emicis* Mimeur, *Bull. Soc. Sci. nat. maroc.*, 14 (7-8) : 186-190.

1969. *Anuraphis emicis* (Mimeur) ; Ghosh, L. K. *Bull. Ent.*, 10 (2) : 107.

Material examined : 4 apterae, 2 alatae, and 8 nymphs, on *Rumex nepalensis*, Simla, 3.vi.1969 ; 6 apterae, on *Rumex* sp., Baghi, 5.x.1974, coll. L. K. Ghosh.

Biological notes : The pinkish white specimens were collected from the roots of the host plants just below the soil surface. Ant was found to attend the aphids.

Remark : Ghosh, L. K. (1969) has redescribed the species.

Distribution : India : Himachal Pradesh, Uttar Pradesh ; Africa.

65. *Dysaphis foeniculus* (Theobald)

1922. *Anuraphis foeniculus* Theobald, *Bull. Soc. Roy. Egypte*, 7 : 39.

1972. *Dysaphis foeniculus* (Theobald) ; Ghosh, L. K. *Oriental Ins.*, 6 (2) : 171.

Material examined : 4 apterae, on *Rumex nepalensis*, Simla, 1.i.1970, coll. L. K. Ghosh.

Remark : Ghosh, L. K. (1972) reported the species for the first time from India.

Distribution : India : Himachal Pradesh, Uttar Pradesh ; Africa ; America, Australia ; New Zealand and Pakistan.

66. *Dysaphis ghanii* Stroyan

(Fig. 195)

1963. *Dysaphis ghanii* Stroyan, *Proc. R. Ent. Soc. Lond. (B)* : 32 : 12.1969. *Dysaphis ghanii* Stroyan ; Ghosh, A. K., Chakrabarti, Chowdhuri and Raychaudhuri
D. N. *Oriental Ins.*, 3 (4) : 330.

Material examined : 6 alatae, on *Viburnum* sp., Khadrula, 26.x.1970 ; 2 alate males, on *Salix* sp., Khadrula, 2.xii.1970 ; 2 alate males, on wild strawberry, 26.xi.1968, coll. A. N. Chowdhuri.

Distribution : India : Himachal Pradesh, Uttar Pradesh ; Pakistan.

67. *Dysaphis stroyani* sp. nov.

(Figs. 165, 196)

Apterous viviparous female : Body oval, 1.65-2.65 mm long with 1.11-1.35 mm as maximum width near the middle of abdomen. Head (Fig. 165A) brown with median prominence and lateral frontal tubercles hardly developed, a pair of ill-developed tubercle and with long hairs (about 62 μ) about 2.2-2.5 times as long as b.d. III ; front gently convex. Antennae (Fig. 165B) 6-segmented, about 0.4-0.5 times as long as body, flagellum yellowish, imbricated and hairy ; a.s. III without secondary rhinaria, longest hair on a.s. III about 2.3-3.3 times as long as b.d. III ; segment IV a little longer than a.s. V, a.s. VI slightly curved at apex ; p.t. 2.2-3.4 times the base of a.s. VI. Eyes many-faceted with distinct triommatidia. Rostrum reaches midcoxae ; u.r.s. (Fig. 165E) with straight margins, equal to or little longer (1.1-1.2) than h.t. 2, with 4-6 secondary hairs. Midthoracic furca stalked. Marginal tubercles present on abdominal segments 1-6, spinal tubercle absent even on tergite 8. Abdominal dorsum (Fig. 165C) with brown transverse bands, 8th abdominal tergite with 6-8 pointed dorsal hairs which are 1.2-1.5 times as long as the longest hair on a.s. III, anterior dorsal hairs about 0.048-0.054 mm long and about twice as long as b.d. III, marginal sclerites present on segments 1-6. Siphunculi (Fig. 165C) brown, small, smooth, about 0.02-0.03 times as long as body and about 0.3 times as long as its maximum width at base, with hardly developed flange. Cauda (Fig. 165C) subpentagonal, con-colourous with siphunculi. Subgenital plate semioval with many small fine hairs, F.T.C. 3,3,2.

Measurements (in mm) of the holotype : Length of body 2.64 ; width of body 1.20 ; antenna 1.15 ; antennal segments III 0.35, IV 0.19, V 0.18, VI (0.09+0.22) ; u. r. s. 0.14 ; h. t. 2 0.14 ; siphunculus 0.03 ; cauda 0.07.

Material examined : Holotype : Apterous viviparous female, India : Himachal Pradesh, Narkanda, Hatupeak, on *Pediculus gracilis* (Roots), 29.ix. 1974, coll. L. K. Ghosh ; paratypes, 2 apterous viviparous females, 2 nymphs,

same data as for holotype ; 2 apterous viviparous females, Narkanda, Hatu-peak, on *Fragaria deltonia* (Roots), 29.ix.1974, coll. L. K. Ghosh.

Biological notes : The colony was found on the roots of the host plants. The adults were globular, blackish brown and nymphs were nearly globular, creamy to brownish. Both nymphs and adults were sluggish. No noticeable injury was found in the host plants.

Remarks : The new species approaches *Dysaphis ghanii* Stroyan in having more hairs on 8th abdominal tergite and united midthoracic furca, but it stands distinct by the presence of shorter u. r. s. in comparison to h. t. 2, longer dorsal hairs and shorter antennae.

Host plant association of the new species is also different.

The species is named after Dr. H. L. G. Stroyan for his outstanding contribution on the genus.

Distribution : India : Himachal Pradesh.

XXV. Genus *Eoessigia* David, Rajasingh and Narayanan

1972. *Eoessigia* David, Rajasingh and Narayanan, *Oriental Ins.*, 6 (1) : 35.

Type-species : *Eoessigia indica* David, Rajasingh and Narayanan, 1972.

Body elongate. Head with distinct lateral frontal tubercles bearing thick hairs with incrassate apices ; front with a large rounded median prominence bearing two pairs of similar hairs. Antennae usually 6-segmented, without secondary rhinaria on a. s. III in apterae, about 0.5 times as long as body ; p. t. about 1.2 times as long as base of a. s. VI. Eyes with triommatidia. Rostrum reaches midcoxae ; u. r. s. about as long as h. t. 2 and with 2-4 secondary hairs. Abdomen pale with circular pitted markings on dorsum ; dorsal hairs a few, about 2μ - 3μ long and blunt. Abdominal tergite 8 produced caudad, reaching just the base of cauda, the periphery of tergite at base with smooth imbrications, slope with pit and top with a median smooth prominence, 6-10 hairs with incrassate apices present on basal and sloping portions. Siphunculi pale on basal 0.6 and brownish on distal 0.3 portion, slender, about 0.17 times as long as body, slightly swollen on distal one-third, with apex slantingly truncate and a central porus and without a flange. Cauda elongate, pale, about half as long as siphunculi, triangular and with 4-6 hairs. Legs pale with sparse hairs ; femora faintly imbricated ; F. T. C. 3, 3, 3. Nymphs with dorsal spinules on hind tibiae.

Distribution : India.

68. *Eoessigia indica* David, Rajasingh and Narayanan

1972. *Eoessigia indica* David, Rajasingh and Narayanan, *Oriental Ins.*, 6 (1) : 35.

Material examined : 1 aptera, on *Cotoneaster* sp., Simla, 12.v.1969, coll. K. Narayanan.

Distribution : India : Himachal Pradesh.

XXVII. *Himalayaphis* Ghosh and Verma

1973. *Himalayaphis* Ghosh, A. K. and Verma, *Oriental Ins.*, 7 (2) : 271.

Type-species : *Himalayaphis anemones* Ghosh and Verma, 1973.

Body oval, about 4.2-4.7 mm long. Head with lateral frontal tubercles and median frontal prominence ; frons spinulose. Antennae 6-segmented, without secondary rhinaria in apterae, about 1.1-1.2 times as long as body ; a. s. I and II with spinules ; flagellum imbricated or smooth ; p. t. about 7.0-7.5 times as long as base of a. s. VI ; longest hair on a. s. III about 0.5 times as long as b. d. III. Eyes with distinct triommatidia. Rostrum reaching near hindcoxae ; u. r. s. shorter than h. t. 2, bearing 4 secondary hairs. Mesosternal furca with a distinct broad base. Tergum pale and papillate over abdomen. Dorsal abdominal hairs thick, with incrassate to capitate apices and arising from distinct tuberculate bases ; 7th tergite with 4 hairs and 8th tergite with 8 hairs. Siphunculi distinctly clavate, without reticulation but with a few striae before apical flange. Cauda elongate, with a slight basal constriction and bearing about 10 hairs. Spiracles reniform. Femora spinulose, distinctly so near distal end, apices of tibiae also spinulose, tarsi with spinulose imbrications. Hindtibiae of nymphs spinulose. F. T. C. 3, 3, 3.

Distribution : India.

69. *Himalayaphis anemones* Ghosh and Verma

1973. *Himalayaphis anemones* Ghosh, A. K. and Verma, *Oriental Ins.*, 7 (2) : 271.

Material examined : 1 aptera (damaged), on *Anemone* sp., Simla, 20.vii.1971, coll. K. D. Verma.

Distribution : India : Himachal Pradesh.

XXVIII. Genus *Hyadaphis* Kirkaldy

1904. *Hyadaphis* Kirkaldy, *Entomologist*, 37 : 279.

Type-species : *Aphis xylostei* Schrank, 1801.

Head smooth ; lateral frontal tubercles ill-developed. Antennae usually 6-segmented, sometimes 5-segmented, shorter than body ; p. t. longer

than base of last antennal segment (about 1.5-2.5 times) ; apterae without secondary rhinaria, alatae with secondary rhinaria, usually on a. s. III and IV. Rostrum reaches midcoxae ; u. r. s. rather short, about as long as h. t. 2 and bearing 2-4 secondary hairs. Midthoracic furca of apterae with separate arms. Abdomen pale, membraneous, with a faint net-like pattern on dorsum ; lateral abdominal tubercles usually present on 5th segment. These may also be present on 4th segment. Dorsal hairs minute with acute to acuminate apices ; 8th tergite with 4-6 hairs. Siphunculi short, distinctly clavate, usually pale, may be dark, about 0.12-0.16 times as long as body and about as long as to a little shorter than cauda in apterae and usually a little longer than cauda in alatae. Cauda as dark as siphunculi and bearing about 8 fine hairs. F. T. C. 3, 3, 3. Wing venation normal. Hindtibiae of nymphs smooth.

Distribution : Cosmopolitan.

70. *Hyadaphis coriandri* (Das)

1918. *Brevicoryne coriandri* Das, *Mem. Indian Mus.*, 6 (4) : 180.

1975. *Hyadaphis coriandri* (Das) ; Hameed, Sud and Giamzo, *Indian J. Ent.*, 37 (2) : 203-205.

Material examined : 8 apterae and 2 alatae, on *Coriandrum* sp., Simla, xii.1973, coll. L. K. Ghosh.

Distribution : India : Bihar, Himachal Pradesh, Manipur, Meghalaya, Sikkim, South India, Uttar Pradesh, West Bengal ; Africa, Egypt and Pakistan.

XXIX. Genus *Hyalomyzus* Richards

(Fig. 168)

1958. *Hyalomyzus* Richards, *Florida Ent.*, 41 (4) : 169.

Type-species : *Myzus oribotryae* Tissot, 1935.

Head distinctly spinulose along the posterior margin both dorsally and ventrally and locally spinulose near base of antennae leaving frons and median area of dorsum smooth, ventrally spinules being more prominent ; median frontal prominence well developed ; dorsal cephalic hairs long, on high sockets and with bluntish to slightly expanded apices. Antennae 6-segmented, about as long as body ; basal two segments scabrous ventrally ; flagellum imbricated near base of a. s. III and from a. s. V apicad, rest smooth ; apterae without secondary rhinaria ; in alatae secondary rhinaria distributed on a. s. III, IV and V ; p. t. longer than base of a. s. VI. Rostrum reaching base of hindcoxae ; u. r. s. longer than h. t. 2 and with 2 secondary hairs. Midthoracic furca in apterae stalked. Thoracic and abdominal

tergites rugose. Abdomen with some scattered muscle-plate like structure pleurally ; dorsal abdominal hairs short and blunt, these gradually becoming longer caudad. Siphunculi swollen at the middle and then gradually attenuated towards apex, imbricated, with a few interconnecting striae just before well-developed flange, longer than cauda. Cauda elongate with a median constriction and bearing about 8 hairs. Femora and tibiae smooth, with some minute pimples near the apices. F. T. C. 3, 3, 3 or 3, 3, 2 or 3, 3, 4 or 5, 5, 5. Hindtibiae of nymphs spinulose. Wing venation normal.

Richards (1958) while erecting the genus stated first tarsal chaetotaxy as 3, 3, 3. David and Narayanan (1968) while describing another species *scabripes* in the genus pointed out that the first tarsal chaetotaxy may be 3, 3, 3 or 3, 3, 2. In the specimens collected from *Fragaria* at Simla, it is noticed that the first tarsal segments may bear 5 hairs each or 3 hairs each or those of fore- and midleg may have 3 hairs each and that of hind leg 4 hairs. Thus, in this genus first tarsal chaetotaxy appears highly variable. Since the present specimens agree well with the concept of the genus *Hyalomyzus* except for first tarsal chaetotaxy, those are presently included in this genus.

Distribution : America ; Canada ; India.

Key to the species of Hyalomyzus Richards

Apterae viviparae :

All dorsal abdominal hairs short and 'myzine' type nearly of similar length ; siphunculi without distinct flange and uniformly faintly imbricated ; femora densely scabrous ; cauda with 6 hairs ; on Compositae ... *scabripes* David and Narayanan

Dorsal abdominal hairs gradually longer caudad so that hairs on 8th tergite longest and with acute apices ; siphunculi with well-developed flange and apical half scabrously imbricated ; femora with fine sparse imbrications ; cauda with 4 hairs ; on *Fragaria* (Rosaceae) ... *fragaricola* sp. nov.

71. *Hyalomyzus fragaricola* sp. nov.

(Fig. 168, 199)

Apterous viviparous female : Body oval to elongate, about 1.41-1.65 mm long with 0.70-0.80 mm as maximum width. Head dark brown and densely uniformly warty ; dorsal cephalic hairs long with blunt apices, longest one about 0.1 times as long as b. d. III ; lateral frontal tubercles convergent and with a few hairs longer than flagellar ones. Antennae (Fig. 168) brown, 6-segmented, a little longer than body ; a. s. I and II

with small warts ; outer margin of a. s. III and IV smooth, inner margin of the segment being with scaly imbrications, a. s. V and VI distinctly imbricated all over ; a. s. IV and V subequal ; p. t. about 2.8 times as long as base of a. s. VI ; flagellar hairs short with blunt apices, longest one on a. s. III about 0.1 times as long as b. d. III ; secondary rhinaria absent ; primary rhinaria nonciliated. Rostrum extending up to hindcoxae ; u. r. s. about 1.3 times as long as h. t. 2 and bearing 2 fine secondary hairs. Dorsum of abdomen faintly rugose up to segment 6, with a brownish patch medially and brownish segmental marginal patches ; dorsal abdominal hairs gradually longer caudad, up to segment 6 with blunt apices and on segments 7 and 8 with fine apices, longest hair on anterior abdominal tergites about 0.2 times as long as b. d. III ; 2 hairs on each of tergites 7 and 8 slightly shorter to a little longer than b. d. III. Siphunculi (Fig. 168B) brown, slender, scabrously imbricated on distal half, rest weakly imbricated, about 0.21 times as long as body, with distal 0.6 portion distinctly swollen, with well-developed apical flange and a preapical circumcission. Cauda (Fig. 168B) swollen on basal half and narrowed apically, with blunt apex, about 0.4 times as long as siphunculi, bearing 4 small hairs. Legs yellow with coxae and trochanter darker ; femora sparsely hairy, with fine spinulose imbrication ; tibiae weakly imbricated, a little more so near the apex and with spiny hairs. F. T. C. 3, 3, 3 or 3, 3, 4 or 5, 5, 5.

Measurements (in mm) of the holotype : Length of body 1.65 ; width of body 0.81 ; Antenna 1.68 ; a. s. III 0.49, IV 0.24, V 0.24, VI (0.14+0.40) ; u. r. s. 0.10 ; h. t. 2 0.35 ; siphunculus 0.32 ; cauda 0.10.

Material examined : Holotype, aptera, on *Fragaria* sp. (N. O. Rosaceae), India : Himachal Pradesh, Simla (2205 m) ; December, 1973, coll. L. K. Ghosh ; Paratypes, 7 apterae viviparae, data same as for holotype.

Remarks : In having completely nodulose head, the new species comes close to *Hyalomyzus scabripes* David and Narayanan but can be easily separated in having a distinct flange at the apex of siphunculi which are scabrously imbricated towards distal half and dorsal abdominal hairs gradually becoming longer caudad besides other characters.

Distribution : India : Himachal Pradesh.

72. *Hyalomyzus scabripes* David and Narayanan

1968. *Hyalomyzus scabripes* David and Narayanan, *Bull. Ent.*, 9 (2) : 99.

Material examined : 2 apterae, on undet. plant, Simla, 25.xi.1969, coll. K. Narayanan and Rajasingh.

Distribution : India : Himachal Pradesh.

XXX Genus *Hyperomyzus* Börner

1933. *Hyperomyzus* Börner, *Kl. Mitt. Über Blattläuse* : 2.

Type-species : *Aphis lactucae* Linnaeus, 1758.

Body elongate. Head smooth with moderately developed diverging lateral frontal tubercles having inner margins slightly rounded ; dorsal cephalic hairs about 8-20 μ long. Antennae 6-segmented, in apterae about as long as the body, in alatae usually longer ; in apterae secondary rhinaria present on a. s. III and sometimes on a. s. IV and V, in alatae such rhinaria present on a. s. III and IV, sometimes also on a. s. V ; p. t. distinctly longer than base of a. s. VI and about as long as or longer than a. s. III. Rostrum reaching midcoxae ; u. r. s. about as long as h. t. 2, bearing 6-8 secondary hairs. Mid-thoracic furca in apterae with a short stalk, spiracles almost rounded. Dorsum of abdomen smooth, in apterae pale and membranous, in alatae with a black patch extending over segments 3 to 5 but sometimes the patch becomes broken in the form of slightly connected segmentally arranged dark transverse bands ; dorsal hairs short with acute to acuminate apices, 8th tergite with 3-5 hairs. Siphunculi dusky in apterae, blackish in alatae, long, clavate, flanged, with post-siphuncular sclerites, longer than cauda which is pale, elongate, constricted at the middle and bears 6-10 hairs. Legs smooth, F. T. C. 3, 3, 3 or 4, 4, 4. Empodial hairs about half as long as claws. Hindtibiae of nymphs smooth. Wing venation normal.

Hille Ris Lambers (1949), Heinze (1961), Shaposhnikov (1964), Narzikulov and Umarov (1969) have discussed European species. Miyazaki (1971) has given an account of Japanese species.

Distribution : Cosmopolitan.

Key to the species of Hyperomyzus Börner

Apterae viviparae :

Hairs on 8th abdominal tergite about 30 μ long and about as long as b. d. III ; secondary rhinaria on a. s. III usually 5-7, (rarely up to 11) ; maximum diameter of siphunculi about 1.5-1.7 times as wide as its basal diameter ...

lactucae (Linnaeus)

Hair on 8th abdominal tergite about 40-43 μ and about 1.2 times as long as b. d. III ; secondary rhinaria on a. s. III usually 10-11 ; maximum diameter of siphunculi less swollen, nearly 1.2 times as wide as its basal diameter ...

carduellinus (Theobald)

Alate viviparae :

Antennal segment III with 36 secondary rhinaria, a. s. IV with 10 and a. s. V broken ; hairs on 8th abdominal tergite about 33μ long and about 1.0-1.1 times as long as b. d. III	...	<i>lactucae</i> (Linnaeus)
Antennal segment III with 49-53, a. s. IV with 19-20 and a. s. V with 1-7 secondary rhinaria ; hairs on 8th abdominal tergite about 43μ long and about 1.2 times b. d. III	...	<i>carduellinus</i> (Theobald)

73. *Hyperomyzus carduellinus* (Theobald)

1915. *Rhopalosiphum carduellinus* Theobald, *Bull. ent. Res.*, **6** : 113.

1958. *Hyperomyzus carduellinus* (Theobald) ; Muller and Scholl. *J. ent. Soc. 8th Afr.*, **21** : 396.

Material examined : 4 apterae, on undet. host, Simla Hills, December, 1973, coll. L. K. Ghosh.

Distribution : India : Arunachal Pradesh, Assam, Himachal Pradesh, Jammu and Kashmir state, Manipur, Meghalaya, Nagaland, Sikkim, South India, Uttar Pradesh, West Bengal ; Africa ; Australia ; Fiji ; Indonesia ; Japan ; Nepal ; New Zealand and Taiwan.

74. *Hyperomyzus lactucae* (Linnaeus)

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

1969. *Hyperomyzus lactucae* (Linnaeus) ; Chowdhuri, Basu, R. C. and Raychaudhuri, D. N., *Sci. Cult.*, **35** : 335.

Material examined : 4 apterae, 6 nymphs and 1 alata, on *Sonchus* sp., Solan, 2.vi.1969, coll. L. K. Ghosh ; 1 alate male on *Taxus baccata*, Khadrula, 26.xi.1968, coll. A. N. Chowdhuri.

Alate male : Body 2.90 mm long with 1.00 mm as its maximum width. Head dark brown ; frons smooth, frontal tubercles diverging. Antennae partly damaged, a. s. I-II concolourous with head, a. s. III with about 70 small, round, secondary rhinaria distributed irregularly over its entire length ; longest hair on a. s. III shorter than b. d. III. Rostrum reaching midcoxae ; u. r. s. about as long as h. t. 2. Abdominal dorsum dark with segmental transverse sclerotic bars on abdominal segments 1-8, anterior tergites also with small sclerotic patches ; post-siphuncular sclerites dark. Siphunculi cylindrical at base, then gradually becoming swollen, 0.14 times as long as body, with distinct preapical circumcission and transverse striae before apical flange. Cauda elongate, a little less than half as long as siphunculi, bearing about 10 hairs. Wing venation normal. Other characters are much like alate viviparous female.

Measurements (in mm) of the specimen : Length of body 2.90 ; width of body 1.00 ; antenna broken ; a. s. III 0.28 ; u. r. s. 0.14 ; h. t. 2 0.14 ; siphunculi 0.48 ; cauda 0.20.

Note : Ghosh, A. K. *et al.* (1969) while reporting the single alate male did not provide any description which is given here. However, sexuales have been described from Europe by Hille Ris Lambers (1949).

Distribution : Virtually cosmopolitan.

XXXI. Genus *Impatientinum* Mordvilko

1914. *Impatientinum* Mordvilko, *Faune de la Russie*, 1 : 72.

Type-species : *Impatientinum fuscum* Mordvilko, 1928
(= *Aphis balsamines* Kaltenbach, 1862)

Body broadly elongate. Head smooth with well-developed diverging lateral frontal tubercles. Antennae 6-segmented, longer than body ; p. t. appreciably longer (about 6 times) than base of a. s. VI ; flagellar hairs short, with blunt to acuminate apices ; apterae with a few secondary rhinaria near base of a. s. III, alatae with such rhinaria on a. s. III-V. Rostrum reaching hind-coxae ; u. r. s. shorter to a little longer than h. t. 2 and with a few secondary hairs. Dorsum of abdomen brown to dark brown in apterae, in alatae with a central patch and segmental marginal sclerites ; dorsal hairs with blunt to acuminate apices. Siphunculi black, long, calf-shaped, apex with a few interconnecting striae forming some cells with thick margin but cells lacking isodiametrical nature as in *Macrosiphum*, F. T. C. 3, 3, 3. Hindtibiae of nymphs smooth. Wing venation normal.

Hille Ris Lambers (1947) has discussed the status of the genus. Here the genus has been used in the sense of Hille Ris Lambers (*op. cit.*). Miyazaki (1971) has dealt with Japanese material.

Distribution : Europe ; India ; Japan ; Korea ; Taiwan and U. S. S. R.

75. *Impatientinum impatiensae dalhousiensis* Verma

(Fig. 200)

1969. *Impatientinum impatiensae dalhousiensis* Verma, *Bull. Ent.*, 10 (1) : 102.

1971. *Impatientinum impatiensae dalhousiensis* Verma ; Chakrabarti, Ghosh, A. K. and Raychaudhuri, D. N., *Sci. Cult.*, 37 (5) : 247.

Material examined : 1 aptera, 1 alata and 1 alate male, undet. host, Simla, 27.xii.1975, coll. K. D. Verma ; many apterae on Wild Rose, *Impatientinum scabrida*, *I. bicornata*, Thanedhar, 2.x.1974 ; many apterae, on *Impatientinum bicornata*, *I. scabrida*, Narkanda, 28.ix.1974 ; many apterae and a few nymphs, on *Smilax parviflora*, Mashobra, 7.x.1974, all L. K. Ghosh coll.

Distribution : India : Himachal Pradesh, Jammu and Kashmir state, and Uttar Pradesh.

XXXII. Genus **Indoidiopterus** Chakrabarti, Ghosh and Raychaudhuri.

1972. *Indoidiopterus* Chakrabarti, Ghosh, A. K. and Raychaudhuri, D. N., *Oriental Ins.*, 6 (2) : 391.

Type-species : *Capitophorus geranii* Chowdhuri, Basu, Chakrabarti and Raychaudhuri, 1969.

Body elongate, Head spinulose over dorsum ; lateral frontal tubercles with almost parallel margins. Antennae 6-segmented, about 1.2-1.3 times as long as body ; a.s. III with reticulate-imbricate base, rest of flagellum progressively more distinctly imbricated towards apex ; apterae without secondary rhinaria, alatae with 12-18 secondary rhinaria on segment III ; p.t. about 4.5 times as long as base of a.s. VI ; longest hair on a.s. III about 0.25-0.30 times as long as b.d. III. Rostrum reaches midcoxae ; u.r.s. 1.3-1.4 times as long as h.t. 2, with 6-7 secondary hairs. Abdominal dorsum smooth to distinctly reticulated ; dorsal hairs sparse, with spatulate to slightly capitate apices and placed on low tubercles. Siphunculi slightly clavate on distal half and flanged. Cauda elongate with 6 hairs. Legs pale except for dark apical half of femora and very apex of fore- and mid-tibiae ; F.T.C. 3,3,2. Forewings with once-forked media, radial sector fused at middle with the outer branch of wing veins bordered brown and very distinctly so on forewing, pterostigma extending almost up to basal 0.13, portion of radial sector ; hindwing with two oblique veins.

Distribution : India.

76. **Indoidiopterus geranii** Chowdhuri, Basu, Chakrabarti and Raychaudhuri

1969. *Capitophorus geranii* Chowdhuri, Basu, R. C., Chakrabarti and Raychaudhuri, D. N., *Oriental Ins.*, 3 (1) : 84.

1972. *Indoidiopterus geranii* Chakrabarti, Ghosh, A. K. and Raychaudhuri, D. N., *Ibid.* 6 (3) : 392.

Material examined : Many apterae, on *Geranium wallichianum*, Narkanda, 29.ix.1974, coll. L. K. Ghosh.

Biological note : Greenish apterae and brownish nymphs were collected from the undersurface of leaves of the host plant.

XXXIII. Genus **Indumasonaphis** Raychaudhuri, Ghosh and Basu

1980. *Indumasonaphis* Raychaudhuri, D. N., Ghosh, M. R., Basu, R. C. Aphids of North-east India and Bhutan, D. N. Raychaudhuri, (Ed.), : 154.

Type-species : *Masonaphis* (*Neomasonaphis*) *inulae* Ghosh and Raychaudhuri, 1972.

Head smooth to slightly wrinkled with strongly diverging smooth lateral frontal tubercles and low but distinct median frontal prominence ;

dorsal cephalic hairs short or long, stout, with slightly spatulate to incrassate apices, these being shorter or longer than b.d. III. Antennae 6-segmented, subequal to or longer than body ; flagellum slightly to distinctly imbricated ; apterae without or with a few secondary rhinaria near base of a.s. III, alates with such tuberculate rhinaria either only on a.s. III or on a.s. III and IV ; p.t. longer than base of a.s. VI ; flagellar hairs like dorsal cephalic ones, longest one on a.s. III about 0.33-0.75 times as long as b.d. III. Ultimate rostral segment long and slender, about 1.20-1.60 times, as long as h.t.2, with many secondary hairs. Abdominal dorsum in apterae pale but distinctly scabrous postsiphuncular sclerite and in alatae either pale like apterae with intersegmental pleural muscle-plates or ornamented with dark brown, faintly spinulose marginal patches on segments 2-4, with a median central patch on segments 2-4 and broken patches on spinopleural area of segments 1, 5, 6, 7 and a continuous transverse band on segment 8 ; hairs on anterior tergites like dorsal cephalic hairs ; those on 8th tergite in apterae much longer and finer but similar hairs in alatae not very different from other tergal hairs. Siphunculi long, about 0.20-0.33 times as long as body with a long cylindrical stem followed by a swollen portion which gradually tapers to a distinct flange, smooth except a little preapical portion which is imbricated and provided with a few rows of transversely drawn out cells. Cauda elongated and somewhat digitiform, slightly constricted at base, about 0.43-0.65 times as long as siphunculi and bears 6-32 hairs, subgenital plate small with 6 long hairs in 2 groups on posterior margin and with 6 long hairs anteriorly. Femora and tibiae nearly smooth but with rows of spinules distally, on tibiae spinules more distinct ; tarsi with dense spinular imbrications ; F.T.C. 5,5,5. Wing venation normal, veins thick and dark.

The genus is characterised by the combination of characters, viz., swollen siphunculus with a few rows of distinct transversely drawn out cells near apex and in having 5, 5, 5 first tarsal chaetotaxy. The genus has been used here in the sense of MacGillivray (1958).

Distribution : Canada : Europe ; India and America.

Key to the species of the genus Indumasonaphis Ghosh, Basu and Raychaudhuri

- | | |
|--|---|
| Ultimate rostral segment with 16-18 secondary hairs ;
siphunculi almost cylindrical ; cauda bears 24-26
hairs | ... <i>inulac</i> (Ghosh and Raychaudhuri) |
| Ultimate rostral segment with 10-15 (usually 12)
secondary hairs ; siphunculi with a long cylindrical
stem (0.28-0.39 portion), rest smoothly clavate ; cauda
bears 45-60 hairs | ... <i>tuberculatus</i> Chakrabarti, Mondal
and Raha |

77. *Indumasonaphis inulae* (Ghosh and Raychaudhuri)

1972. *Masonaphis* (*Neomasonaphis*) *inulae* Ghosh, A. K. and Raychaudhuri, D. N., *Oriental Ins.*, 6 (3) : 377.

Material examined : 2 alatae and 16 alate males, 'on Snow', Kufri, 15.xii.1973, coll. L. K. Ghosh.

Alate male : Body elongate, about 2.40-2.70 mm long with 0.90-1.05 mm as its maximum width at the middle of abdomen. Head brown, hairs on vertex about 27μ - 36μ long with slightly expanded apices. Antennae dark brown except the very base of a. s. III, about 1.8-2.1 times as long as body ; a. s. III imbricated except the base, rest of flagellum progressively more distinctly imbricated ; a. s. III with about 203-216 small round secondary rhinaria distributed throughout the entire length, a. s. IV with about 132-142 and V with about 52-63 similar rhinaria scattered irregularly over the whole length ; flagellar hairs short, somewhat bluntish, the longest one being 0.45-0.60 times as long as b. d. III ; p. t. about 5.0-5.6 times as long as base of a. s. VI. Rostrum reaches hindcoxae ; u. r. s. elongated, slender, about 1.5-1.8 times as long as h. t. 2, with about 12 short secondary hairs. Thorax brownish. Dorsum of the abdomen with a large central sclerotic patch and smaller marginal sclerites ; dorsal hairs about 46μ - 62μ long, the longest one on anterior abdominal tergites about as long as b. d. III ; 8th tergite with 4-6 hairs about 1.1 times as long as b. d. III. Siphunculi pale yellow with darker apices, smooth except a few coalescing striae just before apical flange, about 0.20-0.24 times as long as body and 2.5-2.8 times as long as cauda which bears about 16 hairs. Genitalia well developed, claspers dark, sclerotic and with many short fine hairs. Wing venation normal. Other characters as in alate viviparous female.

Measurements (in mm) of one specimen : Length of body 2.70 ; width of body 1.05 ; antenna 5.52 ; a. s. III 1.17, IV 1.09, V 0.96, VI (0.31+1.75) ; u. r. s. 0.22 ; h.t.2 0.13 ; siphunculus 0.65 ; cauda 0.22.

Remark : The species was so far unknown from North West India and the alate male is described here for the first time.

Distribution : India : Himachal Pradesh and Meghalaya.

78. *Indumasonaphis tuberculatus* Chakrabarti, Mondal and Raha

1983. *Indumasonaphis tuberculatus* Chakrabarti, Mondal and Raha, *J. Linn. Soc. (Zool.)* 78 : 351.

Material examined : 1 aptera, on *Rhododendron* sp., Simla, 13.v.1979, coll. S. P. Maity.

Distribution : Himachal Pradesh.

XXXIV. Genus *Jacksonia* Theobald

1923. *Jacksonia* Theobald, *Scott. Nat.*, 1923 : 9.

Type-species : *Jacksonia papillata* Theobald, 1923.

Body broadly elongate. Head scabrous ; lateral frontal tubercles with convergent inner margins, ventrally with spinules ; dorsal cephalic hairs short and acute. Antennae 6-segmented, shorter than to as long as body ; p. t. about 2.5 times as long as base of a. s. VI ; apterae without secondary rhinaria, alatae with somewhat transversely oval secondary rhinaria on a. s. III-V ; flagellar hairs short with blunt to acute apices. Ultimate rostral segment about as long as h. t. 2, bearing only 2 secondary hairs. Mid-thoracic furca sessile. Abdomen of apterae pale, somewhat sclerotic, and of alatae with large black patch dorsally extending over tergites 3-5 and it sometimes fuse with the large pigmented area on tergite 6 and with dark bands on tergites 2,7 and 8, 8th tergite with 2 hairs. Siphunculi cylindrical to weakly clavate distally with an oblique pore at apex, longer than dark cauda bearing 4-6 hairs. Hind tibiae of nymphs bearing scattered inconspicuous spinules on distal half ; F. T. C. 3, 3, 2. Wing venation normal.

Distribution : Australia ; England ; Formosa ; India and Japan.

Key to the species of the genus Jacksonia Theobald

Apterae viviparae :

- | | |
|---|---|
| Antennae less than half (0.48 times) as long as body ;
siphunculi slightly constricted near middle, with
distinct spinules and at most 1.8 times as long as
cauda ; dorsum of abdomen without polygonal
reticulation | ... <i>papillata</i> Theobald |
| — Antennae nearly (0.8 times) as long as body ; siphun-
culi subcylindrical and without any constriction as
above, without spinules and about 2.2-2.4 times as
long as cauda ; dorsum of abdomen with distinct
polygonal reticulation | ... <i>campanullata</i> Chakrabarti and
Raychaudhuri |

79. *Jacksonia campanullata* Chakrabarti and Raychaudhuri

(Fig. 203)

1978. *Jacksonia campanullata* Chakrabarti and Raychaudhuri, D. N. *Entomon*, 3 (1) : 97-98.

Note : This species is distinguished from *J. conandri* (Takahashi) in having pale body and in the ratio of u. r. s. to h. t. 2 and from *J. papillata* (Theobald) by much longer antennae, longer p. t. and also by much longer siphunculi.

Material examined : 3 apterae, host indet., Simla, November, 1971, coll. L. K. Ghosh.

Distribution : India : Himachal Pradesh and Uttar Pradesh.

80. *Jacksonia papillata* Theobald

1923. *Jacksonia papillata* Theobald, *Scott. Nat.*, 1923 : 9-10.

1972. *Jacksonia papillata* Theobald ; Ghosh, L. K. *Oriental Ins.*, 6 (2) : 171.

Material examined : 1 aptera and 2 nymphs, on Grass, Simla Hills, 7.i. 1970, coll. L. K. Ghosh.

Distribution : India : Himachal Pradesh, Sikkim, Uttar Pradesh and Japan.

XXXV. Genus *Liosomaphis* Walker

1868. *Liosomaphis* Walker, *Zoologist* (2) 3 : 1119.

Type-species : *Aphis berberidis* Kaltenbach, 1843.

Head dorsally wrinkled ; lateral frontal tubercles low and diverging and median frontal prominence distinct ; dorsal cephalic hairs rather short with incrassate apices. Antennae 6-segmented, much shorter than body in apterae and in alatae nearly equal ; p. t. slightly longer than to nearly 3.0 times as long as base of a. s. VI ; apterae without secondary rhinaria, alatae with secondary rhinaria on a. s. III-IV and rarely on a. s. V and VI. Rostrum reaching midcoxae ; u. r. s. about as long as h. t. 2, with 2 or 3 secondary hairs. Mid-thoracic furca in apterae with separate arms. Abdominal dorsum wrinkled, pale to dark brown in apterae and with segmental dark bars which sometimes form a median patch ; dorsal hairs minute ; 8th tergite with 6-8 hairs. Siphunculi distinctly clavate towards distal half and longer than cauda. Cauda elongate with blunt apex, with or without constriction basally and bears 4-9 hairs. Femora sparsely imbricated at least towards tip ; tibiae smooth ; tarsi with normal imbrications ; hairs on legs short with blunt apices ; F. T. C. 3, 3, 3. Wing venation normal.

Basu, A. N. (1964), Hille Ris Lambers (1966) and Narzikulov (1957) have studied the species from Asia. Börner (1920), Cottier (1953) and Eastop (1966) have dealt with the genus.

Distribution : Australia ; England ; Europe ; India ; Japan ; Nepal ; New Zealand ; and North America.

Key to the species of the genus Liosomaphis Walker

Apterae viviparae :

Abdominal tergum dark brown ; 8th tergite with 2 hairs ; p. t. 1.3-1.5 times as long as base of a. s. VI ; maximum width of siphunculi about twice its minimum width near base ; hairs on vertex about 12 μ long

...

atra Hille Ris Lambers

- Abdominal tergum pale ; 8th tergite with 4 hairs ;
p. t. always more than 1.5 times (usually 1.7 to 1.9
times) as long as base of a. s. VI ; maximum width
of siphunculi nearly 1.5 times its minimum width
at base ; hairs on vertex about 26μ long ...

himalayensis Basu

Alate viviparae :

Antennal segment III with 14-25 and a. s. IV with
1-2 secondary rhinaria ; abdominal dorsum with a
compact dark sclerotic patch ; 8th tergite with 2
hairs ; p. t. hardly 1.5 times as long as base of a. s.
VI ; maximum width of siphunculi about 2.0 times
its minimum width at the basal cylindrical portion...

atra Hille Ris Lambers

- Antennal segment III with 26-39, a. s. IV with 4-11
secondary rhinaria ; abdominal dorsum with a dark
sclerotic patch around a central pale area ; 8th tergite
usually with 4 hairs ; p. t. 1.8-1.9 times as long as
base of a. s. VI ; maximum width of siphunculi about
1.5 times its minimum width at the basal cylindri-
cal portion ...

himalayensis Basu

81. *Liosomaphis atra* Hille Ris Lambers

1966. *Liosomaphis atra* Hille Ris Lambers, *Tijdschr. Ent.*, **109** (8) : 211.

1971. *Liosomaphis atra* Hille Ris Lambers ; Chakrabarti, Ghosh, A. K. and Raychaudhuri,
D. N., *Sci. Cult.*, **32** (5) : 247.

Material examined : Many apterae and nymphs, on *Berberis aristata*, Nar-
kanda, 30.ix.1974 ; many apterae, on *Berberis* sp., Simla Hills, December,
1973 ; many alatae, on ?*Polygonum* sp., Baghi, 5.x.1974 ; 1 aptera and 2
alatae, on *Berberis* sp., Narkanda, 27.ix.1974, coll. L. K. Ghosh.

Biological notes : Greenish colony was noticed on the undersurface of the
leaves of host plants. No attendant ant or any predator was found with the
aphids.

Remarks : Hille Ris Lambers (1966) described *Liosomaphis atra* as a new
species based on only apterae feeding on *Berberis* sp. from Pakistan. Ghosh,
L. K. and Pramanik (1976) described for the first time the alate viviparous
female collected from the Simla Hills in India.

David (1969) while studying the species opined that the species has
shorter rostrum reaching only up to the midcoxae. This was also noticed by
the author. In view of the above facts, the remark of Hille Ris Lambers
(1966) that "it is peculiar for the genus that u. r. s. extends base of 3rd
coxae" is difficult to be reconciled.

Distribution : India : Himachal Pradesh ; and Pakistan.

82. *Liosomaphis himalayensis* Basu

1964. *Liosomaphis himalayensis* Basu, A. N., *J. Linn. Soc. (Zool.)*, **45** (305) : 231.

1969. *Liosomaphis himalayensis* Basu ; Ghosh, A. K. *Proc. zool. Soc. Calcutta*, **22** : 126.

Material examined : 4 apterae and 1 alata, on *Berberis* sp., Narkanda, 27.ix.1974 ; 1 alate male, on undet. host plant, Mashobra, 13.xii.1973 ; 3 alatae and 2 alate males, 'on snow', Kufri, 15.xii.1973, 3 alatae, on *Berberis* sp., Phagli, 14.xii.1973, coll. L. K. Ghosh.

Biological notes : Brownish aphids were found to infest the undersurface of leaves and tender shoots of the host-plants.

Remarks : Basu, A. N. (1964) described the species from apterae collected on *Berberis umbellata* from Darjeeling, India. Ghosh, A. K. (1969) described alate viviparous female from the same area. Later, Verma (1974) described an alate male from Himachal Pradesh and subsequently, Ghosh, L. K. and Pramanik (1976) also recorded the same morph from the same area.

Distribution : India : Himachal Pradesh, Meghalaya, Uttar Pradesh, West Bengal ; and Nepal.

XXXVI. Genus *Lipaphis* Mordvilko

1928. *Lipaphis* Mordvilko, *Key for the identification of Insects of European Russia* (in Russian) : 200.

Type-species : *Aphis erysimi* Kaltenbach, 1843.

Body broadly oval. Head smooth with well-developed lateral frontal tubercles and distinct median frontal prominence. Antennae 6-segmented, shorter than to about half as long as body, dark except a. s. I, II and basal half of a. s. III which are paler ; flagellum imbricated, flagellar hairs minute ; p. t. about 2-3 times as long as base of a. s. VI ; apterae without secondary rhinaria, alatae with secondary rhinaria on a. s. III and sometimes also on IV and V. Rostrum reaches midcoxae ; u. r. s. with somewhat acuminate apex, with 2 secondary hairs, about 0.6 to slightly longer than h. t. 2. Mid-thoracic furca sessile. Abdominal dorsum pale in apterae, in alatae abdominal dorsum with scattered brown patches and transverse brown bands on segments 7 and 8 besides spinulose brown marginal patches up to segment 6 and a few 'muskel-platten' like structure. Siphunculi weakly clavate, imbricated, without any trace of reticulation and about as long as cauda. Cauda somewhat constricted at the middle, with rounded apex, bearing 5-6 hairs. F. T. C. 3, 3, 2 or 3, 3, 3, hind tibiae of nymphs smooth. Wing venation normal.

Doncaster (1954) and Heinze (1960) have given accounts of the genus. Eastop (1966) has also dealt with the genus.

Distribution : Cosmopolitan.

83. *Lipaphis erysimi* (Kaltenbach)

1843. *Aphis erysimi* Kaltenbach, *Mon. Fam. Pflanzen.* : 99.
 1928. *Lipaphis erysimi* (Kaltenbach) ; Mordvilko, *Keys for the identification of Insects of European Russia* : 200.
 1969. *Lipaphis erysimi* (Kaltenbach) ; Chowdhuri, Basu, R. C., and Raychaudhuri, D. N., *Sci. Cult.*, 35 : 337.

Material examined : Many apterae, on *Brassica oleracea*, Solan, 2.iii.1969, coll. A. P. Kapur ; many apterae and alatae and 3 apterae oviparae, on *Brassica oleracea*, Thanedar, 2.x.1974, coll. L. K. Ghosh.

Apterous oviparous female : (Fig. 204) : Body oval, pale, 1.92-2.2 mm long with 1.17-1.35 mm as maximum width. Head brownish ; cephalic hairs about 12μ - 15μ long. Antennae darker except the segments I, II and basal half of III, about 0.45-0.50 times as long as body, without secondary rhinaria, hairs on antenna minute, longest hair on a. s. III about 0.71 times as long as b. d. III ; p. t. about 2.1-2.3 times as long as base VI. Rostrum dark brown, reaches 2nd coxae ; u. r. s. 0.70-0.91 times as long as h. t. 2. Abdominal dorsum pale, with small scattered sclerites, dorsal hairs small, about 9μ long. Siphunculi dark, slightly clavate, about 0.091-0.12 times as long as body, 1.3-1.4 times as long as cauda which is nearly conical and bears 5-6 hairs. Abdomen with eggs having 0.33 mm as middle diameter. Hind tibiae swollen to receive numerous small round pseudosensoria distributed all over the length except the very base and distal 0.23-0.35 portion, maximum width of hind tibiae about 0.5 times as long as middle diameter of other tibiae, hairs on hind tibiae rather small about 9μ - 30μ long. Genital plate pigmented. Otherwise as in apterous viviparous female.

Measurements (in mm) of an ovipara : Length of body 1.92, width of body 1.17 ; antenna 0.90, a. s. III 0.24, IV 0.11, V 0.11, VI (0.09+0.20) ; u. r. s. 0.10 ; h.t. 2 0.11 ; siphunculus 0.19 ; cauda 0.14.

Biological note : Greyish green to yellow species feeds gregariously on the host plants.

Remarks : The insect shows a longitudinal row of impressed areas on each side of the mid abdominal dorsum. The species is one of the major pests of cruciferous crops in India and is particularly a menace to the cultivation of mustard. Phalak (1968) while reporting the oviparous morph for the first time from India did not provide the description. As such, the ovipara is described here.

Distribution : Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Manipur, Meghalaya, Nagaland, Rajasthan, Sikkim, South India, Tripura, Uttar Pradesh, West Bengal ; and virtually cosmopolitan.

XXXVII. Genus **Longicaudus** van der Goot

1913. *Longicaudus* van der Goot, *Tijdschr. Ent.*, **55** : 105-1007.

Type-species : *Aphis trirhodus* Walker.

Body broadly elongate. Head with ill-developed lateral frontal tubercles but with well-developed median frontal prominence. Antennae 6-segmented, shorter than body ; apterae without secondary rhinaria, in alatae secondary rhinaria present on a. s. III and sometimes also on a. s. IV and V ; segment III either as long as or longer than a. s. IV and V taken together ; flagellar hairs short and pointed ; p. t. about twice as long as base of a. s. VI. Rostrum reaches midcoxae ; u. r. s. shorter than h. t. 2. Midthoracic furca stalked. Abdomen pale in apterae ; in alatae abdominal dorsum with a rectangular pigmented patch or with segmental bars ; hairs on anterior abdominal tergites with blunt to acuminate apices. Siphunculi short, cylindrical, as long as to shorter than cauda which is elongate and slightly constricted. First tarsal chaetotaxy 5, 5, 5 or 6, 6, 6. Hind tibiae of nymphs smooth. Wing venation normal.

David (1969) and David *et al.* (1970) have dealt with the Indian species.

Distribution : Canada ; Europe ; India and Japan.

84. **Longicaudus himalayensis** Hille Ris Lambers

1965. *Longicaudus himalayensis* Hille Ris Lambers, *Tijdschr. Ent.*, **108** : 193.

1970. *Longicaudus himalayensis* Hille Ris Lambers, David, Rajasingh and Narayanan, *Oriental Ins.*, **4** (4) : 396.

Material examined : 1 aptera, on Rose, Simla, 5.vi.1968, coll. K. Narayanan.

Distribution : India : Himachal Pradesh.

XXXVIII. Genus **Macrosiphoniella** del Guercio

1911. *Macrosiphoniella* del Guercio, *Redia*, **7** : 331.

Type-species : *Siphonophora atra* Ferrari, 1872.

Body elongate. Head smooth, pale to dark brown with well-developed diverging lateral frontal tubercles ; dorsal cephalic hairs mostly with acuminate apices. Antennae 6-segmented, about as long as or longer than body ; p. t. about 3-5 times as long as base of a. s. VI ; flagellar hairs with acuminate to spatulate apices and longer than b. d. III. Ultimate rostral segment stiletto-shaped (Fig. 52), with about 6 hairs, a little shorter to longer than h. t. 2. Abdominal dorsum in apterae with hair-bearing sclerites besides other similiar sclerites. dorsal abdominal hairs with well-developed marginal

patches. Spiracles reniform; lateral abdominal tubercles variably present on segments 2-4. Siphunculi (Fig. 79) nearly tapering, pale to dark brown, with or without an indistinct apical flange, reticulated on apical 0.2 to 0.6 portion, shorter to longer than cauda. Cauda pale to dark brown, with or without basal constriction, bearing 8-30 hairs. Legs pale to dark brown; femora and tibiae smooth or imbricated; tibial hairs sometimes with a row of thick spines beside normal hairs on hind leg; F. T. C. 3, 3, 3. Hind-tibiae of nymphs smooth. Wing venation normal.

Distribution : Cosmopolitan.

Key to the species of the genus Macrosiphoniella del Guercio

Apterae viviparae :

- | | | | |
|-------|---|-----|------------------------------|
| 1 (2) | Siphunculi as long as or a little longer than cauda and reticulated at most on apical 0.50 portion; cauda with 23-29 hairs | ... | <i>kalimpongense</i> Basu |
| 2 (1) | Siphunculi distinctly shorter than cauda and reticulated area extending beyond apical 0.50 portion; cauda with 10-20 hairs | ... | ... |
| 3 (4) | 8th abdominal tergite with 4 hairs; cauda usually with 10-12 hairs; tibiae pale with the very base and apical 0.25 portion brown; femora pale on basal half, rest dark; head dark brown; dorsal abdominal hairs usually on sclerotic bases; secondary rhinaria on a. s. III never less than 10; antesiphuncular sclerite well developed | ... | <i>sanborni</i> Gillette |
| 4 (3) | 8th abdominal tergite with 6-9 hairs; cauda with about 20 hairs; tibiae entirely black; femora entirely dark except the very base which is pale; head pale to pale brown; dorsal abdominal hairs not on sclerotic base; secondary rhinaria on a. s. III at most 9; antesiphuncular sclerite ill-developed | ... | <i>yomogifoliae</i> (Shinji) |

85. *Macrosiphoniella kalimpongense* Basu and Raychaudhuri

1976. *Macrosiphoniella kalimpongense* Basu, R. C. and Raychaudhuri, D. N., *Oriental Ins.*, **10** (2) : 299.
1980. *Macrosiphoniella kalimpongense*; Raychaudhuri, D. N., Ghosh, L. K. and Das, S. K., *Ins. matsum.*, n. s., **20** : 17.

Material examined : 11 apterae and 3 nymphs, on *Artemisia* sp., Dharamapur, 29.x.78; 5 apterae and 3 nymphs, on *Artemisia* sp., Javti, 29.x.78, coll. M. R. G. and P. K. M.

Distribution : India : Himachal Pradesh, Uttar Pradesh and West Bengal.

86. *Macrosiphoniella sanborni* (Gillette)

1908. *Macrosiphum sanborni* Gillette, *Canad. Ent.*, **40** : 65.

1983. *Macrosiphoniella sanborni* (Gillette) ; Hille Ris Lambers, *Temminckia*, **3** : 30.

1973. *Macrosiphoniella sanborni* (Gillette) ; Kumar, *Oriental Ins.*, **7** (1) : 11.

Material examined : 6 apterae, on undet. Compositae, Simla, 29.v.1969 ; many apterae, on *Chrysanthemum* sp., Simla Hills, 11.xii.1973, coll. L. K. Ghosh.

Biological notes ; Dark brown aphids were collected from tender buds and undersurface of leaves. Colony of *Aphis gossypii* group was also found in the same host.

Distribution : India : all over ; and virtually cosmopolitan.

87. *Macrosiphoniella yomogifoliae* (Shinji)

1922. *Macrosiphum yomogifoliae* Shinji, *Dob. Zasshi*, **34** (407) : 788.

1931. *Macrosiphoniella yomogifoliae* (Shinji) ; Takahashi, *Aphididae of Formosa*, **6** : 61.

1969. *Macrosiphoniella yomogifoliae* ; Chowdhuri, Basu, R. C., Chakrabarti and Raychaudhuri, D. N., *Oriental Ins.*, **3** (1) : 89.

Material examined : 3 apterae, on *Artemisia vulgaris*, Thanedhar, 2.x.1974, coll. L. K. Ghosh ; 4 apterae and a few nymphs, on *Bidens wallichii*, Simla, September, 1966, coll. A. N. Chowdhuri.

Biological notes : Greenish aphids were collected from the tender leaves and shoots of host plant. Ant was found in association with the aphids.

Distribution : India : Arunachal Pradesh, Himachal Pradesh, Meghalaya, Sikkim, South India, Uttar Pradesh, West Bengal ; China ; Japan ; Korea ; Malaysia ; Nepal and Taiwan.

XXXIX. Genus *Macrosiphum* Passerini

1960. *Macrosiphum* Passerini, *Gli Afidi* : 27.

Type-species : *Aphis rosae* Linnaeus, 1758.

Head smooth, sometimes finely stippled or minutely spinulose either on both surfaces or on one surface, with moderately to strongly developed diverging smooth lateral frontal tubercles and indistinct to distinct median frontal prominence ; dorsal cephalic hairs long, with acute, acuminate, incrassate or blunt apices. Antennae 6-segmented, shorter to longer than body ; basal two segments either smooth or scabrous ; flagellum imbricated ; apterae always with non-protuberant circular secondary rhinaria (Fig. 31)

in a row restricted either to the very base of segment III or distributed over entire length of the segment, in alatae such rhinaria found mostly on a. s. III but sometimes also on a. s. IV ; primary rhinaria ciliated ; p. t. much longer than base of last segment ; flagellar hairs like dorsal cephalic hairs and may be shorter or longer than 0.50 x b. d. III. Ultimate rostral segment shorter to longer than h. t. 2, heart-shaped or elongate with blunt apex and with 4-6 secondary hairs. Midthoracic furca with a narrow base. Abdominal dorsum in apterae either completely pale or sometimes pigmented middorsally and marginally up to segment VI or with only hair-bearing pigmented areas besides some muscleplate-like structure scattered pleurally, smooth or faintly rugose, in alatae also pale with brown marginal patches and transverse pleural bands often linked by spinal sclerotic area, smooth with spinules on marginal pigmented patches and on segments caudad to siphunculi. Siphunculi cylindrical, with or without a distinct flange, faintly to distinctly imbricated, imbrications passing on to a distinct apical reticulated area which is about 0.10-0.35 portion of siphunculi, reticulations being in the form of isodiametrical cells. Cauda elongate, pale or dark, with or without a basal constriction. Subanal plate somewhat emerginate on posterior margin. Subgenital plate with 7-16 hairs in 2 groups on posterior margin and 2 long fine hairs on anterior 0.50 portion. Venter of abdomen with spinulose striae ; ventral abdominal hairs long with fine to acuminate apices. Legs smooth, sometimes hindtibiae with spines besides normal hairs ; second tarsal segments with normal imbrications, F. T. C. 3, 3, 3 or 4, 4, 4. Wing venation normal.

Distribution : Cosmopolitan.

Key to the subgenera of Macrosiphum Passerini

Longest hair on a. s. III less than 0.50 times as long as b. d. III	...	<i>Sitobion</i> Mordvilko
Longest hair on a. s. III never less than 0.75 times as long as to longer than b. d. III	...	<i>Macrosiphum</i> Passerini

Key to the species of the genus Macrosiphum Passerini

Apterae viviparae :

- | | | |
|--|-----|---|
| 1 (2) First tarsal segments with 4, 4, 4 hairs ; hairs on anterior abdominal tergites much longer (up to 140 μ) ; p. t. longer than base of a. s. VI | ... | (<i>Macrosiphum</i>) <i>pseudogeranii</i>
Chakrabarti and Raychaudhuri |
| 2 (1) First tarsal segments with 3, 3, 3 hairs ; hairs on anterior abdominal tergites much shorter (atmost 80 μ) ; p. t. shorter than to as long as a. s. III | ... | 3 |
| 3 (12) Longest hair on a. s. III less than 0.60 times as long as b. d. III | ... | 4 |

- 4 (9) Siphunculi uniformly coloured ... 5
- 5 (6) Abdominal dorsum with a small to large, faint to dark central patch ; cauda without any constriction ; u. r. s. with 6-11 secondary hairs ... 7
- 6 (5) Abdominal dorsum never with a patch as above ; cauda with slight basal constriction ; 8th tergite with 4 hairs. ... (*Sitobion*) *himalayensis* sp. nov.
- 7 (8) 8th abdominal tergite with 5-6 hairs ; caudal hairs always more than 8 ; p. t. always longer than a. s. III ... (*Sitobion*) *indicum* Basu
- 8 (7) 8th abdominal tergite with only 2 hairs ; cauda with at most 8 hairs ; p. t. shorter than a. s. III ... (*Sitobion*) *bambusicola* sp. nov.
- 9 (4) Siphunculi basally pale and then gradually darker ; cauda with a median constriction ; 8th abdominal tergite with 4-6 hairs ... 10
- 10 (11) Processus terminalis longer than a. s. III ; ultimate rostral segment with 2 secondary hairs ; siphunculi about 0.19 times as long as body ... (*Sitobion*) *pseudoalupecuri* Chakrabarti
- 11 (10) Processus terminalis shorter than a. s. III ; ultimate rostral segment with 4 secondary hairs ; siphunculi about 0.3 times as long as body ... (*Sitobion*) *rosaeiformis* Das
- 12 (3) Longest hair on a. s. III more than 0.60 times as long as b. d. III ... 13
- 13 (14) 8th abdominal tergite with 8-10 hairs ; a. s. III with 2-7 secondary rhinaria ... (*Macrosiphum*) *pachysiphon* Hille Ris Lambers
- 14 (13) 8th abdominal tergite with 4-6 hairs ; a. s. III with 13-19 secondary rhinaria ... (*Macrosiphum*) *rosae* (Linnaeus)

Alate viviparae :

- 1 (4) Longest hair on a. s. III more than 0.60 times as long as b. d. III ...
- 2 (3) Ultimate rostral segment shorter than h. t. 2 ; a. s. III with 12-24 secondary rhinaria ; 8th abdominal tergite with 8-10 hairs ... 2
pachysiphon Hille Ris Lambers
- 3 (2) Ultimate rostral segment longer than h. t. 2 ; a. s. III with 40-60 secondary rhinaria ; 8th tergite with 4-6 hairs ... *rosae* (Linnaeus)
- 4 (1) Longest hair on a. s. III less than 0.60 times as long as b. d. III ... 5
- 5 (6) Lateral frontal tubercles rather low and without any spinules ventrally ; caudal hairs 5-8 (usually 7) ... *miscanthi* Takahashi
- 6 (5) Lateral frontal tubercles appreciably high and with or without any spinule ventrally ; caudal hairs 7-13... 7

- 7 (8) 8th abdominal tergite with 4 hairs which are slightly longer than b. d. III ; lateral frontal tubercles without any spinule ; a. s. I almost smooth ; a. s. III with 6-10 secondary rhinaria on basal 0.50 portion ; abdominal dorsum never with a patch ; caudal hairs 7-10 ... *sikkimensis* Ghosh and Raychaudhuri
- 8 (7) 8th abdominal tergite with 5-6 hairs which are up to 0.66 times as long as b. d. III ; lateral frontal tubercles with a few spinules ; a. s. I scabrous ; a. s. III with 12-15 secondary rhinaria ; abdominal dorsum with a faint to dark central patch ; cauda with 9-13 hairs ... *indicum* (Basu)

Alate males :

- 1 (2) Processus terminalis shorter than a. s. III ; cauda with about 8 hairs ... *rosaeiformis* Das
- 2 (1) Processus terminalis longer than a. s. III ... 3
- 3 (4) Lateral frontal tubercles low ; hairs on 8th abdominal tergite up to about 0.80 times as long as b. d. III ; a. s. I dark and scabrous ; siphunculi about 3.8 times as long as cauda ... *miscanthi* Takahashi
- 4 (3) Lateral frontal tubercles appreciably high ; hairs on 8th abdominal tergite slightly longer than b. d. III ; a. s. I rather pale and almost smooth ; siphunculi about twice as long as cauda ... *sikkimensis* Ghosh and Raychaudhuri

88. *Macrosiphum* (*Macrosiphum*) *pachysiphon* Hille Ris Lambers (Fig. 205)

1966. *Macrosiphum pachysiphon* Hille Ris Lambers ; *Tijdschr. Ent.*, 109 (8) : 218.

1970. *Macrosiphum pachysiphon* Hille Ris Lambers ; Chakrabarti and Ghosh, A. K., *Indian J. Hort.*, 27 (3-4) : 227.

Material examined : 2 apterae and 8 alatae, on *Rosa* sp., Simla, 6.i.1970, coll. L. K. Ghosh.

Distribution : India : Arunachal Pradesh ; Assam ; Himachal Pradesh, Manipur, Meghalaya, Sikkim, Uttar Pradesh, West Bengal ; and Pakistan.

89. *Macrosiphum* (*Macrosiphum*) *pseudogeranii* Chakrabarti and Raychaudhuri (Figs. 206, 207, 208)

1969. *Macrosiphum geranii* Chowdhuri, Basu, R. C., Chakrabarti and Raychaudhuri, D. N., *Oriental Ins.*, 3 (1) : 89.

1974. *Macrosiphum pseudogeranii* Chakrabarti and Raychaudhuri, D. N., *Oriental Ins.*, 8 (3) : 303.

Material examined : Many apterae, on *Geranium wallichianum*, Narkanda, 29.ix.1974, coll. L. K. Ghosh.

Distribution : India : Himachal Pradesh.

90. **Macrosiphum (Macrosiphum) rosae** (Linnaeus)

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

1860. *Macrosiphum rosae* (Linnaeus) ; Passerini, *Gli Afidi* : 27.

1978. *Macrosiphum rosae* (Linnaeus) ; Kumar, *Oriental Ins.*, 7 (1) : 11.

Material examined : Many apterae and alatae, on *Rosa* sp., Simla Hills, 7.i.1970 and December, 1973, coll. L. K. Ghosh.

Distribution : India : all over ; and virtually cosmopolitan.

91. **Macrosiphum (Sitobion) bambusicola** sp. nov.

(Figs. 171, 209)

Apterous viviparous female : Body elongate, about 1.65-3.72 mm long with 0.81-1.50 mm as maximum width. Head (Fig. 171A) brownish, a little wrinkled on dorsum, with somewhat convex front and diverging lateral frontal tubercles ; dorsal cephalic hairs pointed, about 40μ long. Antennae about 1.1-1.2 times as long as body, concolourous with head excepting apex of a. s. III, basal half of a. s. IV and a. s. V and VI which are darker ; a. s. I and II wrinkled, with a few spinules on inner side ; a. s. III nearly smooth excepting the very base which is with a few rows of spinular imbrications, rest of flagellum progressively more distinctly imbricated ; a. s. III with 1-3 small round secondary rhinaria near base, about 1.3-1.4 times as long as a. s. IV and subequal to p. t. which is 4.1-4.6 times as long as base of a. s. VI ; hairs on flagellum sparse with somewhat incrassate apices, longest one on segment III about 0.5 times as long as basal diameter of the segment. Eyes with ocular tubercles. Rostrum reaches midcoxae ; u. r. s. (Fig. 171B) about 0.78-0.80 times as long as h. t.2, with about 9 secondary hairs. Thorax brown ; midthoracic furca with a basal stalk. Abdomen with pigmented dorsum ; hairs sparse, anterior ones being up to about 27μ long and hardly more than half as long as b. d. III, with bluntish apices ; 8th tergite with 2 hairs up to 42μ long and those being about 0.78-0.80 times as long as b. d. III. Siphunculi (Fig. 171C) uniformly dark brown, stout, long, bent outwards at apex, distinctly imbricated with apical 0.14-0.17 portion reticulated, about 0.27-0.32 times as long as body and 2.0-2.2 times as long as cauda and flanged. Cauda dusky, elongate, tapering towards apex, about half as long as siphunculi, without any constriction and bears about 8 hairs (Fig. 171C). Legs long, concolourous with head, excepting darker apices of tibiae and whole of tarsi ; femora nearly smooth excepting

distal half which is sparsely imbricated and with fine spinules ; femoral hairs sparse, short ; tibiae rather smooth, tibial hairs (Fig. 171D) sparse ; F. T. C. 3, 3, 3.

Measurements (in mm) of the holotype : Length of body 3.72 ; width of body 1.50 ; antenna 4.71 ; a. s. III 0.88, IV 0.67, V 0.59, VI (0.15+0.71) ; u. r. s. 0.10 ; h. t.2 0.13 ; siphunculus 1.02 ; cauda 0.49.

Material examined : Holotype, apterous viviparous female, on *Bambusa* sp., Mashobra, sp., 12.xii.1973, coll. L. K. Ghosh ; paratypes, 2 apterous viviparous females and a few nymphs, same data as for holotype.

Biological notes : The yellowish aphids were found in colony under young and tender leaves of the host plant. No ant was noticed in association with the aphids.

Remarks : *Macrosiphum* (*Sitobion*) *bambusicola* sp. nov., resembles *M.* (*S.*) *rosaeiformis* Das in the ratio of ultimate rostral segment to second segment of hind tarsus, in the number of caudal hairs, less uniformly brown legs and in other morphological characters but can be readily distinguished by the presence of more secondary hairs on ultimate rostral segment, lesser reticulated area (thick and not fine) on nearly uniformly dark siphunculi and by fewer secondary rhinaria on antennal segment III. Besides, the new species is yellowish in colour in life.

It is also curious to note that apparently no *Sitobion* species is known to occur on *Bambusa* (Gramineae) in Indian subcontinent, although species of *Sitobion* may alternate between Rosaceae and Gramineae.

Distribution : India ; Himachal Pradesh.

92. *Macrosiphum* (*Sitobion*) *himalayensis* sp. nov.

(Fig. 210)

Apterous viviparous female : Body spindle-shaped, large, about 3.72-4.26 mm long with 1.4-1.7 mm as its maximum width. Head pale brown, smooth with diverging lateral frontal tubercles. Antennae about 0.9 times as long as body ; pale brown except apex of a.s. III, distal half of a.s. IV and whole of a.s. V and VI which are dark ; a.s. III smooth, a.s. IV sparsely imbricated near apex, rest of flagellum progressively more distinctly imbricated ; segment III with 3-9 round secondary rhinaria near at base ; p.t. about 4.4-5.2 times as long as base of a.s. VI and subequal to a.s. III ; flagellar hairs sparse with somewhat acuminate apices, longest one on segment III being about half or a little longer than half of b.d. III. Eyes with distinct triommatidia. Rostrum reaches midcoxae ; u.r.s. a little shorter than h.t.2 and bears 4 secondary hairs. Abdominal dorsum pale ; hairs on dorsum of abdomen sparse with somewhat acuminate apices, anterior ones being up to about

46 μ long and about 0.5-0.8 times as long as b.d. III ; 8th tergite with 4 hairs up to about 0.8 times as long as b.d. III. Siphunculi dark, stout, subcylindrical with constriction near apex, about 0.24-0.26 times as long as body, about 2.0 times as long as cauda, with apical 0.19-0.22 portion reticulated, distinctly imbricated and with ill-developed flange at tip. Cauda paler than siphunculi, elongate, with slight basal constriction, somewhat pointed apex and bears 10-12 rather short hairs. Legs concolourous with head except distal half of femora and apices of tibiae and tarsi which are darker, femora smooth with short hairs ; F.T.C. 3,3,3.

Measurements (in mm) of the holotype : Length of body 4.08 ; width of body 1.50 ; antenna 3.90 ; a.s. III 1.04 ; IV 0.74, V 0.65, VI (0.20+1.04) ; u.r.s. 0.13 ; h.t.2 0.15 ; siphunculus 1.02 ; cauda 0.54.

Material examined : Holotype, apterous viviparous female, India ; Himachal Pradesh, Thanedar, on *Oryzopsis lateralis*, 2.x.1974, coll. L. K. Ghosh ; paratypes 4 apterous viviparous females, same data as for holotype.

Biological notes : Greenish apterae colony was found infesting the inflorescence at the apical part of stem. Neither attendant ant nor predator was found.

Remarks : Following the key to the Indian *Macrosiphum* species provided by (David 1975) the new species comes near to *Macrosiphum (Sitobion) resaeiformis* Das in degree of reticulation in siphunculi, ratio of siphunculus to body, antennal length and ratio of antennal segment III to processus terminalis and also in colouration but can be distinguished by larger body size, siphunculi, darker distal half of femora and apices of tibiae, more caudal hairs and more secondary rhinaria on antennal segment III, paler body and by cauda bearing rather slender and smaller hairs.

M. (S.) himalayaensis sp. nov. also differs from the other new species described in this contribution in having reticulated area on dark siphunculi more extended, more secondary rhinaria on antennal segment III, dark distal half of femora, dark apices of tibiae, pale body, and lesser number of secondary hairs on ultimaterostrual segment.

Moreover, host plant association is different.

Distribution : India : Himachal Pradesh.

93. *Macrosiphum (Sitobion) indicum* (Basu)

1964. *Sitobion indicum* Basu, A. N., *J. Linn. Soc., (Zool.)* **45** (305) : 230.

1980. *Macrosiphum (Sitobion) indicum* (Basu) : Raychaudhuri, D. N., Ghosh, L. K. and Das, S. K., *Ins. matsum., n. s.*, **20** 18.

Material examined : 7 apterae, alata and nymphs, on *Ipomoea* sp., Solan, 25.x.78 ; 2 apterae, on indet host, Dharampur, 29.x.78, coll. *M. R. G. and P. K. M.*

Distribution : India : Arunachal Pradesh, Himachal Pradesh, Meghalaya, Sikkim, Uttar Pradesh and West Bengal.

94. *Macrosiphum* (Sitobion) *miscanthi* Takahashi

1921. *Macrosiphum miscanthi* Takahashi, *Aphididae of Formosa*, pt. 1 : 8-9.

1975. *Macrosiphum* (Sitobion) *miscanthi* Takahashi ; David, *Oriental Ins.*, 9 (4) : 470.

Material examined : 1 alate and 2 nymphs, on *Triticum vulgare*, Solan, 2.iii.1969, coll. *A. P. Kapur* ; 5 alatae, on *Triticum vulgare*, Narkanda, 29.ix.1974, coll. *L. K. Ghosh* ; 2 alatae, on grass, Chhota Simla, 4.iii.1969, coll. *A. N. Chowdhuri*, 1 alate male, on ? Fern, Simla, 6.i.1970, coll. *L. K. Ghosh*.

Biological notes : The species exhibits colour variation. It infests all the aerial parts of the host-plant. No appreciable damage to its host could, however, be found.

Distribution : India : all over ; and virtually cosmopolitan.

95. *Macrosiphum* (Sitobion) *pseudoalupecuri* Chakrabarti

1976. *Macrosiphum* (Sitobion) *pseudoalupecuri* Chakrabarti, *Entomon*, 1 (2) : 173.

Distribution : India : Himachal Pradesh.

96. *Macrosiphum* (Sitobion) *rosaeiformis* Das

(Figs. 10, 211, 212)

1918. *Macrosiphum rosaeiformis* Das, *Mem. Indian Mus.*, 6 : 161.

1972. *Macrosiphum* (Sitobion) *rosaeiformis* Das ; David *et al.*, *Oriental Ins.*, 6 (1) : 42.

Material examined : Many apterae, on *Rosa* sp., Simla, 7.i.1970 ; many alate males, on 'snow', Simla Hills, December, 1973, coll. *L. K. Ghosh* ; 4 apterae and an apterous ovipara, on *Rosa* sp., Kalpa, 26.x.1975, coll. *A. N. Chowdhuri*.

Distribution : India : all over ; Nepal and Pakistan.

97. *Macrosiphum* (Sitobion) *sikkimensis* Ghosh and Raychaudhuri

1968. *Macrosiphum* (Sitobion) *smilacicola sikkimensis* Ghosh, A. K. and Raychaudhuri D. N., *Ann. Ent. Soc. Amer.*, 61 (3) : 753.

1980. *Macrosiphum* (Sitobion) *sikkimensis* ; Raychaudhuri, D. N., Ghosh, L. K. and Das S. K., *Ins. matsum.*, n. s., 20 : 19.

Material examined : 6 alatae, 2 alate males and 3 apterae oviparae, on undet host., Solan, 30.x.78, *M. R. G. and P. K. M.* coll.

Distribution : India : Himachal Pradesh, Meghalaya, Sikkim and West Bengal.

XL. Genus *Matsumuraja* Schumacher

1921. *Matsumuraja* Schumacher, *Zool. Anz.*, **53** : 186.

Type-species : *Acanthaphis rubi* Matsumura, 1918.

Head in apterae spinulose on both surfaces, in alatae smooth ; lateral frontal tubercles distinct but low with diverging inner margin and rounded inner apices, somewhat smooth ; frons usually concave ; both dorsal and ventral cephalic hairs long with swollen apices and placed on tuberculate bases but rarely minute with blunt apices ; venter of head in fundatrices with a part of anteriorly directed hair-bearing projection near base of antennal sockets. Antennae 5-or 6-segmented, always shorter than body ; a. s. I smooth but usually with a capitate hair-bearing finger-like projection on inner apex, sometimes such projection not very strongly developed, a. s. II small and smooth ; flagellum in apterae imbricated from distal 0.50 portion of a. s. IV onwards ; apterae without secondary rhinaria, alatae with secondary rhinaria on a. s. III, IV and sometimes also on a. s. V ; flagellar hairs short with swollen apices ; primary rhinaria ciliated ; p. t. as long as to 3.50 times as long as base of a. s. VI. Rostrum short and reaches a little beyond midcoxae ; u. r. s. pointed, with secondary hairs usually a little longer than primary ones, shorter to longer than h. t. 2. Abdominal dorsum in apterae pale, smooth (sometimes fundatrices with lateral processi with long capitate rows spinally, pleurally and marginally except on segment 6 where marginals absent) ; in alatae with a median dark patch in addition to marginal patches ; dorsal hairs in alatae shorter. Siphunculi about 0.18-0.25 times as long as body, faintly imbricated, with usually apical 0.50 portion slightly swollen, sometimes cylindrical, preapically slightly constricted and with distinct apical flange. Cauda dusky, short nearly subpentagonal, always much shorter than siphunculi. Subgenital plate with posterior margin broadly rounded with 8-10 hairs having acute to acuminate apices and with anterior pair of hairs having acute apices shifted far apart. Spiracular aperture small equidistant on posterior segments. Legs smooth ; hairs on legs mostly capitate, those specially on distal part of tibiae having acuminate apices ; tarsi with normal imbrications ; F. T. C. 3, 3, 3. Wing venation normal. Nymphs with hind tibiae smooth.

The genus is characterised by capitate hairs on the body and antennae together with the finger-like projections on a. s. I.

Distribution : India ; Japan ; Nepal ; Pakistan and Taiwan.

98. *Matsumuraja capitophoroides* Hille Ris Lambers

(Fig. 213)

1966. *Matsumuraja capitophoroides* Hille Ris Lambers, *Tijdsch. Ent.*, **109** (8) : 215.1969. *Matsumuraja capitophoroides* Hille Ris Lambers ; Chowdhuri, Basu, R. C., Chakrabarti and Raychaudhuri, D. N., *Oriental Ins.*, **3** (1) : 88.

Material examined : Many apterae, on wild Rose, Simla Hills, xii.1973, coll. L. K. Ghosh ; many apterae and nymphs on *Rubus macilantus* and unidentified plants of Gramineae, ix.1966. coll. A. N. Chowdhuri.

Biological notes : Yellow to light brown aphids were found to infest the undersurface of leaves of the host-plants. No attendant ant was noticed.

Remarks : The material varies from the description provided by Hille Ris Lambers (1966) in possessing sometimes 3 pairs of caudal hairs instead of usual 2 pairs. When 3 pairs of caudal hairs are found, the basal pair is smaller than the remaining 2 pairs.

Distribution : India : Arunachal Pradesh, Himachal Pradesh, Manipur, Meghalaya, Sikkim, Uttar Pradesh ; Nepal and Pakistan.

XLI Genus *Micromyzodium* David1958. *Micromyzodium* David, *Indian J. Ent.*, **20** (3) : 175.

Type-species : *Micromyzodium filicium* David, 1958.

Head warty to spinulose on both surfaces, sclerotic, completely dark with well-developed, parallel-sided to diverging lateral frontal tubercles in apterae, in alatae spinules more reduced ; dorsal cephalic hairs thick with blunt or spatulate apices, nearly as long as ventral ones. Antennae 6-segmented, longer than body, basal segments dark and scabrous, each with 4 blunt to spatulate hairs, shorter than those on vertex ; a. s. II with a few warts at base on outer surface ; a. s. III and IV pale at base and pigmented at distal ends ; apterae without secondary rhinaria, alatae with secondary rhinaria on a. s. III only ; flagellar hairs short and pointed ; p. t. about 4.50-7.0 times as long as base of a. s. VI. Rostrum long ; u. r. s. longer than h. t. 2, with 6 secondary hairs. Thoracic tergites locally spinulose laterally and rugose all over. Midthoracic furca sessile. Abdominal tergite smooth up to segment 6 which is uniformly dark brown, each of segments 7 and 8 spinulose and with a dark transverse band ; dorsal hairs very long and thick on strongly raised sockets with bluntish to spatulate apices, longest hair on anterior tergites being about 3.0-4.0 times as long as b. d. III, 8th tergite with 4-6 hairs, in alatae these hairs like those in apterae but slightly shorter ; abdominal tergum in alatae with spinopleural band on each segment and with membranous intersegmental portions, marginal

sclerites well developed, small broken patches present between marginal sclerites and bands on dorsum. Siphunculi long, cylindrical, imbricated, with 2-3 rows of connecting striae near flange, about 0.17-0.25 times as long as body. Cauda pale, elongate, triangular and acute, about 0.50 times as long as siphunculi, with 5-7 long hairs. Subanal plate oval on posterior margin. Subgenital plate with 8 hairs in two rows on posterior margin and only 2 hairs anteriorly, all hairs being thick with blunt apices. Abdominal and thoracic venter strongly spinulose; ventral abdominal hairs shorter and finer than dorsal ones; stigmal plates deeply pigmented. Coxae and trochanter, fore-and midfemora with spinules, those on femora restricted to basal 0.50 portion, otherwise femora and tibiae smooth; femoral hairs short with blunt apices, tibial hairs partly with blunt apices and partly with acuminate apices; F. T. C. 3, 3, 3. Wing venation normal.

David (1958) while erecting the genus *Micromyzodium* for accommodating the species *M. filicium*, discussed the affinity of the genus with *Idiopterus* Davis and *Micromyzus* van der Goot.

The members of the genus are apparently restricted to South-East Asia.

Distribution : India and Japan.

Key to the species of Micromyzodium David

Apterae viviparae :

- | | |
|--|----------------------------|
| Siphunculi uniformly dark; dorsal hairs short (55μ);
on <i>Strobilanthes</i> ... | <i>strobilanthes</i> Ghosh |
| — Siphunculi dark only at base and apex, rest paler;
dorsal hairs long (78μ - 91μ); on <i>Asplenium</i> ... | <i>filicium</i> David |

99. *Micromyzodium filicium* David

1958. *Micromyzodium filicium* David, *Indian J. Ent.*, **20** (3) : 176.

1972. *Micromyzodium filicium* David; Ghosh, L. K., *Oriental Ins.*, **6** (2) : 172.

Material examined : 4 apterae, on *Geranium lucidum*, Simla, 6.i.1970; 2 apterae, on *Geranium lucidum*, Simla Hills, 12.xii.1973; 2 apterae, on *Oxalis latifolia*, Simla, 6.i.1970, coll. L. K. Ghosh.

Biological notes : Brownish to black aphids were collected from the undersurface of leaves of the host-plants.

Distribution : India : Himachal Pradesh, Meghalaya, South India and Uttar Pradesh.

100. *Micromyzodium strobilanthes* Ghosh

1970. *Micromyzodium strobilanthes* Ghosh, L. K., *Oriental Ins.*, **4** (4) : 435.

Material examined : Many apterae, on *Strobilanthes dalhousianus*, Simla, 7.i.1970, coll. L. K. Ghosh.

Distribution : India : Himachal Pradesh and Uttar Pradesh.

XLII. Genus *Micromyzus* van der Goot

1971. *Micromyzus* van der Goot, *Contrib. Faune Indes Neerl.*, 1 (3) : 52.

Type-species : *Micromyzus nigrum* van der Goot, 1917.

Head densely spinulose on both surfaces ; lateral frontal tubercles low but distinct with inner margin slightly diverging and inner apices rounded and scabrous ; frons usually straight but sometimes slightly convex ; both dorsal and ventral cephalic hairs short with slightly incrassate to swollen apices and of more or less equal length. Antennae 6-segmented, shorter to longer than body ; a.s. I and II scabrous particularly on inner aspect and granular ; flagellum distinctly imbricated ; apterae usually without secondary rhinaria, alatae always with protuberant round secondary rhinaria on a.s. III, sometimes also on a.s. IV and V ; primary rhinaria ciliated ; flagellar hairs like those on dorsum of head ; p.t. much longer than base of a.s. VI. Rostrum extends up to hindcoxae ; u.r.s. shorter to longer than h.t. 2 and with 2-5 secondary hairs. Prothorax distinct, but segmentation between rest of thoracic segments and first seven abdominal segments in apterae obsolete, midthoracic furca sessile. Abdominal dorsum in apterae pale or pigmented, rugose or nearly smooth and always with polygonal reticular pattern, in alatae smooth and without any central pigmented patch ; dorsal abdominal hairs short, up to about as long as b.d. III ; 8th tergite usually spinulose. Siphunculi about 0.15-0.30 times as long as body, cylindrical with distal 0.30 portion slightly swollen and then attenuating up to narrow subapical incision, bearing 2-3 rows of transverse striae, with apical flange which is narrow but distinct, faintly to distinctly imbricated. Cauda dusky to dark with a swollen base and blunt rounded apex, much shorter than to at most 0.50 times as long as siphunculi and bearing 5-12 hairs. Subgenital plate with posterior margin broadly rounded, bearing 8-12 short blunt hairs ; anterior pair of hairs usually short with blunt apices, sometimes rarely longer with subacute to acuminate apices. Spiracular aperture reniform ; spiracles on segments 5 and 6 closer than those on segments 6 and 7. Femora ventrally distinctly scabrous, dorsally with either normal imbrication or distinct spinules in transverse rows ; tibiae smooth ; hairs on legs short and blunt except those on apical 0.50 portion which are stiff with subacute to acuminate apices ; tarsi with normal imbrications ; first tarsal segment of fore- and mid-legs with 4 or 3 and of hindleg with 3 or 2 hairs. Wing venation normal ; veins strongly bordered brown. Nymphs with hind tibiae smooth.

Eastop (1955, 1958, 1961) has dealt with African species. Again, Eastop (1966) has given an account of Australian species. Japanese species have been discussed by Takahashi (1963) and Miyazaki (1971).

Distribution : Australia ; Ceylon ; India ; Indonesia and Japan.

101. **Micromyzus nigrum** van der Goot1917. *Micromyzus nigrum* van der Goot, *Contrib. Faune Indes Neerl.*, 1 (3) : 53.1973. *Micromyzus nigrum* van der Goot ; Kumar, *Oriental Ins.*, 7 (1) : 11.*Material examined* : 1 alata, on Y P. T. ; Simla, coll. R. Kumar.*Distribution* : India : Himachal Pradesh, Sikkim, West Bengal ; and Indonesia.XLIII. Genus **Myzaphis** van der Goot1913. *Myzaphis* van der Goot, *Tijdschr. Ent.*, 56 : 96.Type-species : *Aphis rosarum* Kaltenbach, 1843.

Body elliptical. Head in apterae distinctly rugose, with a median subquadrate to round process, in alatae smooth and without such distinct process ; lateral frontal tubercles poorly developed. Antennae 5-to 6-segmented ; p.t. as long as to longer than (1.0-2.0 times) last antennal segment ; apterae without secondary rhinaria, alatae with secondary rhinaria on a.s. III only. Rostrum reaches midcoxae ; u.r.s. shorter than h.t. 2, with 2 secondary hairs. Midthoracic furca sessile. Abdominal dorsum in apterae with small islet-like structure and in alatae spinulose on segmentally arranged spinopleural and marginal patches. Dorsal hairs small with bluntish to incrassate apices. Siphunculi cylindrical with swelling on apical half, longer (about 1.50 times) than cauda. F. T. C. 5, 5, 5. Wing venation normal. Hindtibiae of nymphs smooth.

Distribution : America ; Europe ; India ; Japan ; Korea ; Middle East ; New Zealand ; and Taiwan.*Key to the species of the genus Myzaphis* van der Goot

Head with a rectangular median process (Fig. 214) ; hairs on 8th abdominal tergite about 0.25 times as long as b. d. III	...	<i>rosarum</i> (Kaltenbach)
Median process on head more rounded ; hairs on 8th abdominal tergite long, about 0.6-0.7 times as long as b. d. III	...	<i>turanica</i> Nevsky

102. **Myzaphis rosarum** (Kaltenbach)
(Fig. 214)1843. *Aphis rosarum* Kaltenbach, *Mon. der Fam. Pflanz.*, : 101.1970. *Myzaphis rosarum* (Kaltenbach) ; David, Rajasingh and Narayanan, *Oriental Ins.*, 4 (4) : 398.*Material examined* : 2 apterae, on *Rosa* sp. Kufri, 26.xi.1969, coll. K. Narayanan ; may apterae and nymphs, on *Rosa* sp., Simla Hills, 6.i.1970, coll. L. K. Ghosh.

Biological notes : Greenish aphids were found to infest the young tender shoots of the host-plant.

Distribution : India : Himachal Pradesh, Uttar Pradesh ; America ; Europe and New Zealand

103. *Myzaphis turanica* Nevsky

1929. *Myzaphis turanica* Nevsky, *Bull. Plant. Protect. Sta. Uzbekistan* : 16.

1969. *Myzaphis turanica* Nevsky ; Ghosh, L. K., *Bull. Ent.*, 10 (2) : 108.

Material examined : Many apterae, on *Rosa* sp., Simla, 29.v.1969 ; 1 aptera, on *Rosa* sp., Kufri, 26.xi.1969, coll. K. Narayanan ; 5 apterae oviparae and a few nymphs, on undet. host, Simla Hills, xii.1973, coll. L. K. Ghosh.

Apterous oviparous female : Body pale brown, elongate, about 1.41-1.80 mm long with 0.66-1.05 mm as its maximum width. Head brown and slightly wrinkled ; dorsal cephalic hairs about 24μ long. Antennae 6-segmented, pale brown up to a. s. III, rest darker, 0.41-0.50 times as long as body ; segment III very sparsely imbricated, rest of flagellum gradually more distinctly imbricated towards apex ; p. t. 1.1-1.4 times as long as base VI almost equal to a. s. V ; flagellar hairs short and blunt, longest one on a. s. III being about 0.4 times as long as b. d. III. Rostrum reaches midcoxae ; u. r. s. 0.7-0.8 times as long as h. t. 2 and bears 2 secondary hairs. Abdominal dorsum pale ; hairs on dorsum of abdomen like flagellar hairs, longest hair on anterior tergites about 0.6 times as long as b. d. III. Abdomen pale, sometimes with islet-like structure near base of siphunculi ; 8th tergite with 4 hairs, these about 0.75 times as long as b. d. III. Egg (seen in one specimen only) ovoid, 0.54 mm long with 0.45 mm as its middle diameter. Siphunculi small, swollen apicad, 0.15-0.18 times as long as body, 1.7-1.9 times as long as cauda, dusky, with 1-2 striae just before flange. Cauda brown, slightly conical, bearing 6 hairs. Subgenital plate brown with numerous small hairs. Legs pale yellow except apices of tarsi and hindtibiae which are darker ; hindtibiae swollen, about 7-8 times as long as maximum diameter at the middle with sparse hairs which are 9μ - 22μ long, the longest one about 0.35 times as long as maximum width of hindtibiae and with 69-76 small round pseudosensoria distributed along the entire length ; F. T. C. 5, 5, 5.

Measurement (in mm) of one specimen : Length of body 1.65 ; width of body 0.90 ; antenna 0.75 ; a. s. III 0.22, IV 0.10, V 0.10, VI (0.09+0.11) ; u. r. s. 0.07 ; h. t. 2 0.10 ; siphunculus 0.27 ; cauda 0.15.

Remarks : So far, three species of *Myzaphis* van der Goot infesting *Rosa* spp. are known from India, viz., *M. avariola* David, Rajasingh and Narayanan, *M. rosarum* Kaltenbach and *M. turanica* Nevsky. However,

sexuale of *Myzaphis* species in India was unknown. The oviparous female of *M. turanica* is described for the first time from India.

Distribution : India : Himachal Pradesh, Uttar Pradesh ; Iran ; Palestine and Turkestan.

XLIV. Genus *Myzus* Passerini

(Fig. 10)

1860. *Myzus* Passerini, *Gli. Afidi* : 27.

1971. *Myzus* Passerini ; Miyazaki, *Ins. matsum.*, 34 (1) : 116.

Type-species : *Aphis cerasi* Fabricius.

Body oval to elongate. Head (Fig. 17) dorsally spinulose or warty either all over or only laterally, ventrally also spinulose, with hardly or weakly developed median frontal prominence ; lateral frontal tubercles distinct with inner margins converging to slightly diverging ; dorsal cephalic hairs usually short, with acuminate to 'myzine' type of apices, shorter to longer than b.d. III. Antennae 6-segmented, flagellum more distinctly imbricated from base towards apex ; apterae without secondary rhinaria ; alatae always with small to large, somewhat protuberant secondary rhinaria ; p.t. slightly much longer than base of a.s. VI. Rostrum normal reaching midcoxae, u.r.s. shorter to much longer than h.t.2 with blunt and obtuse or normal apex. Midthoracic furca with joined arms and usually with a short stalk. Abdominal dorsum rugose and sparsely to strongly spinulose, in apterae pale to entirely sclerotic, in alatae with a dark large central patch besides scattered sclerotic marginal patches ; dorsal hairs short with 'myzine' type of apices as in antennal hairs. Siphunculi cylindrical or tapering, slightly to distinctly clavate or atleast swollen on distal 0.50 portion, smooth to strongly imbricated, without or with a weakly developed flange at tip, slightly shorter to distinctly longer than cauda and about 0.08-0.25 times as long as body. Cauda (Fig. 106) with or without a median constriction and usually with 4 long and fine hairs. Subanal plate broadly rounded. Femora sometimes with dense spinules besides normal imbrications ; tibiae smooth ; F.T.C. 3,3,3 or 3,3,2. Hindtibiae of nymphs sometimes strongly spinulose. Wing venation normal.

Stroyan (1954), Takahashi (1965), Eastop (1966) are of the opinion that *Nectarosiphon*, *Neotoxoptera*, *Prunomyzus*, *Sciamyzus*, *Tubaphis* should be considered as subgenera of *Myzus*, while Miyazaki (1971) has not gone for subgeneric division. However, Miyazaki (*op. cit.*) divided the Japanese species into two major groups, *viz.*, one possessing spinulose hind tibiae in nymphs and the other lacking such.

Basu, R. C. and Raychaudhuri, D. N. (1976) have dealt with the Indian species of *Myzus* and following Miyazaki (*op. cit.*) the genus *Myzus* has not been divided into subgenera.

Distribution : Cosmopolitan.

Key to the species of the genus Myzus Passerini

- | | | | |
|---------|---|-----|---|
| 1 (2) | Abdominal dorsum completely black ; u. r. s. distinctly shorter than h. t. 2 and with obtuse apex ; siphunculi dark brown to black and without a distinct flange | ... | <i>obtusirostris</i> David, Narayanan and Rajasingh |
| 2 (1) | Abdominal dorsum never completely black but may be with acattered dark patches ; u. r. s. as long as to distinctly longer than h. t. 2 and never with obtuse apex | ... | 3 |
| 3 (4) | Dorsal abdominal hairs about 30 μ long ; both siphunculi and cauda pale ; abdominal dorsum rugose ; venter with transverse rows of spinulose striae ; hindtibiae of nymphs lacking spinules | ... | <i>mumecola</i> Matsumura |
| 4 (3) | Dorsal abdominal hairs short with 'myzine' type of apices | ... | 5 |
| 5 (8) | Siphunculi strongly clavate, swollen portion being about 1.3-1.5 times as wide as basal width | ... | 6 |
| 6 (7) | Antennae distinctly shorter than body ; siphunculi about 0.20-0.24 times as long as body ; distance between 6th and 7th spiracles distinctly more than that between 5th and 6th | ... | <i>persicae</i> (Sulzer) |
| 7 (6) | Antennae as long as or a little longer than body ; siphunculi about 0.15 times as long as body ; distance between 6th and 7th spiracles distinctly less than that between 5th and 6th | ... | <i>ascalonicus</i> Doncaster |
| 8 (5) | Siphunculi weakly clavate, swollen portion being about 1.1-1.2 times as wide as basal width | ... | 9 |
| 9 (10) | Siphunculi as long as width of head across outer margins of eyes ; siphunculi pale with apex dusky ; antennae roughly imbricated ; hindtibiae of nymphs with sparse spinules | ... | <i>dycei</i> Carver |
| 10 (9) | Siphunculi shorter than width of head across outer margins of eyes ; hindtibiae of nymphs strongly spinulose | ... | 11 |
| 11 (12) | Dorsum of head uniformly warty ; siphunculi strongly imbricated ; p. t. shorter than a. s. III as well as siphunculi | ... | <i>cerasi</i> (Fabricius) |
| 12 (11) | Dorsum of head spinulose only laterally ; siphunculi weakly imbricated ; dorsum of abdomen pale but usually with segmentally arranged dark patches | ... | <i>ornatus</i> Laing |

104. *Myzus ascalonicus* Doncaster

1946. *Myzus ascalonicus* Doncaster, *Proc. R. Ent. Soc. Lond.* (B) **15** : 27.

1969. *Myzus* sp., Chowdhuri, Basu, R. C., Chakrabarti and Raychaudhuri, D. N., *Oriental Ins.*, **3** (1) : 88.

Material examined : 4 apterae and 3 nymphs, on *Fragaria* sp., Phagli, 14.xii.1973, coll. L. K. Ghosh ; 5 apterae and a few nymphs, on *Plectranthus coetsa*, Simla, ix.1966, coll. A. N. Chowdhuri.

Distribution : India : Himachal Pradesh, Meghalaya ; America ; Australia ; Canada ; Europe ; Far East ; Japan and New Zealand.

105. *Myzus cerasi* (Fabricius)

1775. *Aphis cerasi* Fabricius, *Syst. Ent.* : 734.

1970. *Myzus cerasi* (Fabricius) ; Chakrabarti, Ghosh, A. K. and Chowdhuri, *Oriental Ins.*, **4** (4) : 449.

1968. *Myzus* (*Prunomyzus*) sp. ; Chowdhuri, Basu, R. C. Chakrabarti and Raychaudhuri, *Sci. Cult.*, **34** : 134.

Material examined : 4 apterae and a few nymphs, on undet. host, Mashobra, 20.ix.1969, coll. A. N. Chowdhuri ; 2 apterae, on *Rubia cordifolia*, Simla, 8.i.1970, many apterae, on undet. Compositae, Summer Hills, 14.xii.1973, coll. L. K. Ghosh.

Distribution : India : Himachal Pradesh, Meghalaya, Sikkim, Uttar Pradesh, West Bengal and virtually cosmopolitan.

106. *Myzus dycei* Carver

1961. *Myzus dycei* Carver, *Proc. R. Ent. Soc. Lon.* (B), **33** : 69.

1971. *Myzus dycei* Carver ; David, Narayanan and Rajasingh, *Madras agric. J.*, **38** (5) : 374.

Material examined : 6 apterae, on *Urtica porviflora*, Simla, 7.i.1970, coll. L. K. Ghosh.

Distribution : India : Arunachal Pradesh, Himachal Pradesh, Meghalaya, Sikkim, West Bengal ; Australia ; China ; Japan and Nepal.

107. *Myzus mumecola* Matsumura

1971. *Myzus mumecola* Matsumura, *J. Coll. Agr. Tohoku Imp. Univ.*, **7** (6) : 399.

1970. *Myzus mumecola* Matsumura ; Chakrabarti, Ghosh, A. K. and Chowdhuri, *Oriental Ins.*, **4** (4) : 449.

Material examined : 3 apterae, on *Prunus cornula*, Simla, 12.v.1967, coll. A. N. Chowdhuri.

Distribution : India : Himachal Pradesh ; and Japan.

108. *Myzus obtusirostris* David, Narayanan and Rajasingh

1971. *Myzus obtusirostris* David, Narayanan and Rajasingh, *Oriental Ins.*, 5 (4) : 563.

Distribution : India : Himachal Pradesh, Manipur, Meghalaya and Uttar Pradesh.

109. *Myzus ornatus* Laing

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

1969. *Myzus ornatus* Laing ; Bindra and Sekhon, *Bull. Ent.*, 10 (1) : 104.

Material examined : 2 apterae, on *Rumex nepalensis* ; Simla, 6.i.1969 ; 7 apterae, on *Lactuca sativa*, Simla Hills, 2.vi.1969 ; 4 apterae and nymphs on *Lindenbergia* sp., Simla, 6.i.1970 ; 5 apterae, on *Rumex nepalensis* ; Simla, 6.i.1970 ; many apterae and nymphs, on *Polygonum* sp., Simla, i.1970 ; 3 alatae and 1 aptera, on undet plant, Simla, i.1970 ; many apterae and nymphs, on *Viola* sp., Phagli, 15.xii.1973 ; 2 apterae, 1 nymph and 1 alata, on wild Holly hock, Simla Hills, xii.1973 ; 2 apterous nymphs, on undet Rosaceae, Simla Hills, xii.1973 ; many apterae and nymphs, on grass, Narkanda, 27.ix.1974, all L. K. Ghosh coll.

Biological notes : The aphids were collected from young leaves and tender shoots of the host-plants.

Distribution : India : all over ; and virtually cosmopolitan.

110. *Myzus persicae* (Sulzer)

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

1969. *Myzus persicae* (Sulzer) ; Chowdhuri, Basu, R. C., and Raychaudhuri, D. N., *Sci. Cult.*, 35 :

Material examined : Many apterae and nymphs, on *Brassica* sp., Solan, 6.i.1970, coll. A. P. Kapur ; many apterae, on *Datura* sp., Simla Hills, xii.1973 ; many apterae, on *Cymbalaria muralis*, Simla Hills, 2.iii.1969, 4 apterae, on *Cardamine hirsuta*, Mashobra, 2.iii.1969 ; 5 apterae and a few nymphs, on *Lindenbergia* sp., Phagli, 2.iii.1969, many apterae, on *Polygonum* sp., Mashobra, December, 1973 ; 6 alatae, 'on Snow' December, 1973, all L. K. Ghosh coll.

Biological notes : Light green or pale brown or pinkish aphids were found to infest the undersurface of leaves and apical tender shoots.

Distribution : India : all over ; and virtually cosmopolitan.

XLV. Genus *Nasonovia* Mordvilko

1914. *Nasonovia* Mordvilko, *Fauna d-I-Pussie, Ins. Hemipt.*, vol. I, Livr. 1 : 71-72.

Type-species : *Nasonovia ribicota* Kaltenbach, 1928.

Body oval, more or less slender. Head (Fig. 173A) with frontal tubercle moderately developed, short, a little rounded at inner apices, with inner margins diverging and smooth ; median tubercle well developed. Antennae (fig. 173B) 6-segmented, always longer than the body, smooth ; a. s. III in apterae with 10-20 small and large protruding secondary rhinaria, portion occupied by rhinaria somewhat darker than the part without rhinaria ; in alatae, a. s. III with 30-40 small round secondary rhinaria distributed over entire length except the very base ; p. t. much longer than a. s. III and about 8-9 times as long as base VI ; flagellar hairs usually about as long as the b. d. III, often thick and stiff with slightly incrassate apices. Eyes with ocular tubercle (Fig. 173A). Rostrum long, at least reaching the hind coxae ; apical segment (Fig. 173C) rather long and slender, longer than the second joint of hind tarsi, with 10-24 secondary hairs, the shortest pair of which is placed a little baseward ; spinal tubercle on vertex apparently absent. Tergum in apterae completely sclerotic and smooth, the segmentation is obsolete ; in alatae, the tergum of abdomen is membraneous, with a blackish sclerotic pattern always consisting of well developed marginal sclerites on segments II-IV. Dorsal abdominal hairs with spatulate apices ; tergite VIII with 4 hairs. Siphunculi (Fig. 173D.) in apterae subcylindrical, rather thick, faintly imbricated, usually with an annular incision just below well developed flange and in this incision with some very distinct transverse striae sometimes forming a strongly transverse hexagonal reticulation, concolourous with the disc of abdomen from nearly colourless with the very apices black, about 0.15-0.20 times as long as the body ; in alatae, siphunculi pigmented, paler towards base. Cauda (Fig. 173E) rather dark, elongate with 6-10 (usually 7) hairs. Subgenital plate with a large distance between the middle pair. Legs pale brown except darker distal half of femora and apices of tibiae and tarsi. F. T. C. 3, 3, 3. Media of forewing twice branched.

Distribution : The genus is of Palaearctic origin.

Remark : The genus is allied to *Neonasonovia* H. R. L. but can be recognised by its siphunculi which are not swollen.

111. *Nasonovia* (*Neokakimia*) *rostrata* David and Hameed

(Figs. 173, 215, 216)

1974. *Nasonovia rostrata* David and Hameed, *Oriental Ins.*, 8 (4) : 503.

1980. *Pilorostris simlaensis* Raychaudhuri, D. N., Ghosh, L. K. and Das, S. K., *Ins. matsum.*, n. s., 20 : 29.

Material examined : 4 apterae, on *Strobilanthes dalhousiensis*, Mashobra, 17.x.1974, coll. L. K. Ghosh ; 8 apterae and 9 alatae, on *Conyza stricta*, Kufri, 26.x.1976, coll. M. R. G. & P. K. M.

Biological notes : The greenish aphids were collected from the undersurface of the leaf of the host-plant. The aphids were not gregarious in habit and not attended by ants.

Remarks : The species is characterised by its having median frontal prominence, much too hairy ultimate rostral segment and tuberculate secondary rhinaria with protuberant membranes.

Distribution : India : N. W. Himalaya.

XLVI. Genus *Neoacyrthosiphon* Tao

1963. *Neoacyrthosiphon* Tao, *Plant. Prot. Bull. Taiwan*, 5 (3) : 189.

Type-species ; *Acyrthosiphon taiheisanum* Takahashi, 1935.

Body somewhat oval. Head smooth with diverging and low lateral frontal tubercles and a median frontal prominence ; dorsal cephalic hairs blunt, with subacute to slightly incrassate apices. Antennae 6-segmented, shorter than body, in apterae pale with terminal segment dark and alatae uniformly dark ; a.s. III faintly imbricated, rest of flagellum progressively more distinctly imbricated ; in apterae secondary rhinaria absent, in alatae such rhinaria present on a.s. III and IV ; flagellar hairs short to moderately long with bluntish apices ; p.t. longer than (about 2-3.5 times) base of a.s. VI. Rostrum usually reaching hindcoxae ; u.r.s. a little shorter to longer (about 1.7 times) than h.t. 2, with 2-6 secondary hairs. Midthoracic furca sessile. Abdominal dorsum in apterae nearly papillate, pale to dusky, in alatae, dorsal hairs like those on dorsum of head ; 8th tergite with 4 hairs. Siphunculi subcylindrical, pale to pale brown, imbricated with a few interconnecting spinulose striae before poorly developed flange at tip, about 0.1-0.2 times as long as body, about 2.0-2.5 times as long as cauda. Cauda pale to dusky with blunt apex, and with long and fine hairs (5-6). Legs yellowish, smooth except very apex of tibiae where spinules may sometimes occur, second tarsal segments and sometimes also first one with spinulose imbrications ; F.T.C. 3,3,3. Wing venation normal.

The genus can be easily separated from its nearest one *Metopolophium* which has no spinules on tarsi, fuscous wing veins and by the presence of spinulose imbrications or warts on the femora.

Miyazaki (1971) has discussed the affinity of the genus with its related ones.

Distribution : India ; Japan and Taiwan.

112. *Neoacyrthosiphon indicum* Ghosh, Verma and Raychaudhuri

1976. *Neoacyrthosiphon indicum* Ghosh, L. K., Verma and Raychaudhuri, D. N., *Oriental Ins.*, 10 (4) : 527.

Material examined : 3 apterae, 1 alata, on *Rhododendron* sp., Simla, 4.v.1968, coll. K. D. Verma.

Distribution : India : Himachal Pradesh.

XLVII. Genus *Neomasonaphis* Ghosh and Raychaudhuri

1972. *Neomasonaphis* Ghosh, A. K. and Raychaudhuri, D. N., *Oriental Ins.*, 6 : 377.

Type-species : *Masonaphis anaphilidis* Basu, 1964.

Body rather pale, elongate. Head smooth to slightly wrinkled, with strongly diverging smooth lateral frontal tubercles and low but distinct median frontal prominence; antennae 6-segmented, flagellum slightly to distinctly imbricated; apterae without or with a few round secondary rhinaria near base of segment III, alatae with numerous such rhinaria on a. s. III and IV, p. t. longer than base of segment VI. Ultimate rostral segment long and slender with many secondary hairs. Abdominal dorsum in apterae pale and smooth, with pale but distinctly scabrous post siphuncular sclerite, alatae with spinopleural sclerotic pattern on abdomen; dorsal abdominal hairs with incrassate to capitate apices, these sometimes arising from distinct tuberculate bases; siphunculi in apterae without or with a few reticulations, presence of spinules on apices of tibiae and also on both tarsal segments, cauda dusky, short, nearly subpentagonal; always much shorter than siphunculi; subgenital plate small, with 8-10 long hairs. Legs rather long and slender, brownish with the tarsi darker; Wing venation normal; veins thick and bordered brown.

This genus has been used in the sense of Eastop and Hille Ris lammers (1976). It is characterised by the absence of secondary rhinaria on antennal segments in apterae.

Distribution : Indo Japan and Taiwan.

113. *Neomasonaphis rhododendris* Chakrabarti *et al.*

1983. *Neomasonaphis rhododendris* Chakrabarti, Mondal and Raha, *J. Linn. Soc., (Zool.)* 78 : 357.

Material examined : 1 aptera and 1 alata, on *Rhododendron* sp., Simla, 17.v.1979, coll. S. P. Maity.

Distribution : India : Himachal Pradesh.

XLVIII. Genus *Neomyzus* van der Goot

1915. *Neomyzus* van der Goot, *Beitr. Kennt. Blattlause* : 7.

Type-species : *Siphonophora circumflexa* Buckton, 1876.

Body rather elliptical. Head strongly spinulose with lateral frontal tubercles, median frontal prominence absent. Antennae 6-segmented, shorter

to longer than body ; a. s. I and II scabrous ; flagellar hairs inconspicuous with blunt to incrassate apices ; a. s. III in apterae usually without secondary rhinaria, in alatae secondary rhinaria present on a. s. III and sometimes also on IV ; p. t. 3.0-5.0 times as long as base VI. U. r. s. with 2-6 secondary hairs. Abdominal dorsum in apterae smooth or rugose, with a horseshoe-shaped patch, in alatae with a solid dorsal abdominal black patch over tergites 3-6 and with transverse pigmented bands on tergites 2, 7 and 8 ; dorsal hairs short and inconspicuous. Siphunculi cylindrical or clavate distally, longer than cauda bearing 4-7 hairs. Subgenital plate broadly oval, with 8-10 hairs on posterior margin and with 4 hairs anteriorly. Legs yellowish to brown ; F. T. C. 3, 3, 3 or 4, 4, 4. Hindtibiae of nymphs either smooth or distinctly spinulose. Wing venation normal.

Distribution : America ; Australia ; Europe ; India ; Japan ; Java and New Zealand.

114. *Neomyzus* (*Neomyzus*) *circumflexus* (Buckton)

1876. *Siphonophora circumflexa* Buckton, *Monogr. Br. Aphides*, 1 : 130.

1980. *Neomyzus* (*Neomyzus*) *circumflexus* ; Raychaudhuri, D. N. (ed.), *Aphids of Northeast India and Bhutan* : 229.

Material examined : 3 apterae and many nymphs, on *Dahlia* sp., Chail, 27.x.78 ; many apterae and nymphs, on undet host, Chail, 27.x.78, coll. M. R. G. and P. K. M.

Distribution : India : almost all over ; and virtually cosmopolitan.

XLIX. Genus *Nudisiphon* Chakrabarti and Bhattacharya

1982. *Nudisiphon* Chakrabarti and Bhattacharya, *Ann. Zool.*, 36 (28) : 539.

Type-species : *Nudisiphon chitinicauda* Chakrabarti and Bhattacharya, 1982.

Body broadly oval. Head without lateral frontal tubercles, dorsum convex, faintly scabrous with indistinct suture. Antennae shorter than body, 6-segmented, p. t. longer than base of a. s. VI ; primary rhinaria ciliated ; apterae without secondary rhinaria ; flagellar hairs 0.3-0.4 times as long as b.d. III. Rostrum reaches beyond the mid-coxae, u. r. s. about 0.5-0.6 times as long as h. t. 2 and with 2 secondary hairs. Eyes multifaceted, apparently without ocular tubercles ; mid thoracic furca jointed and sessile. Abdomen pale brown, abdominal tergum membraneous, dorsal abdominal hairs short and pointed. Siphunculi a little darker than abdomen, clavate apically, without flange, siphuncular pore oblique and placed inwardly. Cauda triangular, concolourous with siphunculi, apex chitinous, pointed and slightly curved laterad. Legs short. F. T. C. 2, 2, 2.

Distribution : India : Himachal Pradesh.

115. Nudisiphon chitinicauda Chakrabarti and Bhattacharya

1982. *Nudisiphon chitinicauda* Chakrabarti and Bhattacharya, *Ann. Zool.*, **36** (28) : 540.

Material examined : 1 aptera, on *Indigofera* (?) sp., Kufri, 13. v. 1979, coll. D. K. Bhattacharya.

Distribution : India : Himachal Pradesh.

L. Genus Raychaudhuriella Chakrabarti

1978. *Raychaudhuriella* Chakrabarti, *J. Linn. Soc. (Zool.)*, **62** : 355.

Type-species : *Raychaudhuriella myzaphoides* Chakrabarti, 1978.

Body somewhat elongate. Head with a median rectangular process, lateral frontal tubercles ill-developed, dorsum of head indistinctly corrugated, with incrassate to slightly knobbed hairs. Antennae 5-segmented, shorter than body ; p. t. shorter to a little longer than the base of a. s. V ; primary rhinaria ciliated ; apterae without secondary rhinaria, flagellar hairs short and sparse, with incrassate to knobbed apices. Rostrum reaches nearly mid coxae, u. r. s. with 2 secondary hairs. Eyes many-faceted with ocular tubercles. Dorsum of abdomen with a distinct supracaudal process having hairs at its tip. Siphunculi elongate, narrow at middle and broadest at base, without flange ; siphuncular pore obliterated. Cauda elongated, pale, with 5 long hairs. Subgenital plate with only 4 hairs on posterior margin. Legs pale, femora smooth, femoral hairs fine, sparse ; F. T. C. 3, 3, 3.

Remark : It is a monotypic genus.

Distribution : India : Himachal Pradesh.

116. Raychaudhuriella myzaphoides Chakrabarti

1978. *Raychaudhuriella myzaphoides* Chakrabarti, *J. Linn. Soc. (Zool.)*, **62** : 357.

Material examined : 2 apterae, on *Salix* sp., Manali, 1. i. 1973, coll. S. Chakrabarti.

Distribution : India : Himachal Pradesh.

LI. Genus Rhopalosiphoninus Baker

(Fig. 175)

1920. *Rhopalosiphoninus* Baker, *U. S. Dept. Agric. Bull.*, **826** : 58.

Type-species : *Amphorophora latysiphon* Davidson, 1912.

Body broadly oval. Head smooth with rough and spinulose lateral frontal tubercles, dorsal cephalic hairs with slightly incrassate to fine apices. Antennae 6-segmented, shorter to longer than body, basal two segments

scabrous with spinules, a. s. III either completely smooth or imbricated only basally, rest of flagellum imbricated; flagellar hairs like dorsal cephalic hairs; apterae with or without secondary rhinaria, these when present may be near basal part of a. s. III or on its distal part, a. s. IV and V rarely with such rhinaria, alatae with secondary rhinaria on a. s. III, sometime also on a. s. IV, very rarely on a. s. V, longer than base of a. s. VI. Ultimate rostral segment about as long as to longer than h. t. 2, with 2-4 secondary hairs. Midthoracic furca with narrow base. Abdominal dorsum in apterae pale, smooth or wrinkled or sometimes with polygonal spinular reticulation, in alatae usually with spino-pleural patches which may sometimes fuse to form a large central patch, dorsal abdominal hairs rather short with blunt to slightly incrassate apices. Siphunculi (Fig. 175) bagpipe-like with hexagonal reticulation just above thick apical flange, about 0.2-0.33 times as long as body. Cauda (Fig. 175) short, triangular, with 4-6 hairs. Femora smooth or sometimes scabrous; tibiae smooth; F. T. C. 3, 3, 3 or 3, 3, 2. Wing venation normal.

Hille Ris Lambers (1953) has discussed the genus in detail. This genus has been used here in the sense of Hille Ris Lambers (*op. cit.*).

Distribution : America ; Europe ; India ; Japan and Nepal.

Key to the species of the genus Rhopalosiphoninus Baker

Apterae viviparae :

Secondary rhinaria on a. s. III confined to distal half of the segment, such rhinaria present also on a. s. IV and V ; p. t. shorter to longer than a. s. III and 3.4-4.0 times as long as base of a. s. VI ; 8th tergite with 6 hairs ; siphunculi 5.3-6.6 times as long as its minimum diameter near base ; dorsum of abdomen smooth ; u. r. s. with more than 2 secondary hairs ...

sensoriatus Chakrabarti

— Secondary rhinaria on a. s. III absent ; p. t. always shorter than a. s. III and 4.6-5.1 times as long as base of a. s. VI ; 8th tergite usually with 4 hairs ; siphunculi 2.8-3.5 times as long as its minimum diameter near base ; dorsum of abdomen with spinular reticulation ; only 2 secondary hairs on u. r. s. (Fig. 174) ...

indicus sp. nov.

Alate viviparae :

Secondary rhinaria present on a. s. IV ; flagellar hairs 78μ - 84μ long and 2.1 times as long as b. d. III ; maximum diameter of siphunculi 5-6 times as wide as its basal minimum diameter ...

longisetosus Chakrabarti and Ghosh

- Secondary rhinaria absent on a.s. IV ; flagellar hairs up to about 35μ long and hardly 1.5 times as long as b.d. III ; maximum diameter of siphunculi 3.0-3.5 times as wide as its basal minimum diameter

...

latysiphon (Davidson)

117. *Rhopalosiphoninus indicus* sp. nov.

(Figs. 174, 213)

Apterous viviparous female : Body oval, about 1.44-1.89 mm long with 0.69-1.02 mm as maximum width. Head brown with median frontal prominence and distinct spinulose, lateral frontal tubercles ; dorsal cephalic hairs with incrassate apices, about 65μ - 74μ long and about 2.1-2.4 times as long as b.d. III. Antennae (Fig. 174A) brown except a.s. V and VI which are darker, about 1.1-1.2 times as long as body ; secondary rhinaria absent, a.s. I and II spinuled, a.s. III smooth except very base which is with faint spinular imbrications, a.s. IV almost smooth, rest of flagellum progressively imbricated, p.t. about 4.6-5.1 times as long as base of a.s. VI and a little longer than a.s. III ; flagellar hairs also with incrassate apices, longest one about 30μ - 39μ long and about as long as or a little longer than b.d. III. Rostrum reaches base of hindcoxae ; u.r.s. about as long as or a little longer than h.t.2 and with a pair of fine secondary hairs (Fig. 174B). Midthoracic furca with a narrow base and a short stalk. Abdominal dorsum slightly darker than head and with spinular reticulation, hairs on dorsum of abdomen long and also with incrassate apices, those on anterior tergites 23μ - 28μ long and about 0.7-0.8 times as long as b.d. III, the two hairs on 7th tergite up to about 36μ - 39μ and about 1.2-1.3 times as long as b.d. III, 8th tergite with 4 hairs up to about 39μ long. Siphunculi (Fig. 174C) brown, pitcher-shaped, with basal 0.30-0.34 and apical 0.1 portion cylindrical, about 0.26-0.32 times as long as body and about 3.2-3.8 times as long as cauda, basal cylindrical portion wrinkled and apical cylindrical portion with a few rows of transversely elongated cells before well-developed flange at tip, the maximum diameter of siphunculi being about 2.8-3.5 times as wide as minimum diameter of basal stem. Cauda (Fig. 174D) with somewhat bulbous base and nearly rounded apex, with 5 long hairs including the preapical one. Legs brown, apical 0.5-0.6 portion of femora with fine spinulose striae ventrally on distal half (Fig. 174E) ; tibiae smooth ; F.T.C, 3,3,2.

Measurements (in mm) of the holotype : Length of body 1.56 ; width of body 0.75 ; antenna 1.77 ; a.s. III 0.53, IV 0.37, V 0.29, VI (0.11+0.54) ; u.r.s. 0.09 ; h.t.2 0.07 ; siphunculus 0.43 ; cauda 0.13.

Material examined : Holotype, apterous viviparous female, Tuttikandi, 23.ix.1969, on roots of Maize, coll. O. B. Chhotani ; paratypes, 5 apterous viviparous females, same data as for holotype.

Note : Reexamination of the material recorded as *Rhopalosiphoninus latysiphon* (Davidson) by Ghosh L. K. (1972) refers to *R. indicus* sp. nov.

Remarks : Following the publication of Hille Ris Lambers (1953) it appears that the material shows closeness with *R. latysiphon* Davidson but differs in having processus terminalis never shorter than antennal segment III, siphunculi 2.8-3.5 times the minimum diameter near base, and also in possessing much spinular body and femora.

The collection data show that above material was collected from Maize roots and this is unusual for a species of *Rhopalosiphoninus*.

Distribution : India : Himachal Pradesh.

118. *Rhopalosiphoninus latysiphon* (Davidson)

1912. *Amphorophora latysiphon* Davidson, *J. Econ. Ent.*, 5 : 405.

1975. *Rhopalosiphoninus latysiphon* (Davidson) ; Ghosh, A.K., *J. Bombay nat. Hist. Soc.*, 71 (2) : 219.

Material examined : 2 alatae, 'on Snow' : Kufri, December 1973, coll. L. K. Ghosh.

Distribution : India : Himachal Pradesh, Meghalaya, Nagaland, South India ; America ; Europe and Nepal.

119. *Rhopalosiphoninus longisetosus* Chakrabarti and Ghosh

1974. *Rhopalosiphoninus longisetosus* Chakrabarti and Ghosh, A. K., *Oriental Ins.*, 8 (4) : 525.

Material examined : 1 alata (Holotype) and 2 oviparae, on undet. host plant, Jokoo Hills, 2.xi.1970, coll. A. N. Chowdhuri.

Distribution : India : Himachal Pradesh.

120. *Rhopalosiphoninus sensoriatus* Chakrabarti

1978. *Rhopalosiphoninus sensoriatus* Chakrabarti, *J. Linn. Soc. (Zool.)*, 62 : 359-363.

Material examined : Holotype, aptera, on undet. host ; Simla, 29.xii.1972, coll. S. Chakrabarti.

Distribution : India ; Himachal Pradesh.

LII. Genus *Senisetotarsaphis* Raychaudhuri et al.

1980. *Senisetotarsaphis* Raychaudhuri, D. N., Ghosh, L. K. and Das, S. K., *Ins. matsum.*, n. s., 20 : 30.

Type-species : *Senisetotarsaphis jakhuensis* Raychaudhuri et al.

Body elongate. Head dark brown with smooth lateral frontal tubercles. Antennae 6-segmented, dark, flagellum imbricated ; a.s. III with strongly

protuberant secondary rhinaria irregularly distributed over the entire length. Rostrum reaches fore coxae ; u.r.s. with about 8 secondary hairs. Dorsum of abdomen pale with broken brownish spinal and pleural sclerites forming dorsal patches ; dorsal abdominal hairs moderately long and fine. Siphunculi slender, cylindrical, imbricated, with distinct preapical flange. Cauda elongate, triangular with about 10 hairs. Legs pale brown except the dark brown apices of femora, tibiae and tarsi. F.T.C. 6,6,6. Wing venation normal ; hind wing with 2 oblique veins.

Distribution : India : Himachal Pradesh.

121. *Senisetotarsaphis jakhuensis* Raychaudhuri *et al.*

1980. *Senisetotarsaphis jakhuensis* Raychaudhuri, D. N., Ghosh, L. K. and Das, S. K., *Ins. matsum., n. s.*, **20** : 31.

Material examined : 1 alata, on *Rubus* sp., Jakhu, 28.x.78, coll. M. R. G. and P. K. M. ; 1 alata, on undet. host, 10.xi.74, coll. L. K. Ghosh.

Distribution : India : Himachal Pradesh.

LIII. Genus *Spinaphis* gen. nov.

Body oval. Head brown and smooth ; lateral frontal tubercles little developed, median frontal prominence absent. Antennae 6-segmented, shorter than body ; p.t. about 6 times as long as base of a.s. VI ; secondary rhinaria on segment III absent. Ultimate rostral segment about 1.2 times as long as h.t.2 and with about 12 secondary hairs. Abdominal dorsum highly pigmented with fine spinules all over ; dorsal hairs long, thin with acuminate apices ; 8th abdominal tergite with 8 hairs. Siphunculi more or less cylindrical and about 0.25 times as long as body. Cauda semicircular, with about 20 hairs. F.T.C. 3,3,2. Stigmal pori reniform.

Type-species : *Spinaphis multisetosa* sp. nov.

Remarks : The new genus is different from other genera of the tribe Macrosiphini because of combination of characters mentioned above.

Distribution : India.

122. *Spinaphis multisetosa* sp. nov.

(Figs. 178, 219, 220)

Apterous viviparous female : Body oval, about 2.40-2.55 mm long with 1.29-1.50 mm as maximum width. Head (Fig. 178A) brown, smooth without median frontal prominence and with ill-developed lateral frontal tubercles ; dorsal cephalic hairs long (up to 51μ) and fine sparse spinules present on venter of head. Antennae 6-segmented, about 0.80-0.88 times as long as

body, segments I and II concolourous with head, segment I sparsely spinulose, segment II imbricated and wrinkled, segment III pale up to basal 0.4-0.6 portion, rest of the flagellum dark brown ; flagellar hairs long with blunt or slightly spatulate apices, longest one on a.s. III up to about 48μ long and 1.2-1.3 times as long as b.d. III ; secondary rhinaria absent ; primary rhinarium large and non-ciliated ; p.t. about 6.5-8.1 times as long as base of a.s. VI and distinctly shorter than a.s. III. Rostrum reaches midcoxae ; u.r.s. (Fig. 178C) about 1.1-1.2 times as long as h.t. 2 and with about 12 secondary hairs. Thorax sclerotic, dark brown, with spinules on dorsum. Abdominal dorsum (Figs. 178D, E) pigmented, with dark marginal sclerites on segments 1-7 and with fine spinules all over ; 8th abdominal tergite with a transverse sclerotic band ; dorsal hairs up to about 51μ long, with bluntish to slightly acuminate apices, the longest one on anterior tergites about 1.6 times as long as b.d. III ; 12 hairs on 8th tergite up to about 93μ long and about 2.5 times as long as the mentioned diameter. Siphunculi slightly curved outwards, about 0.24 times as long as body, cylindrical, dark brown, faintly imbricated and with circumcission on a few interconnecting striae before the apical flange. Cauda dark, helmet-shaped, with many hairs, about 0.78 times its basal width and bearing many hairs. Legs long, pale, except coxae and distal half of femora which are dark, tibiae thick, with thin and fine hairs ; F.T.C. 3,3,2.

Material examined : Holotype, apterous viviparous female, on undet. plant, Narkanda, 26.ix.1974, coll. L. K. Ghosh. Paratype, apterous viviparous female, same data as for holotype.

Distribution : India ; Himachal Pradesh.

LIV. Genus *Tricaudatus* Narzikulov

1957. *Tricaudatus* Narzikulov, *Ent. Obozr.*, 36 (3) : 383.

Type-species : *Rhopalosiphoninus polygoni* Narzikulov, 1953.

Head in apterae smooth, dorsally slightly wrinkled and usually without but sometimes with a few spinules below antennal sockets, in alatae dorsally finely granulated anteriorly and on posterior margin and slightly wrinkled posterolaterally close to inner margin of eyes, these wrinkles sometimes appearing finely spinulated ; slightly diverging lateral frontal tubercles low to moderately developed and scabrous on inner margin ; median frontal prominence developed and wrinkled, dorsal cephalic hairs in apterae blunt, in alatae with subacute apices ; ventrally hairs all long and fine. Antennae 6-segmented, about 0.50-0.90 times as long as body ; a.s. I usually scabrous towards inner margin and sometimes with a few spinules on one surface, sometimes slightly protruded on distal 0.50 portion of inner margin ; flagellum imbricated ; apterae without secondary rhinaria, alatae with circular,

small to large strongly protuberant rhinaria on a.s. III and IV ; primary rhinaria ciliated ; flagellar hairs short with blunt apices ; p.t. longer than base of a.s. VI. Rostrum extends up to hindcoxae, u.r.s. shorter to longer than h.t. 2, without or with at most 2 secondary hairs. Midthoracic furca stalked. Abdominal tergum in apterae weakly to strongly wrinkled, usually pale but sometimes with marginal and spinopleural patches arranged segmentally, in alatae with brown marginal spinulose patches and a solid middorsal patch extending from segments 2-6, the last of these segments also locally spinulose posteriorly ; each of abdominal segments 7 and 8 in apterae with a dorsal supracaudal process, in alatae such processes are difficult to recognise, dorsal abdominal hairs in apterae short and blunt but those caudad moderately long and thick, in alatae hairs long with bluntish apices. Siphunculi distinctly swollen on apical 0.5-0.6 portion, about 2.0-2.6 times as long as cauda. Cauda dusky to brown, elongate, without basal constriction and bears 8-12 hairs. Subgenital plate with 8-10 hairs on posterior margin. Femora gradually more distinctly imbricated apicad, tibiae smooth, some of the tibial hairs with blunt apices, rest with normal apices ; F.T.C. 3,3,3 ; second tarsal segments imbricated. Hind tibiae of nymphs spinulose.

Distribution : India ; Indonesia ; Japan ; Korea and U.S.S.R.

Key to the species of the genus Tricaudatus Narzikulov

Apterae viviparae :

- Processus terminalis 1.9-2.0 times as long as base of a. s. VI ; antennae about 0.6 times as long as body ; on *Polygonum* sp. ... *polygoni* (Narzikulov)
- Processus terminalis as long as or a little longer (about 1.1 times) than base of a. s. VI ; antennae about 0.4 times as long as body ; on *Princepia* sp. ... *indicus* Ghosh, Basu and Raychaudhuri

123. *Tricaudatus indicus* Ghosh, Basu and Raychaudhuri

1969. *Tricaudatus indicus* Ghosh, A. K., Basu, R. C. and Raychaudhuri, D. N., *Oriental Ins.*, 3 (3) : 251.
1969. *Liosomaphis* sp. ; Chowdhuri, Basu, R.C. and Raychaudhuri, D. N., *Sci. Cult.*, 35 : 334.
- Material examined* : 1 aptera, on *Princepia* sp., Simla, 25.iii.1967, coll. A. N. Chowdhuri.

Distribution : India : Himachal Pradesh.

124. *Tricaudatus polygoni* (Narzikulov)

1953. *Rhopalosiphoninus polygoni*, Narzikulov, *Izv. Otd. Estestv. Nauk, A. N. Tadz. SSR*, 4 : 62.
1969. *Tricaudatus polygoni* (Narzikulov) ; Chowdhuri, Basu, R. C., Chakrabarti and Raychaudhuri, D. N., *Oriental Ins.*, 3 (1) : 90.

Material examined : 3 apterae, 2 apterae oviparae, on undet. host, Simla Hills, 13.xii.1973, 1 aptera, on *Polygnum* sp., Narkanda, 27.ix.1974, coll. L. K. Ghosh.

Biological notes : Yellowish brown aphids were collected from the under-surface of leaves of the host-plants.

Remarks : Chakrabarti and Raychaudhuri (1975) recorded apterae, alate viviparae and alate male. Of these, male was described from the Kumaon Himalaya for the first time. The oviparous female is being newly reported from Himachal Pradesh. However, the oviparae from Himachal Pradesh differ from the original description in having more (90-102) pseudosensoria on hindtibiae and also in the bigger size of the body.

Distribution : India : Arunachal Pradesh, Himachal Pradesh, Jammu and Kashmir state, Meghalaya, Sikkim, Uttar Pradesh, West Bengal ; Indonesia ; European U.S.S.R. ; Japan and Korea.

LV. Genus *Uroleucon* Mordvilko

1914. *Uroleucon* Mordvilko, *Faune de la Russie*, 1 : 64.

Type-species : *Aphis sonchi* Linnaeus, 1767, designated by Börner, 1930.

Body broadly elongate to spindle-shaped. Head dark brown ; lateral frontal tubercles well developed with diverging inner sides. Antennae 6-segmented, about as long as to a little longer than body, a.s. III in apterae with many protuberant secondary rhinaria over basal 0.25-0.75 portion, a.s. IV usually without secondary rhinaria (in one specimen of *Uroleucon himachali* L. K. Ghosh, a.s. IV with a rhinarium), in alatae a.s. III with 45 or more similar secondary rhinaria, a.s. IV and V usually without them ; flagellar hairs about as long as b.d. III, p.t. about 4-6 times as long as base of a.s. VI. Rostrum reaching hindcoxae ; u.r.s. shorter to a little longer than h.t.2, with 4-8 secondary hairs. Midthoracic furca stalked. Dorsal abdominal hairs longer than b.d. III and arising from dark sclerites, lateral abdominal tubercles variably present on segments 2-4 ; alatae with well-developed marginal sclerites. Siphunculi elongate, cylindrical or tapering and usually black with the flange not well developed, reticulated over distal 0.2-0.4 portion and a little longer than to about twice as long as elongate cauda bearing about 5-15 hairs. Spiracular apertures reniform. F.T.C. 5,5,5 or 3,3,3. Wing venation normal. Hind tibiae of nymphs without spinules.

Hille Ris Lambers (1949) has dealt with European species. Japanese species have been discussed by Takahashi (1962). Olive (1963) has made valuable contribution to the species of North Carolina. Miyazaki (1971) has provided key to the Japanese species.

The genus has been considered in the sense of Eastop and Hille Ris Lambers (1976).

Distribution : Cosmopolitan.

Key to the species of the genus Uroleucon Mordvilko

- | | | | |
|---------|---|-----|---|
| 1 (2) | Ultimate rostral segment shorter than h. t. 2 ; caudal hairs usually more than 20 ; p. t. about 7 times (or more) as long as base of a. s. VI | ... | <i>sonchi</i> (Linn.) |
| 2 (1) | Ultimate rostral segment always longer than h. t. 2 ; caudal hairs at most 17 ; p. t. hardly up to 6.5 times as long as base VI | --- | 3 |
| 3 (4) | Cauda dark ; ante-siphuncular sclerite present ; siphunculi twice as long as cauda ; a. s. III with 9-18 secondary rhinaria ; F. T. C. 5, 5, 5 | ... | <i>himachali</i> Ghosh |
| 4 (3) | Cauda pale to dusky and never black | ... | 5 |
| 5 (10) | Antesiphuncular sclerite present | ... | 6 |
| 6 (7) | 8th abdominal tergite with 6-8 hairs ; siphunculi usually about twice as long as cauda bearing 11-16 hairs ; F. T. C. 4, 4, 4. | ... | <i>minatii</i> Das <i>et al.</i> |
| 7 (6) | 8th abdominal tergite only with 4 hairs ; siphunculi 1.2-1.5 times as long as cauda ; F. T. C. variable | ... | 8 |
| 8 (9) | Siphunculi 1.20-1.25 times as long as cauda and 0.16-0.17 times as long as body ; apical 0.35-0.40 portion of siphunculi reticulated ; caudal hairs 12-17 ; tarsal segments with 3-5 hairs but mostly with 4-5 hairs on fore and mid legs | ... | <i>longisetosus</i> Chakrabarti and Verma |
| 9 (8) | Siphunculi 1.50 times as long as cauda and at most 0.15 times as long as body ; siphunculi at most 0.3 portion reticulated apically ; caudal hairs 8-12 (usually 10) ; first tarsal segments with 5 hairs | ... | <i>fagopyri</i> Chowdhuri <i>et al.</i> |
| 10 (5) | Antesiphuncular sclerite absent | ... | 11 |
| 11 (12) | Antennal segment III with 36-50 secondary rhinaria ; siphunculi usually more than 1.5 times as long as pale to dusky cauda bearing 12-15 hairs | ... | <i>simlaensis</i> Chakrabarti <i>et al.</i> |
| 12 (11) | Antennal segment III with 17-34 secondary rhinaria ; siphunculi hardly 1.5 times as long as pale cauda bearing 7-8 hairs | --- | <i>kashmiricus</i> Verma |

125. *Uroleucon fagopyri* (Chowdhuri, Basu, Chakrabarti and Raychaudhuri)

1969. *Dactynotus fagopyri* Chowdhuri, Basu, R. C., Chakrabarti and Raychaudhuri, D. N., *Oriental Ins.*, 3 (1) : 85.
1968. *Dactynotus fagopyri* ; Chowdhuri, Basu, R. C., Chakrabarti and Raychaudhuri, D. N., *Sci. Cult.*, 34 : 133.

Material examined : 5 apterae, on *Fagopyrum cymosum*, Simla, August, 1966, coll. A. N. Chowdhuri.

Distribution : India : Himachal Pradesh and Uttar Pradesh.

126. *Uroleucon himachali* Ghosh

1975. *Uroleucon himachali* Ghosh, L. K., *Oriental Ins.*, 9 (2) : 135.

Material examined : 9 apterae, on undet. Compositae, Simla, 11.xii.1973, coll. L. K. Ghosh.

Distribution : India : Himachal Pradesh.

127. *Uroleucon kashmiricus* (Verma)

1966. *Dactynotus kashmiricus* Verma, *Indian J. Ent.*, 28 (2) : 265.

1972. *Uroleucon kashmiricus* Verma ; Ghosh, L. K., *Oriental Ins.*, 6 (2) : 172.

Material examined : 9 apterae, 2 nymphs and 1 alata, on *Campanula colorata*, Simla, 7.i.1970, coll. L. K. Ghosh.

Distribution : India : Himachal Pradesh, Jammu and Kashmir state, and Uttar Pradesh.

128. *Uroleucon longisetosus* Chakrabarti and Verma

1975. *Uroleucon longisetosus* Chakrabarti and Verma, *Oriental Ins.*, 9 (2) : 169.

Material examined : 5 apterae and 2 apterae oviparae, on *Prenanthes bruniana*, Narkanda, 29. ix. 1974, 1 aptera on *Prenanthes bruniana*, Simla, 29.x.1968, coll. A. N. Chowdhuri.

Remarks : The material agrees well with the original description except in the pale cauda both in apterae viviparae and oviparae. The antennal hairs are about 1.4-1.5 times as long as b.d. III (1.1-1.2 times in original description).

Sexuales of the species present in the Entomological Laboratory, Department of Zoology, Calcutta University showed rather dark cauda. Furthermore, the present oviparae have slightly more (up to 24) secondary rhinaria on a. s. III and a little longer siphunculi.

In spite of the small variations, the present material is treated as *longisetosus* till further specimens are available to confirm the consistency of the variations.

Distribution : India : Himachal Pradesh and Uttar Pradesh.

129. *Uroleucon minatii* (Das et al.)

1981. *Dactynotus minatii* Das, S. K., Raychaudhuri, D. and Raychaudhuri, D. N., *Entomon*, 6 (1) : 49.

Material examined : 5 apterae viviparae, on *Delphinium* sp., Simla (C 2000m), 22.x. 1979, coll. S. K. Das.

Distribution : India : Himachal Pradesh.

130. *Uroleucon simlaensis* Chakrabarti, Ghosh and Raychaudhuri

1971. *Uroleucon simlaensis* Chakrabarti, Ghosh, A. K. and Raychaudhuri, D. N., *Kontyu*, **39** (4) : 371.

Material examined : 3 apterae, on *Erigeron* sp., Simla, Joko Hills, 7.ix.1969, coll. A. N. Chowdhuri.

Distribution : India : Himachal Pradesh.

131. *Uroleucon sonchi* (Linnaeus)

1767. *Aphis sonchi* Linnaeus, *Syst. Nat.* (12th ed.) : 735.

1972. *Uroleucon sonchi* (Linnaeus) ; Ghosh, L. K., *Oriental Ins.*, **6** (2) : 171.

Material examined : Many apterae and 1 alata, on *Sonchus* sp., Solan, 2.vi.1969, many apterae, on *Sonchus arvensis*, Simla, 7.i.1970, all L. K. Ghosh coll.

Distribution : India : Himachal Pradesh, Manipur, Meghalaya, Sikkim, S. India, Uttar Pradesh, West Bengal ; Africa ; Australia ; Egypt ; Europe ; and South America.

LVI. Genus *Vesiculaphis* del Guercio

1911. *Vesiculaphis* del Guercio, *Redia*, **7** : 463.

Type-species : *Toxoptera caricis* Fullaway, 1910.

Body broadly spindle-shaped. Head in apterae rugose or warty (Fig. 18) ; venter either nearly smooth or with warts ; lateral frontal tubercles usually low but in some cases with anteriorly directed projection as in *Akkaia* ; median frontal prominence slightly to strongly developed ; in alatae dorsum of head smooth but venter with minute granules ; dorsal cephalic hairs either 'myzine' type or long with somewhat incrassate to expanded apices and on tuberculate bases. Antennae 5- or 6-segmented in apterae and in alatae always 6-segmented, shorter than body ; flagellum in apterae with either distinct warty imbrications all over or with normal imbrications ; apterae without but alatae with circular protuberant secondary rhinaria on a. s. III, IV and V ; primary rhinaria ciliated or nonciliated ; flagellar hairs in apterae minute to moderately long with blunt, acuminate or distinctly swollen apices, in alatae hairs rather long with more or less acuminate apices ; p. t. shorter than to 3.0 times as long as base of last antennal segment. Rostrum extends beyond bases of midcoxae ; u. r. s. with bluntish apex and with 0-3 secondary hairs. Thorax scabrous and locally pitted. Abdominal dorsum sclerotic, distinctly rugose, sometimes ante- and post-siphuncular sclerites present ; dorsal hairs in apterae either 'myzine' type or long with somewhat expanded apices, in alatae either minute or long on tuberculate bases. Siphunculi in

apterae warty, nearly cylindrical with rather narrow apex or swollen on inner margin near middle, with well-developed thick flange ; in alatae siphunculi nearly cylindrical with normal imbrications, about 0.2 times as long as body. Cauda in apterae with bulbous base and blunt apex (Fig. 109), in alatae shortly conical with bluntish apex. Legs either completely smooth or sometimes femora scabrous ; hairs on legs with acute to nearly acute apices ; F. T. C. 3, 3, 3. Nymphs with spinulose hindtibiae. Wing venation normal with veins rather thick, dark and bordered brown.

Ghosh, M. R., Basu, R. C. and Raychaudhuri, D. N. (1976) have reviewed the genus while discussing the material of the genus from India. Miyazaki (1980) has made an excellent contribution on world species of the genus.

Distribution : Europe ; India and Japan.

Key to the species of the genus Vesiculaphis del Guercio

Apterae viviparae :

Processus terminalis 2.5-3.0 times as long as base of a. s. VI ; abdominal tergite 8 produced caudad in the form of a triangular hood ; antennae 6-segmented and at least 0.5 times as long as body ; on *Verbascum* spp. and *Polygonum* spp. ...

verbasci Chowdhuri, Basu, Chakrabarti and Raychaudhuri

— Processus terminalis about as long as or a little shorter than base of a. s. VI ; abdominal tergite 8 not produced as above ; antennae 5- or 6-segmented and 0.2-0.3 times as long as body ; on *Pieris* spp. ...

pieridis Basu

132. *Vesiculaphis pieridis* Basu

1964. *Vesiculaphis pieridis* Basu, A. N., *J. Linn. Soc. (Zool.)*, **45** (305) : 237.

1974. *Vesiculaphis pieridis* Basu ; Chakrabarti, Chowdhuri and Raychaudhuri, D. N., *Sci. Cult.*, **40** : 461.

Material examined : 2 apterae, on *Ageratum* sp., Mashobra, 20.iv.1970 ; 1 aptera, on *Ageratum* sp., Dhaultan, 12.v.1974, coll. A. N. Chowdhuri.

Distribution : India : Himachal Pradesh, Meghalaya, Uttar Pradesh and West Bengal.

133. *Vesiculaphis verbasci* Chowdhuri, Basu, Chakrabarti and Raychaudhuri

1969. *Vesiculaphis verbasci* Chowdhuri, Basu, R. C., Chakrabarti and Raychaudhuri, D. N., *Oriental Ins.*, **3** (1) : 90.

Material examined : 2 apterae, on *Verbascum thapsus*, Simla, ix.1966, coll. A. N. Chowdhuri ; many apterae, on *Rubia cordifolia*, Simla, 8.i.1970, coll. L. K. Ghosh.

Biological notes : Dark brown aphids were found to colonize the apex of tender shoots of the host-plants.

Distribution : India : Arunachal Pradesh, Himachal Pradesh, Manipur, Meghalaya, Nagaland, Sikkim, Uttar Pradesh and West Bengal.

LVII. Genus *Xenosiphonaphis* Takahashi

1961. *Xenosiphonaphis* Takahashi, *Bull. Univ. Osaka Pref. (B)*, 11 : 6.

Type-species : *Xenosiphonaphis conandri* Takahashi, 1961.

Body oval to elongate. Head not protuberant at middle of front, with spinules on dorsum ; lateral frontal tubercles broad and parallel on measal margin ; median frontal prominence absent. Antennae 6-segmented, little shorter than body, with short hairs ; a.s. III without secondary rhinaria in apterae, in alatae oval to subcircular secondary rhinaria on a.s. III, IV and V ; p.t. hardly 3.0 times as long as base of a.s. VI. Eyes large. Ultimate rostral segment with a few secondary hairs. Midthoracic furca with a short basal stem. In apterae abdominal dorsum corrugated, without distinct dorsal and marginal sclerites and tubercles, in alatae abdomen with well-developed marginal sclerites which are very small on 5th segment and small or absent on 6th. Siphunculi in apterae longer than cauda, roughly imbricated, with some minute spinules, obliquely truncated and without any apical flange, in alatae siphunculi smooth on distal half, narrowed and with transverse irregular wrinkles or grooves on basal half, without spinules and imbrications, with normal pore and without apical flange. Cauda stout, longer than its basal width. Wing venation normal.

The genus has been used in the sense of Takahashi (1961).

Distribution : India ; Japan and Taiwan.

134. *Xenosiphonaphis folisacculatus* Kumar and Burkhardt

(Fig. 227)

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

Material examined : 1 alata and 1 alate male, on *Spiraea* sp., Fagu, 16.viii. 1966, coll. R. Kumar.

Remarks : Dr. R. Kumar, on request sent two slides of the species. One of them had an alate viviparous female and the other an alate male. Examination of these materials reveals that in alate viviparous female, the longest hair on a. s. III is about 0.6 times as long as b. d. III ; 4 fine hairs on 8th tergite are up to about 30 mm. long ; 63-65 secondary rhinaria are present on a. s. III and F. T. C. 3, 3, 3 and in alate male distribution of secondary rhinaria is as follows : a. s. III 45-56, a. s. IV 18-19, a. s. V 9-14 and a. s. VI 4-5. These are additional characters.

Distribution : India : Himachal Pradesh.

Tribe : **Pterocommatini**LVIII. Genus **Pterocomma** Buckton

1879. *Pterocomma* Buckton, *Mongr. Br. Aphides*, **2** : 142.

Type-species : *Pterocomma pilosa* Buckton, 1879.

Head smooth ; median frontal prominence weakly developed, lateral frontal tubercles smooth and diverging ; dorsal cephalic hairs long with finely drawn out apices and placed on distinct sockets. Eyes with prominent triommatidia. Antennae 6-segmented, shorter than body ; flagellum more distinctly imbricated from distal part of segment III ; apterae with or without secondary rhinaria, alatae with circular secondary rhinaria on segmsnt III ; flagellar hairs long with finely drawn out apices, those on p. t. much short and blunt or long and fine ; p. t. shorter to longer than base of segment VI. Rostrum extends a little beyond midcoxae ; u. r. s. shorter to longer than h. t. 2 and with 4-16 secondary hairs ; mid thoracic furca sessile. Abdominal dorsum in apterae smooth, usually pale with scattered pigmented sclerotic patches on bases of hairs with various degrees of coalescence ; lateral abdominal tubercles present ; muscle-plates arranged pleurally on all ante-siphuncular segments ; alatae with irregular shaped, transverse sclerotic bands on all abdominal segment except segment I bearing a few scattered sclerites ; marginal sclerites with many hairs on segments 2-7, those on segment 7 variously fuse with spinopleural band ; dorsal hairs numerous with long and finely drawn out apices. Siphunculi much variable in length, usually subcylindrical, sometimes swollen on distal half, swollen portion gradually attenuating up to well developed apical flange, basally always smooth and sometimes with a few imbrications on distal portion. Cauda broadly rounded, always shorter than basal width and with numerous long hairs. Subgenital plate brown, bearing numerous thin, long, acute hairs. Legs with long fine hairs ; empodial hairs short with acuminate apices. F. T. C. usually 5 : 5 : 5, second tarsal segments imbricated. Wing venation normal. Hindtibiae of nymphs smooth.

Distribution : America ; Europe ; India and Japan.

135. **Pterocomma populifoliae** (Fitch)

1851. *Aphis populifoliae* Fitch, *Annual Rep. N. Y. State Lab. Natur. Hist.*, **4** : 66.

1965. *Pterocomma populifoliae* (Fitch) ; Szelegiewicz, *Ann. zool.*, **23** : 295.

1981. *Pterocomma populifolie* (Fitch) ; Maity and Chakrabarti, *Entomon*, **6** (4) : 303.

Material examined : 1 alata (vagrant), Mashobra, Simla, 30.iv.1972, coll. A. N. Chowdhuri.

Remarks : Richards (1967) has given a detailed account of the species. According to him it usually infests roots rather than aerial portion of *Populus* spp. (Salicaceae). However, in India *Pterocomma* sp. has been recorded on

a tree belonging to family Bucklandiaceae, closely related to Salicaceae (Raychaudhuri, D. N. *Ed.*, 1980).

Distribution : India : Northeast and Northwest part ; America ; Europe ; and Japan.

Subfamily CALLIPTERINAE

The subfamily name Callipterinae has been used after Higuchi (1972). It includes subfamilies Drepanosiphinae and Chaitophorinae of other workers.

Key to the genera

- | | | | |
|-------|--|-----|-----------------------------------|
| 1 (2) | Antennae 5-segmented (Fig. 176) | ... | <i>Sipha</i> Passerini |
| 2 (1) | Antennae 6-segmented | ... | ... |
| 3 (4) | p. t. always longer than base of a. s. VI ; rudimentary gonapophyses 4 ; first tarsal segment without dorsal hairs ; secondary rhinaria not ciliated ; Subanal plate entire ; apical tibial hairs not different from other tibial hairs ; wax-pores absent ; siphunculi reticulated (Fig. 72) ; head and pronotum in apterae separate | ... | ... |
| 4 (3) | p. t. usually shorter than base of a. s. VI, if longer then rudimentary gonapophyses always less than 4 ; dorsal hairs on first tarsal segments may or may not be present ; secondary rhanaria usually ciliated ; Subanal plate indented or distinctly bilobed ; apical tibial hairs usually different from other tibial hairs ; wax-pores may be present in the from of distinct plates or as scattered irregular pores ; siphunculi most usually not reticulated | ... | ... |
| 5 (6) | Dorsum of head and pronotum smooth ; hindtibiae spinulose apically ; Subanal plate rounded and cauda semilunar ; empodial hairs flattened ; first tarsal segments with 5-7 ventral hairs | ... | <i>Periphyllus</i> van der Hoeven |
| 6 (5) | Posterior margin of dorsum of head and pronotum rugose ; hindtibiae with or without spinules ; subanal plate entire, rounded cauda usually knobbed ; siphunculi short, truncate ; body and appendages covered with long hairs | ... | <i>Chaitophorus</i> Koch |
| 7 (8) | Clypeus with a nose-like process ; rostrum very short ; spinal hairs on abdominal tergite 5 shifted laterad ; marginal hairs on tergites 5-7 shortened ; p. t. usually longer than base of last antennal segment ; first tarsal segments with 5 ventral and 2 dorsal hairs (Fig. 180) | ... | <i>Takecallis</i> Matsumura |
| 8 (7) | Clypeus without process as above ; rostrum not very short | ... | ... |

9 (10)	Body with wax-plates or wax-pores	...	...	11
10 (9)	Body without wax-plates or wax-pores	...	...	17
11 (12)	Subanal plate rounded ; first tarsal segments with 7 ventral and 2 dorsal hairs	...	<i>Euceraphis</i> Walker	
12 (11)	Subanal plate slightly to distinctly bilobed	...	...	13
13 (14)	Siphunculus with distinct wax-plates besides wax-pores or-plates on other parts of body ; apterae with a longitudinal median suture on head ; first tarsal segments with 5 ventral and 2 dorsal hairs ; subanal plate deeply cleft	...	<i>Shivaphis</i> Das	
14 (13)	Siphunculus lacking wax-plates	...	...	15
15 (16)	Lateral abdominal tubercles always with more than 1 hair ; spinal hair on abdomen either single or duplicated ; subanal plate distinctly indented ; first tarsal segments with 5 ventral and 2 dorsal hairs	...	<i>Chromaphis</i> Walker	
16 (15)	Lateral abdominal tubercles never with more than 1 hair ; spinal hairs on abdomen single and arranged in longitudinal rows except on segment 7 where these laterally shifted ; subanal plate bilobed ; first tarsal segments with 5 ventral and 2 dorsal hairs	...	<i>Tinocalloides</i> Basu	
17 (18)	Rudimentary gonapophyses 3 ; cauda elongate with a median constriction and pointed apex ; first tarsal segments with 5 ventral and 2 dorsal hairs ; p. t. shorter than or as long as base of a. s. VI ; head in apterae with a rectangular median prominence ; u. r. s. with 2-4 secondary hairs	...	<i>Neobetulaphis</i> Basu	
18 (17)	Rudimentary gonapophyses 2 ; cauda globular ; first tarsal segments with 5 ventral hairs only, p.t. always longer (nearly 1.5 times) than base of a. s. VI ; head in apterae without any rectangular median prominence ; u. r. s. with 5-8 secondary hairs	...	<i>Myzocallis</i> Passerini	

LIX. Genus *Chaitophorus* Koch

1854. *Chaitophorus* Koch, *Die Pflanzenlause Aphiden*, Nurnberg, 1 : 1.

Type-species : *Chaitophorus populi* Koch, 1854.

Body broadly oval to elongate. Head smooth ; frons weakly convex ; lateral frontal tubercles absent. Head and pronotum free. Antennae 6-segmented, rarely 5-segmented, usually shorter than or atmost as long as the body, p.t. always longer than base of a.s. VI ; secondary rhinaria absent in apterae but in alatae on a.s. III ; primary rhinaria without cilia ; flagellar hairs numerous, long and fine, usually longer than b.d. III ; head and prothorax never fused. Eyes with distinct ocular tubercles. Ultimate rostral segment thick and slender usually shorter than or equal to but never longer than twice the length of h.t. 2. Abdominal tergites mutually free, more

often 1st-6th tergites fused and dark sclerotic, tergite 7th sometimes fused with 6th tergite but 8th tergite always free. Abdominal dorsum smooth or spiculose or reticulated or nodulose in apterae ; in alatae dorsum of abdomen with paired marginal sclerites and segmental sclerites, sometimes the latter become confluent to form a solid patch. Dorsal hairs usually acute, sometimes with furcated apices, in alatae usually fine ; 8th tergite with variable hairs, may be upto 20. Siphunculi short, truncate, pale to dark, hardly longer than its basal width, imbricated with apical reticulation. Cauda usually knobbed or arch-shaped or tongue-shaped. Subanal plate entire. Subgenital plate with many hairs on posterior margin. Primary gonapophyses 4. Legs smooth ; apical hairs on tibiae not different from other hairs ; hindtibiae sometimes with a few pseudosensoria ; first tarsal segment with 5-7 ventral hairs. Empodial hair fine. Hairs on tibiae of nymphs with acuminate to bluntish apices. Fore wings with media twice-branched, hind wings with one oblique.

Valuable contributions were made by Chakrabarti (1977), Ghosh, A. K. (1980), Higuchi (1972), Hille Ris Lambers (1960), Palmer (1952), Richards (1972), Shaposnikov (1964), Szelegiewicz (1959, 1961, 1974), Stroyan (1957), and Tao (1961, 1963).

Key to the species of Chaitophorus Koch

- | | | | | |
|-------|---|-----|---------------------------------------|---|
| 1 (6) | Abdominal dorsum pale | ... | ... | 2 |
| 2 (3) | Dorsum of abdomen smooth ; u. r. s. with one pair of accessory hairs ; p. t. about 1.5-2.0 times as long as base of segment VI | ... | <i>pakistanicus</i> Hille Ris Lambers | |
| 3 (2) | Dorsum of abdomen never smooth | ... | ... | 4 |
| 4 (5) | First tarsal segments with 7, 7, 7 hairs ; dorsum of head spiculose ; longest hair on a. s. III about 4.0 times as long as b. d. III ; u. r. s. with 2 accessory hairs | ... | <i>manaliensis</i> Chakrabarti | |
| 5 (4) | First tarsal segments with 5, 5, 5 hairs ; dorsum of head nodulose ; longest hair on a. s. III 2.0-2.5 times as long as b. d. III | ... | <i>indicus</i> Ghosh <i>et al.</i> | |
| 6 (1) | Abdominal dorsum dark | ... | ... | 7 |
| 7 (8) | First tarsal segments with 5, 5, 5 hairs ; p. t. about 2.0 times as long as the base of segment VI ; u. r. s. with 6 accessory hairs ; longest hair on a. s. III 4.0-4.5 times as long as b. d. III | ... | <i>niger</i> Mordvilko | |
| 8 (7) | First tarsal segments with 7, 7, 7 hairs ; p. t. 3.0-3.4 times as long as base of segment VI ; u. r. s. with 4 accessory hairs ; longest hair on a. s. III about 3.0 times as long as b. d. III | ... | <i>kapuri</i> Hille Ris Lambers | |

136. *Chaitophorus indicus* Ghosh *et al.*

1970. *Chaitophorus indicus* Ghosh, A. K., Ghosh, M. R. and Raychaudhuri, D. N., *Oriental Ins.*, **4** (2) : 196.

1981. *Chaitophorus indicus* ; Das, S. K., Raychaudhuri, D. and Raychaudhuri, D. N., *Entomon*, **6** (1) : 53.

Material examined : 1 aptera vivipara, 3 apterae oviparae, 5 alatae and 6 nymphs, on *Populus* sp., 28.x.1979, coll. S. K. Das.

Remarks : Das *et al.* (1981) recorded the sexuales of the species on *Populus* sp. for the first time.

Distribution : India : Himachal Pradesh, West Bengal.

137. *Chaitophorus kapuri* Hille Ris Lambers

1966. *Chaitophorus kapuri* Hille Ris Lambers, *Tijdschr. Ent.*, **109** : 197.

1973. *Chaitophorus kapuri* ; Kumar, *Oriental Ins.*, **7** (1) : 11.

Material examined : 1 alata, on Y.P.T., Simla, 4.v.1972, coll. A. N. Chowdhuri.

Distribution : India : Himachal Pradesh, Jammu & Kashmir and Pakistan.

138. *Chaitophorus manaliensis* Chakrabarti

1977. *Chaitophorus manaliensis* Chakrabarti, *Oriental Ins.*, **11** (2) : 211.

1980. *Chaitophorus manaliensis* ; Ghosh, A. K., *Fauna India, Homoptera, Aphidoidea*, pt. I : 60.

Material examined : 2 apterae, on *Salix* sp., Manali, 1.i.1973, coll. S. Chakrabarti.

Distribution : India : Himachal Pradesh.

139. *Chaitophorus salijaponicus niger* Mordvilko

1929. *Chaitophorus niger* Mordvilko, *Trudy Prikl. Ent.*, Leningrad, **14** : 29.

1969. *Chaitophorus niger* ; Verma, *Sci. Cult.*, **25** : 28.

1980. *Chaitophorus salijaponicus niger* ; Ghosh, A.K., *Fauna India, Homoptera : Aphidoidea*, pt. I : 41.

Material examined : 2 apterae, on *Salix* sp., Dalhousie, 4.vi.1964. coll. K. D. Verma.

Distribution : India : Himachal Pradesh ; Europe ; and Middle East.

140. *Chaitophorus pakistanicus* Hille Ris Lambers

1966. *Chaitophorus pakistanicus* Hille Ris Lambers, *Tijdschr. Ent.*, **109** : 200.

1969. *Chaitophorus pakistanicus* ; Verma, *Sci. Cult.*, **35** : 28.

1980. *Chaitophorus pakistanicus* ; Ghosh, A. K., *Fauna India, Homoptera, Aphidoidea*, pt. I : 48,

Material examined : Apteræ viviparæ, on *Salix* sp., Simla, 24.ii.1964, coll. K. D. Verma.

Distribution : India : N. W. part ; Pakistan.

LX. Genus *Chromaphis* Walker

1870. *Chromaphis* Walker, *Zoologist*, (2) 5 : 2000.

Type-species : *Lachnus juglandicola* Kaltenbach, 1843.

Head smooth ; lateral frontal tubercles ill-developed ; median frontal prominence developed. Antennæ 6-segmented, shorter (about 0.5 times) than body ; p.t. also shorter than base of a.s. VI ; a.s. III in alatae with semioval to elongate secondary rhinaria, a.s. IV usually without secondary rhinaria ; primary rhinaria ciliated. Rostrum reaching past 1st coxæ ; u.r.s. with 3-5 secondary hairs, about 0.5 times as long as h.t.2. Abdomen pale ; dorsal hairs with acute apices in alatae, those of nymphs and apteræ with capitate apices, spinal hairs not in cluster ; lateral abdominal tubercles with hairs. Siphunculi short, truncate and flanged, with a hair appended to base. Cauda knobbed. Subanal plate indented. Hairs on rudimentary gonapophyses in 2 clusters. Legs brown except darker tarsi ; femoral hairs sparse, short with fine apices, tibial hairs normal except in *C. hirsutustibis* Kumar and Lavigne where tibial hairs much longer, dense and with finely drawn out apices, the apices of tibiae with a few peg-like hairs ; first tarsal segments with 5 dorsal and 5 ventral hairs. Wing venation normal, veins sometimes bordered brown ; radial sector faintly indicated.

Distribution : America ; Central Asia ; Europe ; India ; Middle East and Nepal.

141. *Chromaphis hirsutustibis* Kumar and Lavigne

1970. *Chromaphis hirsutustibis* Kumar and Lavigne, *Pan-Pacif. Ent.*, **146** (2) : 123.

1973. *Chromaphis hirsutustibis* Kumar and Lavigne ; Quednau, *Can. Ent.*, **105** : 226.

Material examined : 1 alata and 2 apterous nymphs ; on walnut, Simla, 2.iv.1971, coll. K. D. Verma ; 1 alata, on *Juglans regia*, Simla, Charabara, 19.ix.1969, coll. A. N. Chowdhuri.

Remarks : The species was originally described by Kumar and Lavigne (1970) from the alatae and alatoid nymphs collected on *Juglans regia* at Simla (India). The species is characterized in having dense hairs on the hind tibiae. Quednau (1973) has provided an excellent redescription of the species and discussed its affinity.

Distribution : India : Himachal Pradesh and Uttar Pradesh ; Nepal.

LXI. Genus *Euceraphis* Walker

1870. *Euceraphis* Walker, *Zoologist*, (2) 5 : 2001.

Type-species : *Aphis betulae* Walker, 1870.

Head smooth with lateral frontal tubercles somewhat developed ; frons concave ; dorsal cephalic hairs long with incrassate apices. Antennae 6-segmented, nearly as long as body ; p. t. much shorter than to as long as base of a. s. VI ; a. s. III with ciliated oval secondary rhinaria ; flagellar hairs short, bluntish to somewhat expanded apices, longest hair on a. s. III about 0.5 times as long as b. d. III. Ultimate rostral segment shorter (0.6-0.7 times) than h. t. 2, bearing 6-12 secondary hairs. Abdomen pale with wax-plates ; dorsal hairs long, arranged segmentally on each abdominal segment, with acute to slightly expanded apices, marginal tubercles or protuberance absent. Siphunculus short, truncate, a little longer than its basal diameter, with hair appended to base. Cauda elongate and knobbed. Subanal plate with posterior margin rather rounded. Tibiae spinulose near apices and with a few spine-like hairs, first tarsal segments with 2 dorsal and 7 ventral hairs.

Palmer (1952) has dealt with the American species and the Australian species have been discussed by Eastop (1966).

Distribution : America ; Australia ; British Columbia ; Britain ; China ; India ; Iceland ; Japan ; Nepal ; Norway ; Sweden ; Tasmania and U. S. S. R.

142. *Euceraphis chuansiensis* Tao

1964. *Euceraphis chuansiensis* Tao, *Q. Jl. Taiwan Mus.*, 17 (3 & 4) : 213.

1971. *Euceraphis chuansiensis* Rao ; Ghosh, M. R., Ghosh, A. K. and Raychaudhuri, D. N., *Proc. zool. Soc., Calcutta*, 24 : 50.

Material examined : 1 alata (damaged), on *Betula* sp., Kufri, 4.vi.1968, coll. K. D. Verma.

Distribution : India ; Himachal Pradesh ; Nepal and U.S.S.R.

LXII. Genus *Myzocallis* Passerini

1860. *Myzocallis* Passerini, *Gli Afidi* : 28.

Type-species : *Aphis coryli* Goetze, 1973 (Fixed by Passerini, 1860).

Body small to medium-sized. Head with ill-developed lateral frontal tubercles and well-developed median frontal prominence ; dorsal cephalic hairs long and capitate. Antennae 6-segmented, shorter than body ; apterae without secondary rhinaria ; in alatae, a.s. III with 4-5 round or oval secondary rhinaria with less evident marginal ciliation ; primary rhinaria with ciliated margins ; flagellar hairs capitate ; p. t. about 1.5 times as long as base of a. s. VI. Rostrum reaching midcoxae ; u. r. s. shorter (0.9 times) than h. t. 2.

Abdomen with either variably developed dorsal and lateral tubercles or without any tubercle ; dorsal abdominal hairs in clusters, lateral conical tubercle when present usually do not have apical hairs. Wax-plates absent. Siphunculus truncate and without any flange. Cauda knobbed and bears lateral ventral hairs. Subanal plate indented. Rudimentary gonapophyses 2. Legs normal with pointed and capitate hairs, first tarsal segments usually with 5 ventral and 2 dorsal hairs ; second tarsal segments and distal half of tibiae spinulose. Wing venation normal.

Distribution : Africa ; China ; Europe ; India and Japan.

Key to the subgenera of Myzocallis Passerini

- | | |
|--|--------------------------------|
| Flagellar hairs capitate ; u. r. s. shorter than h. t. | |
| 2 | ... <i>Myzocallis</i> s. s. |
| — Flagellar hairs with acute to acuminate apices ; | |
| u. r. s. as long as to longer than h. t. 2 | ... <i>Hoplocallis</i> Pintera |

143. *Myzocallis polychaetus* David

1969. *Myzocallis* (*Dryomyzus*) *polychaetus* David, *Oriental Ins.*, **3** (1) : 79.

1974. *Myzocallis polychaetus* David ; Chakrabarti and Raychaudhuri, D. N., *Indian J. Ent.*, **36** (2) : 129-131.

Material examined : 3 apterae, on *Quercus dialbata*, Khadrula, 29.xi.1968, coll. A. N. Chowdhuri ; 1 aptera and 2 apterous nymphs, on *Quercus dilata*, Simla, 26.xi.1969, coll. K. Narayanan and S. G. Rajasingh, many apterous oviparae and 4 alate males, on *Quercus dialbata*, Khadrula, 29.xi.1971, coll. A. N. Chowdhuri.

Remarks : The species was originally described by David (1969a) from only apterous viviparous females from North-West Himalaya under the subgenus *Dryomyzus* Hille Ris Lambers (1948). But Richards (1968) considers *Dryomyzus* as a synonym of *Myzocallis* s. s. Chakrabarti and Raychaudhuri, D. N. (1974) described the sexuales of the species from Simla where the species probably enjoys holocyclic mode of life-cycle on *Quercus* (Fagaceae).

Distribution : India : Himachal Pradesh.

144. *Myzocallis* (*Hoplocallis*) ? *pictus* (Ferrari)

1872. *Pterocallis pictus* Ferrari, *Annali Mus. Civ. Stor. nat. Giacomo Doria*, **2** : 77.

1934. *Myzocallis boudyi* Mimeur, *Mem. Soc. Sci. nat. phys. Maroc.*, **40** : 12.

1957. *Myzocallis pictus* Ferrari ; Stroyan, *Trans. R. ent. Soc. Lond.*, **109** : 344.

Material examined : 1 alata, 'on snow,' Kufri, 15.xii.1973, coll. L. K. Ghosh.

Biological notes : The specimen was collected in dead condition on snow where it might have been carried by the air-current from nearby Oak trees.

Remarks : Since the material is not in good condition, and larval characters could not be studied, ? mark has been put before the species name. According to the comments of Quednau (in litt.) the species is considered here under the subgenus *Hoplocallis*. However, the species is characterized by the conspicuous and extensive dorsal pigmentation. The presence of abdominal multiple spinal and lateral prothoracic hairs is also distinguishing feature.

The species is being reported from India for the first time.

Distribution : India : Himachal Pradesh ; America ; Chile ; France ; Italy ; Morocco.

LXIII. Genus *Neobetulaphis* Basu

1964. *Neobetulaphis* Basu, *J. Linn. Soc. (Zool.)*, Lond. **45** (305) : 226.

Type-species : *Neobetulaphis pusilla* Basu, 1964.

Body elongate. Head scabrously corrugated dorsally and spinulose ventrally, without lateral frontal tubercles in alatae, in apterae with low lateral frontal tubercles and with a rectangular median process. Antennae 6-segmented, shorter than body ; p.t. shorter than to as long as base of a.s. VI ; apterae without secondary rhinaria, alatae with distinctly ciliated secondary rhinaria on a.s. III ; hairs on flagellum very short and inconspicuous. Eyes with ocular tubercles. Rostrum reaching mid coxae ; u.r.s. about as long as h.t. 2. In apterae, abdominal segmentation distinct, tergum sclerotic, scabrous and corrugated ; in alatae, with or without dorsal segmental or median dark patch ; dorsal hairs with distinct sockets, shorter ones with incrassate apices and longer ones in apterae with knobbed apices, in alatae hairs without distinct raised sockets and with fine apices. Siphunculus truncate, conical, imbricated and with wide flange. Cauda in apterae (Fig. 116) elongate, with distinct constriction at about basal 0.3 portion and pointed apex bearing many hairs, in alatae rather blunt at apex. Subanal plate bilobed. Rudimentary gonapophyses 3. Wax-pores absent. Legs with apices of tibiae and tarsi spinulose, first tarsal segments with only 5 ventral hairs. Empodial hair flattened. Wing venation normal.

Distribution : India and Japan.

145. *Neobetulaphis pusilla* Basu

1964. *Neobetulaphis pusilla* Basu, A. N., *J. Linn. Soc. (Zool.)*, Lond., **45** (305) : 223.

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

Material examined : 4 alatae (damaged), on *Betula* sp., Kufri, 4.vi.1968, coll. K. D. Verma.

Remarks : Basu (1964) reported this species from North-East Himalaya. The find of this species for the first time in North-West Himalaya extends the knowledge of distribution of the species.

Distribution : India : Himachal Pradesh, West Bengal and Sikkim.

LXIV. Genus *Periphyllus* van der Hoeven

1863. *Periphyllus* van der Hoeven, *Tijdschr. Ent.*, 6 : 11.

Type-species : *Periphyllus testudo* van der Hoeven, 1863
= *Phyllophora testudinacea* Fernie, 1852.

Body broadly oval. Head smooth, without lateral frontal tubercles ; dorsal cephalic hairs long and fine. Head and pronotum free in apterae. Antennae 6-segmented, about 0.5 times as long as body ; p. t. longer than base of a. s. VI ; apterae without secondary rhinaria, alatae with oval secondary rhinaria on a. s. III-V ; primary rhinaria non-ciliated, hairs on flagellum longer than b. d. III, with finely drawn out apices. Ultimate rostral segment shorter (about 0.6-0.8 times) than h. t. 2, bearing 1-3 secondary hairs. In alatae, abdominal tergites 1-8 with transverse black bars and 7 lateral hairs on each abdominal tergite. Wax-plate absent. Siphunculi short, truncate, usually reticulated distally (Fig. 72). Cauda rounded with 8-22 hairs. Subanal plate rounded. Rudimentary gonapophyses 4, each with 4 hairs. Legs pale-brown except apices of tibiae and entire tarsi which are darker ; apices of tibiae strongly spinulose ; first tarsal segments with only 5-7 ventral hairs. Empodial hair flattened, Wing venation normal.

The genus has been discussed by Quednau and Chakrabarti (1976) and Ghosh, A. K. (1980).

Distribution : Cosmopolitan.

Key to the species of the genus Periphyllus van der Hoeven

Alatae viviparae :

- | | | |
|--|-----|---------------------------------------|
| Ultimate rostral segment as long as second joint of hind tarsus ; siphunculi about 0.8 times as long as h. t. 2 | ... | <i>vandenboschi</i> Hille Ris Lambers |
| — Ultimate rostral segment distinctly shorter (about 0.7 times) than second joint of hind tarsus ; siphunculi 1.1 times as long as h. t. 2 | ... | <i>himalayensis</i> Chakrabarti |

146. *Periphyllus* ? *aesculi* Hille Ris Lambers

1933. *Periphyllus aesculi* Hille Ris Lambers, *Stylops*, 2 : 200.

1980. *Periphyllus aesculi* Hille Ris Lambers ; Ghosh, A. K., *Fauna of India, Homoptera, Aphidoidea*, pt. I : 70.

Material examined : 4 apterae oviparae, on *Aesculus* sp., Simla, October, 1974, coll. L. K. Ghosh,

Apterous oviparous female : Body oval, about 2.25-2.55 mm long with about 1.20-1.26 mm as its maximum width near middle of abdomen. Head pale brown ; dorsal cephalic hairs up to about 247μ long and 6.3 times as long as b.d. III. Antennae 6-segmented, concolourous with head except a.s. VI which is darker, about 0.6—0.7 times as long as body ; a.s. VI finger-like, p.t. 1.3-1.4 times as long as base of a.s. VI ; flagellar hairs long with finely drawn out apices, longest hair on a.s. III about 5 times as long as b.d. III. Eyes with distinct ocular tubercles. Rostrum reaching beyond hind coxae ; u.r.s. about as long as h.t. 2, bearing 4 secondary hairs. Dorsal abdominal hairs very long, about 7.0 times as long as b.d. III. Siphunculi about as long as h.t. 2. Hind tibiae swollen with numerous small and round pseudosensoria distributed over its entire length except basal 0.12 and distal 0.17 portion, with many short and very long hairs having acuminate apices, the longest one being about 2.4 times as long as its maximum width. Subgenital plate with numerous short, fine hairs. Other characters as in apterous viviparous female.

Biological notes : The dark brown to brown aphids were collected from the undersurface of the young apical leaves of the host-plant. No ant was found attending the aphids.

Remarks : Hille Ris Lambers (1933) provided very short description of his new species *Periphyllus aesculi* basing only on alate viviparae collected on *Aesculus indicus*. Chakrabarti, Ghosh, A. K. and Raychaudhuri, D. N. (1972) described both apterae and alatae collected on *Aesculus indicus* taken at Uttar Pradesh. But sexuales of the species were hitherto unknown. Ghosh, L. K. (1976a) collected four apterae oviparae (two damaged) on *Aesculus* sp. at Simla Himalaya. These, on comparison with the original description and with authentic material of this species available at the Entomology Laboratory, Department of Zoology, Calcutta University, have been tentatively determined as oviparae of *P. aesculi* Hille Ris Lambers.

147. *Periphyllus himalayensis* Chakrabarti

1977. *Periphyllus himalayensis* Chakrabarti, *Oriental Ins.*, **11** (2) : 216.

1980. *Periphyllus himalayensis* ; Ghosh, A. K. *Fauna of India and adjacent countries, Homoptera, Aphidoidea, pt. I ; Chaitophorinae* : 80.

Material examined : 1 alata, on *Acer* sp., Simla, 30.xii.1972, coll. S. Chakrabarti.

Distribution : India : Himachal Pradesh, West Bengal.

148. *Periphyllus vandenboschi* Hille Ris Lambers

1966. *Periphyllus vandenboschi* Hille Ris Lambers, *Tijdschr. Ent.*, **109** (8) : 217-219.

1980. *Periphyllus vandenboschi* Hille Ris Lambers ; Ghosh, A. K., *Fauna of India and adjacent countries, Aphidoidea, pt. I* : 85.

Material examined : 1 alata and 2 apterous nymphs, on *Acer* sp., Narkanda, 18.ix.1971, coll. K. D. Verma.

Remarks : Hille Ris Lambers (1966) based his description on apterae and nymphs taken from *Acer* sp. at Muree, Pakistan. David, Narayanan and Rajasingh (1969) reported the species for the first time from India. Chakrabarti, Ghosh, A. K. and Raychaudhuri, D. N. (1972) recorded the species from Kumaon Himalaya in India. Subsequently, Verma (1974) collected the nymphs, apterae and a single alata from Simla, the last named morph being described for the first time by him.

Distribution : India : Himachal Pradesh ; and Pakistan.

LXV. Genus *Shivaphis* Das

1918. *Shivaphis* Das, *Rec. Indian Mus.*, 6 (4) : 245.

Type-species ; *Shivaphis celti* Das, 1918.

Body elongate and medium-sized. Head smooth, without lateral frontal tubercles, in apterae with a dorsal longitudinal suture and wax-plates. Antennae 6-segmented, shorter than body ; apterae without secondary rhinaria ; alatae with 6-8 transversely elongate ciliated secondary rhinaria on a.s. III ; primary rhinaria rounded with ciliated margins. Eyes with ocular tubercles. Rostrum hardly reaching mid coxae ; u.r.s. shorter than h.t.2 and with 6-8 secondary hairs. Thorax with well-developed wax-plates. Dorsum of abdomen pale excepting the areas bearing wax-plates ; spinal hairs in parallel longitudinal rows, marginal hair single. Siphunculi distinct, cone-shaped, bearing wax-plates. Cauda elongate with knobbed apex, bearing about 8-11 hairs. Subanal plate deeply bilobed. Rudimentary gonapophyses 2. Subgenital plate with a row of fine hairs on posterior margin and 2 long fine hairs placed wide apart besides 2 other long fine hairs near the anterior margin. Femora smooth, tibiae with wax-plates and spinules ; 4 apical tibial hairs stouter than other tibial hairs ; second tarsal segments with distinct spinules in transverse rows ; first tarsal segments with 6 ventral and 2 dorsal hairs ; empodial hairs flattened. Wing veins usually bordered brown or faintly indicated ; pterostigma fuscous with margin darker ; media of forewing twice branched ; hindwing with 2 oblique veins.

Distribution : Ceylon ; China ; India ; Japan ; Korea ; Nepal ; Pakistan and Taiwan.

149. *Shivaphis celti* Das

1918. *Shivaphis celti* Das, *Rec. Indian Mus.*, 6 (4) : 245.

1970. *Shivaphis celti* Das ; Chakrabarti, Ghosh, A. K. and Chowdhuri, *Oriental Ins.*, 4 (4) : 450.

Material examined : 2 alatae, on unknown tree, Simla, 4.viii.1966, coll. R. Kumar ; 4 apterae, 2 alatae and nymphs, on *Celtis australis*, Mashobra, 26.v.1969, coll. A. N. Chowdhuri.

Biological notes : Yellowish aphids infest the undersurface of the leaves of the host plant.

Distribution : India : Himachal Pradesh, Jammu & Kashmir state, Manipur, Meghalaya, Sikkim, South India, West Bengal ; China ; Japan ; Korea ; Nepal ; Pakistan ; Sri Lanka and Taiwan.

LXVI. Genus *Sipha* Passerini

1860. *Sipha* Passerini, *Gli Afidi*, Parma : 38.

Type-species : *Aphis glyceriae* Kaltenbach, 1843.

Body broadly oval. Head (Fig. 176A) dark brown, without median frontal tubercles, frons smooth, dorsal cephalic hairs stout, long with somewhat acute apices. Eyes without apparent ocular tubercles. Antennae (Fig. 176B) 5-segmented, a little shorter than half as long as body ; flagellum progressively more distinctly imbricated ; flagellar hairs long, about 3.0 times as long as b. d. III ; p. t. 1.5-2.0 times as long as base of a. s. V. Rostrum reaches midcoxae ; u. r. s. short, blunt, about 0.64 times as long as h. t. 2, bearing normally 2 secondary hairs. Abdominal dorsum pigmented ; dorsal hairs long (108 μ —149 μ), marginal hairs present. Siphunculi short, a pore-like. Cauda rounded. Subanal plate also rounded. Redimentary gonapophyses 4. Legs brown ; femoral hairs sparse ; first tarsal segments with 7 ventral and 2 dorsal hairs. Empodial hairs flattened.

Ghosh, A. K. (1980) has discussed the genus from India and adjacent countries.

Distribution : Africa ; Egypt ; Europe ; India ; Israel ; Lebanon ; Turkey.

150. *Sipha* (*Rungisia*) *maydis* (Passerini)

(Fig. 176)

1860. *Sipha maydis* Passerini, *Gli Afidi*, Parma : 38.

1973. *Sipha* (*Rungsiella*) *maydis* Passerini ; Kumar, *Oriental Ins.*, 7 (1) : 11.

1980. *Sipha* (*Rungisia*) *maydis* (Passerini) ; Ghosh, A. K., *Fauna India*, pt. I : 101.

Material examined : Many apterae, on *Avena sativum*, Mashobra, 13.xii.1973 ; many apterae, on *Saccharum officinarum*, Mashobra, 13.xii.1973 ; many apterae, on *Briza minor*, Mashobra, 13.xii.1973 ; many apterae, on *Stellaria media*, Simla, 7.i.1970 ; all L. K. Ghosh coll.

Biological notes : The black aphids were found infesting the young leaves of the host-plant. Ants and coccinellid larvae were noticed in association with the aphids.

Distribution : India : North western part ; Africa ; Europe and Middle East.

LXVII. Genus *Takecallis* Matsumura

1917. *Takecallis* Matsumura, *J. Coll. Agric. Hokkaido Imp. Univ. Sapporo*, 7 (6) : 375.

Type-species : *Takecallis bambusae* Matsumura, 1917.

Body elongate. Head without lateral frontal tubercles ; clypeus with an anteriorly directed nose-like projection. Antennae 6-segmented ; flagellum imbricated and with hairs having acute apices ; p. t. about as long as base VI ; secondary rhinaria ciliated and distributed over a. s. III ; primary rhinaria ciliated. Eyes multifaceted with ocular tubercles. Rostrum short, hardly reaching forecoxae ; u. r. s. shorter than h. t. 2. Abdomen pale ; dorsum smooth ; dorsal hairs short with acute apices ; marginal hairs single, spinal hairs arranged in parallel longitudinal rows excepting on 5th and 7th tergite where these shifted laterad ; 8th tergite with 2-4 hairs. Siphunculi truncate, with or without a hair appended to. Cauda knobbed. Subanal plate bilobed. Rudimentary gonapophyses fused. Subgenital plate with 2 hairs on anterior margin and many hairs on posterior margin. Legs smooth except apical half of tibiae and whole of tarsi which are with spinules ; apical tibial hairs different from other tibial hairs ; first tarsal segments with 5 ventral and 2 dorsal hairs. Wax-pores absent. Media of forewing once-branched ; hindwing with 2 oblique veins.

Tao (1964) has provided key to species based on the material from China. Higuchi (1968) has revised the genus from Japan.

Distribution : America ; China ; Europe ; Formosa ; India ; Japan ; Korea ; New Zealand and Taiwan.

Key to the species of the genus Takecallis Matsumura

Alate viviparae :

Flagellum uniformly dark ; a. s. I and II pale ; a. s. III with 10-15 secondary rhinaria on basal 0.5 portion ...

affinis sp. nov.

— Antennal segments I and II, basal 0.3 portion of a. s. III and apices of a. s. IV-VI dark, rest of antennae pale ; a. s. III with 4-8 secondary rhinaria on basal 0.3 portion only ...

arundinariae (Essig)

151. *Takecallis affinis* sp. nov. (Figs. 179, 222)

Alate viviparous female : Body elongate, about 2.10-2.46 mm long with 0.66-0.90 mm as maximum width. Head (Fig. 179A) light brown ; frons nearly smooth ; median frontal prominence hardly developed ; dorsal cephalic hairs fine and long (about 54μ - 62μ), the longest one about 1.3-1.5 times as long as b. d. III ; clypeus with anteriorly directed finger-like process. Antennae 6-segmented, about 1.4-1.7 times as long as body ; a. s. I and II darker than head ; flagellum blackish except pale and smooth base of a. s. III, rest of the flagellum progressively more imbricated spinulosely ; a. s. III (Fig. 179C) with 10-15 transversely oval to circular finely ciliated secondary rhinaria (Fig. 179C) on basal 0.4 portion except very base ; p. t. about 0.9-1.3 times as long as base of a. s. VI ; flagellar hairs thin and fine, longest hair on a. s. III about 0.7-0.8 times as long as b. d. III. Rostrum short ; u. r. s. about 0.5 times as long as h. t. 2, bearing 4 secondary hairs. Abdominal dorsum with light brown to brown sclerotic spinal areas on segments 1 to 6 ; hairs on anterior abdominal tergites about 18μ - 62μ long, longest one about equal to dorsal cephalic hairs and that on 8th tergite slightly longer than cephalic ones ; marginal hairs present on abdominal segments (Fig. 179D). Siphunculi cylindrical, smooth, a little darker than pale abdomen, about as long as knobbed cauda bearing about 13-15 hairs. Subanal plate (Fig. 179E) bilobed. Legs concolourous with head, with distal half of tibiae and tarsi darker ; femora smooth with fine hairs ; tibiae with spinular imbrications on about distal half ; femoral and tibial hairs normal but apices of tibiae with 4 thick spiny hairs ; second tarsal segment with spinules ; first tarsal segments with 5 ventral and 2 dorsal hairs. Radial sector and pterostigma pale brown to brown, other veins normal.

Measurements (in mm) of the holotype : Length of body 2.46 ; width of body 0.81 ; antenna 3.60 ; a. s. III 1.26, IV 0.91, V 0.78, VI (0.28+0.32) ; u. r. s. 0.06 ; h. t. 2 0.11 ; siphunculus 0.09 ; cauda 0.10.

Alate male (Fig. 222) : Body about 1.95-2.10 mm long. Head dark brown, concolourous with antenna except base of a. s. III which is pale. Antennae about 1.7-2.0 times as long as body ; a. s. III with 28-34 transversely oval secondary rhinaria arranged along the margin in a row and spread over the entire length, a. s. IV with 2-5 almost round secondary rhinaria on distal half, a. s. V with 6-8 and base of a. s. VI with 2-4 similar rhinaria. 7th and 8th abdominal tergites, each with transverse sclerotic band. Subgenital plate sclerotic with numerous small pointed hairs. Claspers sclerotic. Other characters as in alate viviparous female.

Apterous oviparous female : Body about 2.31-2.85 mm long with 0.93-0.99 mm as maximum width near the middle of abdomen. Head brown ; dorsal cephalic hairs up to about 83μ long and about 1.6 times as long as b. d. III.

Antennae 1.1-1.4 times as long as body ; a.s. III with 2 transversely oval finely ciliated secondary rhinaria on basal 0.17 portion ; p.t. about 1.2 times as long as base of a.s. VI ; longest hair on a.s. III about half as long as b.d. III. Abdominal dorsum pale, smooth ; eggs within abdomen about 0.52-0.75 mm long with 0.28—0.39 mm as its middle diameter. Hindtibiae swollen with numerous small round pseudosensoria distributed almost over its entire length, maximum width being about 1.6-1.8 times as wide as that of midtibiae ; longest hair on hindtibiae about as long as or a little longer than its maximum width near base. Other characters as in alate viviparous female.

Material examined : Holotype, Alate viviparous female, INDIA : Himachal Pradesh, Mashobra, on *Bambusa* sp., 28.x.1974, coll. A. N. Chowdhuri ; Paratypes, 3 alate viviparous females, same data as for holotype ; 1 alate viviparous female, on *Arundinaria jounsarensis*, Mashobra, 17.x.1974, coll. L. K. Ghosh. Morphotype, 2 apterous oviparous females, Mashobra, on *Arundinaria jounsarensis*, 17.x.1974, coll. L. K. Ghosh ; Paramorphotype, 1 alate male, vagrant, Simla Hills, December 1973, coll. L. K. Ghosh, 1 alate male, Mashobra, 28.x.1974, coll. A. N. Chowdhuri.

Biological notes : The wax covered insects were found on the underside of the leaves of the host-plant. The wax when removed in alcohol the aphids appeared blackish in colour. No ant was noticed in association with these aphids.

Remarks : Following Higuchi (1972), the new species comes close to *Takecalis arundinariae* (Essig) but differs in being blackish in life, in not having hairs appended to siphunculi, in having more (10-15) secondary rhinaria on a.s. III in alatae (usually 4-8 in *arundinariae*) and also in possessing longer processus terminalis in embryos.

Distribution : India : Himachal Pradesh.

152. *Takecalis arundinariae* (Essig)

(Figs. 180, 221)

1917. *Myzocallis arundinariae* Essig, *Univ. Calif. Publ. Ent.*, 1 : 302.

1971. *Takecalis arundinariae* (Essig) ; Ghosh, A. K., Basu, R. C. and Raychaudhuri, D. N., *Kontyu*, 39 (2) : 125.

Material examined : 2 alatae, on *Dendrocalamus* sp. ; Simla, viii. 1966, coll. A. N. Chowdhuri.

Distribution : India : Arunachal Pradesh, Assam, Himachal Pradesh, Meghalaya, West Bengal ; America ; Europe ; Far eastern countries ; Japan ; Korea and Taiwan.

LXVIII. Genus *Tinocalloides* Basu

1969. *Tinocalloides* Basu, A. N., *Oriental Ins.*, 3 (4) : 367.

Type-species : *Tinocalloides montanus* Basu, 1969.

Body elongate. Head without lateral frontal tubercles. Antennae 6-segmented, shorter than body ; p. t. as long as or slightly longer than base of a. s. VI ; secondary rhinaria transversely oval, and faintly ciliated ; primary rhinaria large, elongate-oval ; flagellar hairs short and fine. Eyes with distinct ocular tubercles. Rostrum short ; u. r. s. bluntish and shorter than h. t. 2. Abdominal dorsum ornamented with rather large brown pleural sclerites on tergites 1-5, each marginal sclerite bearing a tubercle ; marginal sclerite bearing a tubercle ; marginal hair single, spinal hairs arranged in parallel longitudinal rows excepting on 7th segment where these shifted laterally ; pleural hairs absent ; 8th tergite with 6 hairs. Siphunculi truncate with a hair appended to its base. Subgenital plate with many hairs more or less in a row on posterior margin and with 4 hairs anteriorly in two rows. Rudimentary gonapophyses fused. Legs spinulose on apices of tibiae and whole of tarsi ; femoral and tibial hairs long and fine, apices of tibiae with a few thick short spine-like hairs, first tarsal segment with 5 ventral and 2 dorsal hairs. Wax-pores present on body and legs, Subanal plate bilobed. F. T. C. 7, 7, 7. Wing venation normal, media of forewing twice-branched and hindwing with both oblique veins lacking pigmentation on the border.

Quednau (1973) has discussed the affinity of the genus which is monotypic.

Distribution : India and Nepal.

153. *Tinocalloides montanus* Basu

(Fig. 224)

1969. *Tinocalloides montanus* Basu, A. N., *Oriental Ins.*, 3 (4) : 367.

1973. *Tuberdefectus eastopi* Kumar and Lavigne ; Quednau, *Can. Ent.*, 105 : 223.

Material examined : 4 alatae (damaged) and 1 alate male, on snow, Kufri, 15.xii.1973, coll. L. K. Ghosh ; Many alatae and nymphs, on *Prunus puddum*, Simla, 9.xii.1969, coll. A. N. Chowdhuri.

Remarks : Quednau (1973) has provided an excellent redescription and illustrations of the species and the first description of ovipara from Nepal has also been provided. Male of the species is yet to be known. Quednau (*op. cit.*) has also discussed the affinity with the related genera and species. Kumar and Lavigne (1970) while erecting the new genus *Tuberdefectus* (Type-species : *Tuberdefectus eastopi* Kumar and Lavigne), described alatoid

nymph, alate male and alate viviparous female collected on *Prunus* sp. at Simla. Later, Quednau (*op. cit.*) synonymised *Tuberdefectus eastopi* Kumar and Lavigne with *Tinocalloides montanus* A. N. Basu, both feeding on *Prunus* spp. (Rosaceae). In his same publication, Quednau opines "it seems likely that in East Asia these aphids have selected host plants different from those on which they occur in the palaearctic and Nearctic regions".

Distribution : India : Arunachal Pradesh, Himachal Pradesh, Manipur, Meghalaya, West Bengal, Sikkim and Nepal.

Subfamily : GREENIDEINAE

The subfamily Greenideinae under study is represented by the single genus, *viz.* *Eutrichosiphum* Essig and Kuwana in Himachal Pradesh, India.

LXIX. Genus *Eutrichosiphum* Essig and Kuwana

1918. *Eutrichosiphum* Essig and Kuwana, *Proc. Calif. Acad. Sci.*, 8 (3) : 97.

Type-species : *Trichosiphum pasaniae* Okajima, 1908.

Body elongate to oval. Head smooth and without lateral frontal tubercle. Antennae 5-segmented, shorter than body, with long and short flagellar hairs having acute or acuminate apices ; flagellum gradually more distinctly imbricated from base towards apex ; p. t. as long as to much longer than base of last antennal segment. Rostrum extending up to hind-coxae, with distinct 4th and 5th segments. Dorsum of abdomen in apterae smooth or partially to entirely spinulose, in alatae sometimes with a pattern of faint spinulose striae ; hairs on tergites long and short, stout and stiff having acuminate, blunt or furcated apices. Siphunculi in apterae elongated, outwardly curved, non-reticulated, about 0.12-0.50 times as long as body, in alatae cylindrical ; hairs on siphunculi mostly of uniform length and with acuminate to fine apices, sometimes a few of these hairs with slightly to distinctly furcated apices ; in apterae spinules present all over the length, more densely so towards apex, cauda oval. Subanal plate round. Legs pale ; femora ventrally sometimes with spinulose striae ; tibiae mostly smooth excepting the very imbricated apex ; F. T. C. 7, 7, 7. Wing venation normal, radial sector more or less curved.

The genus *Eutrichosiphum* was erected by Essig and Kuwana in 1918. Takahashi (1931) erected the genus *Paratrachosiphum* with *Greenidea tattakana* Takahashi, 1925 as type-species. Raychaudhuri, D. N. (1956) while revising world Greenideinae, retained *Paratrachosiphum* Takahashi as a genus distinct from *Eutrichosiphum* because the former differs from the latter in having 6-segmented antennae. Since *Eutrichosiphum* and *Paratrachosiphum* show agreement in almost all the morphological features and since variation in

the number of antennal segments even in large populations of single species is not uncommon, the criterion of different antennal segments cannot receive ample justification for differentiating the closely allied genera.

In the above context, *Paratrichosiphum* Takahashi has been used here as a subgenus under *Eutrichosiphum*. The subgenus *Neoparatrichosiphum* erected by Ghosh, A. K. and Raychaudhuri, D. N. (1962) under *Paratrichosiphum* is also transferred under *Eutrichosiphum*.

Distribution : China ; India ; Indonesia ; Malaysia ; Taiwan and Vietnam.

Key to the subgenera of Eutrichosiphum Essig and Kuwana

- | | | | |
|-------|--|-----|---|
| 1 (2) | Antennae 5-segmented | ... | <i>Eutrichosiphum</i> s. s. |
| 2 (1) | Antennae 6-segmented | ... | ... |
| 3 (4) | Hairs on siphunculi fine and more or less of similar length | ... | <i>Paratrichosiphum</i> Takahashi |
| 4 (3) | Some of the hairs on siphunculi with fine apices and some others with furcated apices, the latter type of hairs sometimes extending up to basal 0.70 portion of siphunculi | ... | <i>Neoparatrichosiphon</i> Ghosh and Raychaudhuri |

Key to the species of the subgenus Eutrichosiphum Ghosh and Raychaudhuri

- | | | |
|--|-----|---------------------------------|
| Abdominal dorsum spinulose ; dorsal abdominal hairs deeply furcated ; femora smooth ; a. s. III imbricated only on distal 0.25 portion | ... | <i>vandergooti</i> Raychaudhuri |
| — Abdominal dorsum without spinules ; dorsal abdominal hairs indistinctly furcated ; femora somewhat imbricated or spinulated on distal half ; a. s. III imbricated except for basal 0.3 portion | ... | <i>simlaensis</i> sp. nov |

154. *Eutrichosiphum* (*Eutrichosiphum*) *simlaensis* sp. nov.

(Fig. 166)

Apterous viviparous female : Body pear-shaped, about 1.71-1.95 mm long with 0.93-1.05 mm as its maximum width. Head (Fig. 166A) brown, longest hair on dorsum of head 4.0 times as long as b.d. III. Pro- meso- and meta-thoracic tergites with spinules. Antennae 5-segmented, about 0.47-0.5 times as long as body ; apex of a.s. IV (Fig. 166B) and whole of a.s. V dark brown (Fig. 166B), rest of flagellum concolourous with head, a.s. III (Fig. 166B) nearly smooth on basal 0.3 portion, other flagellar segments progressively more distinctly imbricated from base towards apex (Fig. 166B) ; p.t. about 1.3-1.6 times as long as base of a.s. V (Fig. 166B) and about 0.6-0.7 times as long as a.s. III : hairs of flagellum with bluntish to slightly furcated apices, about 9 μ to 93 μ long, the longest one on a.s. III being about 3 times, and

the shortest one about 0.3 times as long as b. d. III. Rostrum reaches well beyond the hind coxae ; segments 4+5 (Fig. 166D) about 2.2-2.5 times as long as second segment of hind tarsus, segment 4 about 5.6-6.6 times as long as segment 5, with about 6 secondary minute hairs. Abdominal dorsum (Fig. 166C) sclerotized, brownish, smooth with short and long hairs having slightly furcated apices (Fig. 166C) on segments 1-6, longest hair on anterior abdominal tergites about 3-4 times as long as b. d. III ; 7th tergite with 2 spinal and 2 lateral and 8th tergite with 2 long and fine hairs, these being about 3.2 times as long as b. d. III, margin of abdominal dorsum with distinct spinules (Fig. 166C). Siphunculi (Fig. 166C) dark brown, a little darker apicad, cigar-shaped, apex slightly curved outwards, about 0.27-0.29 times as long as body and about 3.5 times its maximum diameter ; width at base about 1.6, at middle about 4.0 and at apex about 1.3 times as thick as middle of hindtibiae ; long and short hairs with rather acuminate apices occur intermingled at least on basal half, longest hair a little longer than twice the basal diameter of siphunculus. Cauda (Fig. 166C) coloured like siphunculi, with about 6 hairs. Legs pale yellow except for darker tibiae and tarsi ; femora with spinulose striae on venter ; tibial hairs (Fig. 166E) long with finely drawn out apices, a few hairs at base with incrassate apices, with four apical tibial spiny hairs, F. T. C. 7, 7, 7.

Measurements of one specimen (Holotype) in mm : Length of 1.95 ; width of body 1.05 ; antenna ?, a. s. III 0.39, IV 0.18, V ?, u. r. s. IV+V (0.21+0.03) ; h. t. 2 0.11, siphunculus 0.55.

Material examined : Holotype, apterous viviparous female, INDIA : Himachal Pradesh, Narkanda, on *Quercus* sp., 27.ix.1974 ; paratypes : 2 apterous viviparous females and a few apterous nymphs, data same as holotype.

Biological notes : The greenish apterae formed small colony on the under-surface of young leaf as well as on apical shoot of the host-plant. Neuropteran larvae were found as predator.

Remarks : In having 5-segmented antennae and medially smooth abdominal dorsum, the new species resembles *Eutrichosiphum* (*Eutrichosiphum*) *assamense* Ghosh, A. K., Basu, R. C. and Raychaudhuri, D. N. and *E. (E.) quercifoliae* Raychaudhuri, D. N., Ghosh, M. R. Banerjee and Ghosh, A. K. but differs from the former in the presence of somewhat slightly furcated dorsal hairs and from the latter not only by the shape of dorsal hairs but also by shorter siphunculi, longer hairs on a. s. III and longer rostrum.

Distribution : India : Himachal Pradesh.

155. *Eutrichosiphum vandergooti* Raychaudhuri

1956. *Eutrichosiphum vandergooti* Raychaudhuri, D. N., *Zool. Verh.*, **31** : 19.

1970. *Eutrichosiphum vandergooti* Raychaudhuri ; Ghosh, L. K., *Sci. Cult.*, **36** : 563.

Material examined : 1 aptera, on *Quercus* sp., Simla, 17.vi.1968, coll. K. D. Verma.

Note : The species is a new record from Himachal Pradesh.

Distribution : India : Arunachal Pradesh, Himachal Pradesh ; and Indonesia.

Key to the species of the subgenus Neopatrinosiphum

- Cauda with 8-10 hairs ; segment 4 of u. r. s. about 8 times as long as segment 5 ; longest hair on a. s. III about 1.8-3.0 times as long as b. d. III ... *khasyanum* (Ghosh and Raychaudhuri)
- Cauda with only 2 hairs ; segment 4 of u. r. s. about 3.6-4.5 times as long as segment 5 ; longest hair on a. s. III about 1.3-1.7 times as long as b. d. III ... *atini* Raychaudhuri and Chatterjee

156. *Eutrichosiphum* (*Neopatrinosiphum*) *atini*

Raychaudhuri and Chatterjee

1977. *Eutrichosiphum* (*Neopatrinosiphum*) *atini* Raychaudhuri, D. N. and Chatterjee, M., *Sci. Cult.*, **43** : 536.
1974. *Holotrichosiphon* sp. ; Chakrabarti, Chowdhuri and Raychaudhuri, D. N., *Sci. Cult.*, **40** : 461.

Material examined : 1 aptera, on unidentified plant, Simla, 20.v.1971 ; many apterae, on unidentified plant, Simla, 12.viii.1971, coll. A. N. Chowdhuri.

Note : The species is characterised in having shorter segment 5 of rostrum, and most of siphuncular hairs with acuminate or slightly furcated apices.

Distribution : India : Himachal Pradesh.

157. *Eutrichosiphum* (*Neopatrinosiphum*) *khasyanum*

(Ghosh and Raychaudhuri)

(Fig. 198)

1962. *Paratrinosiphum* (*Neopatrinosiphum*) *khasyanum* Ghosh, A. K., and Raychaudhuri, D. N., *J. Asiat. Soc. Beng.*, **4** (3-4) : 108.
1962. *Paratrinosiphum tattakanum assamense* Ghosh, A. K. and Raychaudhuri, D. N., *J. Asiat. Soc. Beng.*, **4** (3-4) : 112.
1972. *Paratrinosiphum* (*Neopatrinosiphum*) *khasyanum* Ghosh and Raychaudhuri ; Chakrabarti, Ghosh, A. K. and Raychaudhuri, D. N., *Oriental Ins.*, **6** (3) : 395.

Material examined : Many apterae and a few nymphs, on *Quercus dilata*, Simla, April, 1966 ; 3 apterae and 1 nymph, on *Quercus incana*, Simla,

April 1966, Coll. A. N. Chowdhuri ; 1 aptera, on *Quercus* sp., Simla, 12.v. 1968, coll. K. D. Verma.

Biological notes : The yellowish aphids infest the undersurface of the leaves of the host-plants.

Remarks : Ghosh, A. K. and Raychaudhuri, D. N. (1962) described *assamense* as a subspecies of *Paratrichosiphum tattakanum* but the presence of both furcated and normal hairs on siphunculi was then apparently overlooked. In view of the nature of siphuncular hairs at least in apterae brings the subspecies to the subgenus *Neoparatrichosiphum* and in that case (*Neoparatrichosiphum*) *assamense* and (*Neoparatrichosiphum*) *khasyanum* appear conspecific. Both *khasyanum* and *assamense* were described in the same publication. Following the law of priority in respect of page number the name *khasyanum* is retained here.

Distribution : India : Arunachal Pradesh, Himachal Pradesh, Manipur, Meghalaya, and Uttar Pradesh.

Key to the species of the subgenus Paratrichosiphum Takahashi

Processus terminalis 1.4-1.6 times as long as base

VI : longest hair on a. s. III 2.5-3.0 times as long as

b. d. III ; siphunculi 3.3-5.0 times as long as its maximum width

... *neoalnicola* Raychaudhuri, Ghosh and Das

— Processus terminalis 1.9-2.2 times as long as base VI ;

longest hair on a. s. III 3.8-4.0 times as long as b. d.

III ; siphunculi 5.6-6.0 times as long as its maximum width

... *alnicola* (Basu)

158. *Eutrichosiphum* (*Paratrichosiphum*) *alnicola* (Basu)

1967. *Paratrichosiphum alnicola* Basu, A. N., *Bull. Ent.*, 8 (2) : 14.

1980. *Eutrichosiphum* (*Paratrichosiphum*) *alnicola* (Basu) ; Raychaudhuri, D. N., Ghosh, L. K. and Das, S. K., *Ins. matsum.*, n. s., 20 : 64.

Material examined : 2 alate oviparous females, on *Quercus incana*, Mashobra, 17.x.1974, coll. L. K. Ghosh.

Biological notes : The specimens were collected from the undersurface of the leaf of the host plant growing in the shady place. No ant or predator was noticed in association with the aphids. The oviparous morph was found singly on the leaf.

Distribution : India : Himachal Pradesh, Sikkim and West Bengal.

**159. *Eutrichosiphum* (*Paratrichosiphum*) *neoalnicola* Raychaudhuri *et al.*
(Fig. 167)**

1980. *Eutrichosiphum* (*Paratrichosiphum*) *neoalnicola* Raychaudhuri, D. N., Ghosh, L. K. and Das, S. K., *Ins. matsum.*, n. s., 20 : 34-36.

Material examined : 3 apterous viviparous females, Nagwain (c 5,000 ft.), on *Quercus* sp., July 1970, coll. S. K. Sen ; paratypes, 1 apterous viviparous female, Narkanda, on *Quercus* sp., 27.ix.1974, coll. L. K. Ghosh.

Biological notes : The aphids were collected from the undersurface of leaves and tender shoot of the host-plants. Ants were found to attend the aphids.

Distribution : India : Himachal Pradesh.

Subfamily : HORMAPHIDINAE

Key to the genera of Hormaphidinae

- | | | | | |
|-------|--|-----|-----|--|
| 1 (4) | Antennae 3-segmented ; siphunculi absent | ... | ... | 2 |
| 2 (3) | Minute submarginal hairs present on each side of tergites 1-V11 ; tarsi and claws rudimentary ; cauda much broader than long and with basal constriction... | | | <i>Reticulaphis</i> Takahashi |
| 3 (2) | Submarginal hairs absent on abdominal segments ; legs with normal tarsi and claws ; cauda knobbed, wider than long and without constriction | ... | | <i>Pseudothoracaphis</i> Raychaudhuri
<i>et al.</i> |
| 4 (1) | Antennae always more than 3-segmented ; siphunculi either on elevated cone or poriform | --- | ... | 5 |
| 5 (8) | Two dorsoapical hairs on 2nd tarsal segments in apterae with swollen apices | ... | ... | 6 |
| 6 (7) | Siphunculi on elevated cones ; at least marginal wax gland cell groups on abdomen consist of partly transversely oval cells arranged in a row | ... | | <i>Astegopteryx</i> Karsch |
| 7 (6) | Siphunculi poriform ; wax gland cell groups consisting of rounded cells or some irregularly shaped ones ; dorsoapical hairs on 2nd tarsal segments in both apterae and alatae smooth and with swollen apices | ... | | <i>Ceratovacuna</i> Zehntner |
| 8 (5) | One dorsoapical hair on 2nd tarsal segments in both apterae and alatae with swollen apex and other always shorter with more or less normal apex | ... | | <i>Pseudoregma</i> Doncaster |

LXX. Genus *Astegopteryx* Karsch

1890. *Astegopteryx* Karsch, *Ber. dt. bot. Ges.*, 8 : 51.

Type-species : *Astegopteryx styracophila* Karsch, 1890.

Body pear-shaped ; head smooth to slightly wrinkled and with a pair of blunt frontal horns bearing minute hairs ; dorsal cephalic hairs fairly long with acute apices ; in apterae fused head and prothorax with wax glands ; alatae with head free from prothorax and without wax-glands. Antennae short, 4-or 5-segmented ; antennal segments in alatae with closely set sub-annular secondary rhinaria ; flagellar hairs short with acute apices ; p. t.

about 0.10-0.25 times as long as base of last segment. Rostrum short, extends just beyond the forecoxae ; u. r. s. about 0.6-0.7 times as long as the 2nd segment of hind tarsus. Abdominal dorsum pale with sparse and rather long acute hairs. Siphunculi on elevated cones, with a few hairs on or around siphuncular cone. Cauda broader than long with a basal constriction and bears stout long hairs. Subgenital plate normal. F. T. C. 3, 3, 2 ; 2nd tarsal segment with sparse normal imbrications and with a pair of long dorsoapical hairs having funnel-shaped apices, and in alatae one such hair with blunt to subacute apices. M of forewing once-branched ; Cu and A united at base ; hindwing with 2 oblique veins.

Distribution : China ; India ; Indonesia ; Japan, Korea and Taiwan.

160. *Astegopteryx minuta* (van der Goot)

1917. *Oregma minuta* van der Goot, *Contrib. Faune Indes neerl.*, 1 (3) : 201.

1980. *Astegopteryx minuta* (v. d. Goot) ; Raychaudhuri, D. N., Ghosh, L. K. and Das, S. K., *Ins. matsum.*, n. s., 20 : 36.

Material examined : A few alatae, on an unidentified host (Gramineae), Solan, 25.x.1978, coll. M. R. G. and P. K. M.

Distribution : India : Arunachal Pradesh, Himachal Pradesh, Manipur, Meghalaya, Nagaland, Sikkim, Uttar Pradesh, South India, West Bengal ; and Japan.

LXXI. Genus *Ceratovacuna* Zehntner

1897. *Ceratovacuna* Zehntner, *Meded. Proefs. Oost-Java*, (n. s.), 37 : 29.

Type-species : *Ceratovacuna lanigera* Zehntner, 1897.

Body rather pear-shaped. Head and prothorax fused in apterae and with a pair of short bluntish horns, these in alatae much reduced ; Cephalothorax in apterae often with wax-gland cells. Antennae in apterae 4-or 5-segmented ; 5-segmented in alatae ; flagellum imbricated, flagellar hairs usually short to fairly long ; secondary rhinaria in alatae subannular ; p.t. upto about half as long as base of last antennal segment ; primary rhinaria very finely ciliated. Eyes in apterae 3-faceted with triommatidia. Rostrum short, extending upto midcoxae ; u.r.s. bluntish, short, and without secondary hairs. Abdominal dorsum in apterae pale or may be sclerotic around wax-gland cell groups ; dorsal hairs sparse usually with swollen apices ; alatae with variably developed spinopleural sclerotic dorsal bands on post siphuncular segments. Siphunculi poriform, with a sclerotic rim. Cauda transversely oval with a distinct constriction. Anal plate bilobed. Legs pale brown, smooth ; F.T.C. 4,3,2 ; dorsoapical hairs on second tarsal segments stout, long and with funnel-shaped apices.

Remarks : Ghosh, M. R., Pal and Raychaudhuri, D. N. (1976) have discussed on the genus.

Distribution : Ceylon ; India ; Indonesia ; Japan ; and Philippines.

161. *Ceratovacuna lanigera* Zehntner

1897. *Ceratovacuna lanigera* Zehntner, *Meded. Proefs. Java* (n. s.), 37 : 29.

1980. *Ceratovacuna lanigera* ; Raychaudhuri, D. N., Ghosh, L. K. and Das, S. K., *Ins. matsum.*, n. s., 20 : 36.

Material examined : Many apterae and nymphs, on an undet. host (Gramineae), Solan, 25.x.1978, coll. M. R. G. and P. K. M.

Distribution : India : Assam, Himachal Pradesh, Sikkim, Tripura, Uttar Pradesh, West Bengal, Ceylon, Indonesia ; Japan and Philippines.

LXXII. Genus *Pseudoregma* Doncaster

1966. *Pseudoregma* Doncaster, *Entomologist*, 99 : 159.

Type-species : *Oregma bambusicola* Doncaster, 1966.

Body oval to pear-shaped. Head brown with numerous waxpores, fused with prothorax in apterae ; dorsal cephalic hairs acute and sparse. Antennae 4- or 5-segmented in apterae, in alatae antennae always 5-segmented, sparsely imbricated, flagellar hairs sparse ; in alatae flagellar segments with subannular secondary rhinaria all over ; p. t. at most 0.50 times as long as base of last antennal segment. Eyes 3-faceted in apterae, in alatae multifaceted with reduced triommatidia. Rostrum reaches up to mid coxae ; u. r. s. blunt, without any secondary hair. Abdomen pale to pale brown ; dorsal hairs sparse, short with acute apices ; abdominal dorsum in apterae with sclerotic patches and with irregularly scattered waxpores ; Siphunculi poriform, on brown sclerotic areas. Cauda transversely oval with distinct basal constriction and with numerous long hairs. Anal plate bilobed. Legs dark brown, sparsely spinuled ; empodial hair and dorsoapical hairs on second tarsal segment almost as long as or slightly longer than claw and with funnel-shaped apices ; F. T. C. 4, 4, 2. Wing veins brown, M of forewing once-branched ; Cu and A united at base ; hindwings with 2 oblique veins.

Remarks : Detailed discussion on the genus has been made by Ghosh, M. R., Pal and Raychaudhuri, D. N. (1976).

Distribution : China ; India ; Indonesia, Japan, Sri Lanka, Taiwan and Vietnam.

162. *Pseudoregma bucktoni* Ghosh, Pal and Raychaudhuri

1976. *Pseudoregma bucktoni* Ghosh, M. R., Pal and Raychaudhuri, D. N., *Proc. zool. Soc. Calcutta*, 27 : 113.

1980. *Pseudoregma bucktoni* ; Raychaudhuri, D. N., Ghosh, L. K., and Das, S. K., *Ins. matsum.*, n. s., 20 : 36.

Material examined : 2 alatae, on *Bambusa* sp., Solan, 25. x. 1978, coll. M. R. G. and P. K. M.

Distribution : India : Himachal Pradesh, Manipur, Meghalaya, Nagaland, Sikkim, South India, West Bengal, Sri Lanka ; Taiwan and Vietnam.

LXXIII. Genus *Pseudothoracaphis* Raychaudhuri, Ghosh and Das

1980. *Pseudothoracaphis* Raychaudhuri, D. N., Ghosh, L. K. and Das, S. K., *Ins. matsum.*, n. s., 20 : 36.

Type-species : *Pseudothoracaphis himachali* Raychaudhuri, Ghosh and Das.

Body semioval, dark brown, sclerotised. Antennae 3-segmented ; prosoma and abdominal segments completely separated ; submarginal hairs on prosoma and fused abdominal segments absent ; dorsal hairs minute. Dorsum of prosoma wrinkled and sculptured but without pustules ; submarginal area appears reticulated, posteromesial hairs on prosoma and abdomen absent. Eyes 3-faceted. Rostrum short ; u. r. s. blunt, without any secondary hair. Cauda knobbed. Subanal plate bilobed. Legs normal with claws ; dorsoapical hairs on second tarsal segment with expanded apices.

Distribution : India.

163. *Pseudothoracaphis himachali* Raychaudhuri, Ghosh and Das

1980. *Pseudothoracaphis himachali* Raychaudhuri, D. N., Ghosh, L. K. and Das, S. K., *Ins. matsum.*, n. s., 20 : 37.

Material examined : Many apterae, Kufri, on *Ilex* sp., 28.x.1978 ; many apterae, Mashobra, on *Quercus* sp., 28.x.1978, coll. M. R. G. and P. K. M.

Distribution : India : Himachal Pradesh.

LXXIV. *Reticulaphis* Takahashi

1958. *Reticulaphis* Takahashi, *Ins. matsum.*, 22 (1/2) : 11.

Type-species : *Reticulaphis shiiae* Takahashi.

Body rather ovate, depressed, strongly sclerotised, dark brown. Eyes submarginal, 3-faceted. Antennae short, 2 or 3 segmented. Cephalothorax reticulated, without papillae, with about 20 long setae on marginal area, 6 of which are between eyes. Rostrum short ; u.r.s. with blunt apex and without any secondary hair. Abdomen small, separated from cephalothorax, with 6 minute submarginal setae on each side of anterior part (tergites I-VII), 8th tergite

with 2 hairs. Cauda much broader than long, constricted basally. Subanal plate deeply bilobed. Legs short, hind legs a little exposed, tarsi rudimentary, not segmented, claws rudimentary or atrophied.

Distribution : India : Indonesia.

164. *Reticulaphis distylli rotifera* Hille Ris Lambers and Takahashi

1959. *Reticulaphis distylli rotifera* Hille Ris Lambers and Takahashi, *Tidschr. Ent.*, 102 (i) : 12.

1980. *Reticulaphis distylli rotifera* Hille Ris Lambers and Takahashi ; Raychaudhuri, D. N., Ghosh, L. K. and Das, S. K., *Ins. matsum.*, n. s., 20 : 28.

Material examined : Many apterae, on *Quercus* sp., 28.1978, coll. M. R. G. and P. K. M.

Distribution : India : Himachal Pradesh ; and Indonesia.

Subfamily LACHNINAE

Key to the tribes :

- | | | |
|---|-----|----------|
| 1 (2) Second tarsal segment of the hind leg greatly elongated, first segment reduced ; eyes of true apterae only with three facets | ... | Tramini |
| 2 (1) Second tarsal segment of the hind leg normal, never elongate as above, first segment never reduced ; eyes of all forms usually many-faceted | ... | 3 |
| 3 (4) Ultimate rostral segment long and pointed, distinctly divided into segments 4 and 5 (Fig. 46), cone-shaped ; media of forewing faintly indicated, radial sector short and straight | ... | Cinarini |
| 4 (3) Ultimate rostral segment rather short and blunt (Fig. 54), rostral segment 5 reduced ; media of forewing distinctly indicated, radial sector of moderate length and slightly to markedly curved | ... | Lachnini |

Tribe Cinarini

Key to the genera of Cinarini

- | | | |
|---|-----|--|
| 1 (2) Eyes in apterae without ocular tubercle ; apterae with thick hairs arising from papillate, sclerotic bases, these being mostly furcated ; first tarsal segments with 10-11 ventral hairs and one short peg-like dorsal hair ; on Labiatae | ... | <i>Indocinara</i> Ghosh, Basu and Raychaudhuri |
| 2 (1) Eyes in apterae with ocular tubercle ; apterae sometimes with a rhinarium of a. s. III ; dorsal abdominal hairs thin and pointed ; first tarsal segments without dorsal hairs ; midthoracic furca in apterae with a short stalk ; usually on Pinaceae | ... | <i>Cinara</i> Curtis |

LXXV. Genus *Cinara* Curtis1835. *Cinara* Curtis, *British Entomology*, 12 : 576.Type-species : *Aphis pini* Linnaeus, 1758.

Head without lateral frontal tubercles. Antennae 6-segmented, shorter than body ; p. t. about 0.09-0.40 times as long as base of a. s. VI ; apterae usually without secondary rhinaria, alatae with secondary rhinaria on a. s. III and IV and sometimes also on a. s. V and VI ; flagellar hairs long with finely drawn out apices. Eyes with ocular tubercles. Rostrum long and pointed ; rostral segments 4 and 5 distinct and these together short to much longer than h. t. 2. Midthoracic furca with a short stalk. Abdominal tergites usually pale but sometimes with numerous dark brown hair-bearing sclerites. Siphunculi ring-like and placed on hairy cones (Fig. 69). Cauda (Fig. 99) semioval to crescent-shaped, bearing up to about 20 hairs, only about 0.1 times as long as claws. Subanal plate entire. Wing venation normal, radius originating from apex of the pterostigma ; media once-or twice-branched, hindwing with 2 oblique veins.

Ghosh, A. K. (1982) has discussed the genus from India and adjacent countries.

Distribution : Cosmopolitan.

Key to the species and subspecies of the genus Cinara Curtis

Apterae viviparae :

- | | |
|---|--|
| Flagellar hairs short, about 0.6 times as long as b. d. | |
| III ; legs with scattered patches | ... <i>maculipes</i> Hille Ris Lambers |
| Flagellar hairs much longer, about 4.0 times as long | |
| as b. d. III ; legs without such patches | ... <i>confinis tenuipes</i> (Chakrabarti and Ghosh) |

Alate viviparae :

- | | |
|---|--|
| Segment 4 of rostrum with about 20 secondary hairs ; | |
| a. s. III with 2-4, IV with 2-3, V with 1-2 and VI | |
| with 6 secondary rhinaria ; cauda always with more | |
| than 10 hairs ; longest flagellar hair about 4.5-5.0 | |
| times as long as b. d. III | ... <i>chaetorostrata</i> Ghosh and Raychaudhuri |
| Segment 4 of rostrum with only 4 secondary hairs ; | |
| a. s. III with 7-9, IV with 2-3, V with 1-2 and VI | |
| with 4 secondary rhinaria ; cauda with at most 10 | |
| hairs ; longest flagellar hair up to about 4.0 times as | |
| long as b. d. III | ... <i>confinis tenuipes</i> Chakrabarti and Ghosh |

165. *Cinara confinis tenuipes* (Chakrabarti and Ghosh)

1974. *Cinara abieticola tenuipes* Chakrabarti and Ghosh, A. K., *Oriental Ins.*, 8 (4) : 522-524.

1976. *Cinara confinis tenuipes*; Eastop and Hille Ris Lambers, *Survey World's Aphids*, : 148.

Material examined : 3 apterae and 2 alatae, host unknown, Mashobra, 6.iv.1970, coll. A. N. Chowdhuri ; 3 alatae, on snow, Kufri, 15.xii.1973 ; 1 alate male, on snow, Kufri, 15.xii.1973 ; 1 alate male (damaged), on snow, Jakhoo, Simla, 12.xii.1973, all L. K. Ghosh coll.

Alate male (Fig. 193) : Body 2.55-3.00 mm long with 0.99-1.05 mm as maximum width near middle of abdomen. Head and thorax black. Head with a median suture ; dorsal cephalic hairs fine and about 140μ - 160μ long. Antennae about 0.4-0.5 times as long as body ; a. s. III with 24-35, IV with 12-14, V with 1-9 and VI with 0-3 tuberculate secondary rhinaria, a. s. VI with 4-5 accessory rhinaria near the primary rhinarium, secondary rhinaria on a. s. III, IV and V arranged irregularly almost over the entire length, those on a. s. VI restricted only on basal 0.3 portion. Rostral segments 4+5 about 0.6 times as long as h. t. 2 and with 4 secondary hairs. Abdominal dorsum pale with spinal sclerites besides marginal ones ; dorsal hairs about 156μ - 169μ long. Legs pale yellow to dark brown. First tarsal segments with about 14 hairs. Wing venation normal. Other characters as in alate viviparous female.

Note : Chakrabarti and Ghosh, A. K. (1974) described the subspecies based on apterae and alatae collected from *Abies* sp. at Simla. Ghosh, A. K. (1982) described a single alate male collected on snow, Jakhoo, 12.xii.1973, coll. L. K. Ghosh. However, the morph is redescribed here with more specimens.

Distribution : India : Himachal Pradesh.

166. *Cinara chaetorostrata* Ghosh and Raychaudhuri

(Fig. 163)

1981. *Cinara chaetorostrata* Ghosh, L. K. and Raychaudhuri, D. N., *Entomon*, 6 (2) : 173.

1982. *Cinara chaetorostrata* ; Ghosh, A. K., *Fauna India, Homoptera, Aphidoidea*, pt. 11 : 24.

Material examined : *Holotype* : Alate viviparous female ; Kufri, on snow, 15.xii.1973, coll. L. K. Ghosh ; *paratype*, alate viviparous female, same data as for holotype.

Note : The dark brown alate aphids were collected dead on snow at an elevation of Ca. 2500 m.

Distribution : India : Himachal Pradesh,

167. ***Cinara maculipes* Hille Ris Lambers**

1966. *Cinara maculipes* Hille Ris Lambers, *Tijdschr. Ent.*, **109** (8) : 203-204.

1969. *Cinara maculipes* Hille Ris Lambers ; David, Narayanan and Rajasingh, *Bull. Ent.*, **10** (2) : 158.

1982. *Cinara maculipes* ; Ghosh, A. K., *Fauna of India, Homoptera, Aphidoidea* pt. 11, Subfamily Lachninae : 46.

Material examined : 2 apterae, on *Pinus wallachiana*, Manali, 12.vi.1968, coll. S. G. Rajasingh and K. Narayanan ; 3 apterae and 10 nymphs, on *Pinus* sp., Mashobra, 17.x.1974, coll. L. K. Ghosh ; 1 aptera and 6 nymphs, on *Pinus* sp., Thanedar, 2.x.1974, coll. L. K. Ghosh.

Distribution : India : Himachal Pradesh, Jammu and Kashmir ; and Pakistan.

LXXVI. Genus ***Indocinara* Ghosh, Basu and Raychaudhuri**

1969. *Indocinara* Ghosh, A. K., Basu, R. C. and Raychaudhuri, D. N., *Oriental Ins.*, **3** (3) : 249.

Type-species : *Indocinara hottesis* Ghosh, Basu and Raychaudhuri, 1969.

Medium-sized oval insects. Head dark brown ; hairs on frons fine ; dorsal cephalic hairs acuminate or furcated at apices ; Eyes without occular tubercles. Antennae pale, 6-segmented, about 0.25 times as long as body, flagellar hairs long, fine and acute, p. t. very short, about 0.25 times as long as base of a. s. VI ; apterae without secondary rhinaria. Rostrum long, reaching middle of abdomen, rostral segments (4+5) about as long as h. t. 2 ; rostral segments 4 and 5 distinctly divided, segment 5 acute and about half as long as segment 4, the latter being about as long as h. t. 2. Abdominal hairs thick (Fig. 201), arising from papillate sclerotic bases and with acuminate or furcated apices ; 8th tergite with about 8 hairs ; each of 7th and 8th tergite with a dark brown transverse sclerotic band. Siphunculi on hairy cones (Fig. 201) ; siphuncular hairs similar to dorsal abdominal hairs. Cauda (Fig. 201) semilunar, bearing many fine hairs. Legs pale with coxae, trochanters, preapical part of femora and very apex of tibiae and tarsi dusky ; hairs on legs fine with acute apices. First tarsal segments bearing 10-11 ventral hairs and one peg-like hair.

Distribution : India.

168. ***Indocinara hottesis* Ghosh, Basu and Raychaudhuri**
(Figs. 201, 202)

1969. *Indocinara hottesis* Ghosh, A. K., Basu, R. C. and Raychaudhuri, D. N., *Oriental Ins.*, **3** (3) : 249.

1969. *Cinara* sp. ; Chowdhuri, Basu, R. C. and Raychaudhuri, D. N., *Sci. Cult.*, **35** : 334.

1982. *Indocinara hottesis* ; Ghosh, A. K., *Fauna of India, Homoptera, Lachninae*, pt. 11 : 60.

Material examined : 1 aptera and 3 nymphs, on *Plectranthus* sp., Simla, September 1966, coll. A. N. Chowdhuri ; 1 apterous ovipara, host unknown, Simla, October-November 1974, coll. A. N. Chowdhuri ; 1 damaged ovipara, on indet. tree, Kufri, 5.vii.1970, coll. K. D. Verma.

Apterous oviparous female (Fig. 202) : Body oval, about 3.15-3.42 mm long with 1.86-2.10 mm as its maximum width near middle of abdomen. Head dark brown ; frontal hairs fine, longest one about 117μ and about 4-5 times as long as b. d. III. Antennae 6-segmented, about 0.26 times as long as body, flagellar hairs long and fine, longest one about 3.0 times as long as b. d. III. Rostral segments (4+5) about 0.8 times as long as h. t. 2, segment 4 about twice as long as segment 5. Abdominal hairs thick with both pointed and furcated apices, about 12μ - 24μ long, the longest one about 4.0 times as long as b. d. III ; 8th abdominal tergite with 8 hairs up to about 26μ long. Hindtibiae pigmented except the very base, swollen, about 8.4-8.6 times as long as its maximum width at the middle which is about 2.1 times as thick as mid-diameter of other tibiae and with numerous small round pseudosensoria (Fig. 202) distributed irregularly almost over its entire length ; hairs on hindtibiae with acuminate apices, longest one being about 130μ long and about 5 times as long as b. d. III. Subgenital plate dark sclerotic, transversely oval with slight constriction anteromedially and bearing numerous long hairs with acute to acuminate apices.

Measurements (in mm) of an ovipara : Length of body 3.42 ; width of body 1.86 ; antenna 0.81 ; a.s. III 0.29, IV 0.16, V 0.18, VI (0.09+0.03) ; u. r. s. 4+5 (0.04+0.03) ; h. t. 2 0.054.

Remarks : Ghosh, A. K., Basu, R. C. and Raychaudhuri, D. N. (1969) erected the genus *Indocinara* with *I. hottesis* Ghosh *et al.* as its type. The genus was described from apterae and nymphs collected on *Plectranthus coetsa* at Simla. Males are unknown.

Distribution : India : Himachal Pradesh.

Tribe Lachnini

Key to the genera of Lachnini

- | | | | | |
|-------|---|-----|--------------------------------|---|
| 1 (2) | Abdominal dorsum with a large spinal tubercle on 4th tergite | ... | <i>Tuberolachnus</i> Mordvilko | |
| 2 (1) | Abdominal dorsum without such tubercle | ... | ... | 3 |
| 3 (4) | Triommatidia absent in adults ; body elongated oval ; dorsal cephalic hairs usually long and fine, may be upto 6.5 times as long as b. d. III | ... | <i>Nippolachnus</i> Matsumura | |
| 4 (3) | Triommatidia present in adults ; body usually globular or pear-shaped ; dorsal cephalic hairs only upto 3.5 times as long as b. d. III | ... | ... | 5 |

- 5 (6) Rostrum extending beyond body ; segments 4+5 about 1.5 times as long as h. t. 2 ; cauda subconical, rounded at apex ; hind tibiae shorter than body ... *Stomaphis* Walker
- 6 (5) Rostrum reaches hind coxae ; segments 4+5 about 0.6-0.8 times as long as h. t. 2 ; cauda semioval ; hind tibiae longer than body ... *Lachnus* Burmeister

LXXVII. Genus *Lachnus* Burmeister

1835. *Lachnus* Burmeister, *Handbuch der Entomologie, Berlin*, 2 (1) : 91.

Type-species : *Lachnus fasciatus* Burmeister, 1835 = *Aphis ruboris* Linnaeus, 1758.

Medium-sized body. Head smooth with frons slightly convex and without lateral frontal tubercles ; dorsal cephalic hairs long with acute to subacute apices or short and thick with blunt apices. Antennae 6-segmented, about half as long as body ; flagellum smooth or imbricated, flagellar hairs long with acute apices or short and spiny with blunt apices ; apterae usually with secondary rhinaria, alatae always with large rounded secondary rhinaria ; p. t. shorter than base of a. s. VI, and bears many hairs. Eyes with ocular tubercles. Rostrum reaches hindcoxae ; u. r. s. (Fig. 54) blunt, slightly shorter than to as long as h. t. 2, segment 5 very short but distinct. Midthoracic furca sessile. Abdominal dorsum pale and with muscle-plates. Dorsal hairs like cephalic hairs. Siphunculi on pigmented hairy cones. Cauda dark, broadly semilunar and bears numerous hairs. Subgenital plate brown with the posterior margin depressed anteriorly and bears numerous fine hairs. Legs brown, smooth but the second tarsal segment with usual imbrications. First tarsal segments with many ventral hairs. Forewing (Fig. 62) variegated, a white blotch at base of media, radial sector curved at least near base.

Ghosh, A. K. (1982) has discussed the genus.

Remarks : This genus is close to *Eulachnus* del Guercio and *Maculolachnus* Gaumont. But the former genus is distinct in having dorsal hairs on first tarsal segments while the latter has hind tibiae shorter than body.

Distribution : Cosmopolitan.

Key to the species of Lachnus Burmeister

- 1 (2) Hairs on antennal segment III much longer, up to about 3 times as long as basal diameter of the segment ; antennal segment III with 1-2 secondary rhinaria ... *longisetosus* Ghosh
- 2 (1) Hairs on antennal segment III rather shorter, almost twice as long as the basal diameter of the segment ; antennal segment III always with more than 2 secondary rhinaria ... 3

- 3 (4) Wings pale hyaline ; antennal segment VI as long as segment IV ; antennal segment III with fewer number (7-8) of secondary rhinaria ... *longirostrum* David and Ghosh
- 4 (3) Wings variegated ; antennal segment VI much shorter than segment IV ; antennal segment III with more number (6-13) of secondary rhinaria ... 5
- 5 (6) Ultimate rostral segment bears 18-22 accessory hairs and 0.90-1.0 times as long as second joint of hind tarsus ; antennal segment III with 12-23 protuberant secondary rhinaria ... *tropicalis* (van der Goot)
- 6 (5) Ultimate rostral segment bears 11-12 accessory hairs and less than 0.70 times as long as second joint of hind tarsus ; antennal segment III only with 6-7 small secondary rhinaria ... *acutihirsutus* Kumar and Burkhardt

169. *Lachnus acutihirsutus* Kumar & Burkhardt

1970. *Lachnus acutihirsutus* Kumar and Burkhardt, *J. kans. ent. Soc.*, **43** (4) : 461.

1982. *Lachnus acutihirsutus* ; Ghosh, A. K., *Fauna of India, Homoptera*, subfamily *Lachninae*, pt. II : 84.

Material examined : 1 aptera and 1 alata, on a tree (indet.), Simla, 31.vii.1966, coll. R. Kumar.

Distribution : India : Himachal Pradesh.

170. *Lachnus longirostrum* David and Ghosh

1982. *Lachnus longirostrum* David and Ghosh, A. K., *Fauna of India, Homoptera*, pt. 2 : 83.

Material examined : 2 apterae and 1 alata, on *Salix fragilis*, Manali, 12.vi.1968. coll. S. G. R. & K. Narayanan.

Distribution : India : Himachal Pradesh.

171. *Lachnus longisetosus* Ghosh

1982. *Lachnus longisetosus* Ghosh, A. K., *Fauna of India, Homoptera*, pt. 2 : 96.

Material examined : 1 alata, on undet. host, kufri, 15.xii.1973, coll. L. K. Ghosh.

Distribution : India : Himachal Pradesh.

172. *Lachnus tropicalis* (van der Goot)

1916. *Pterochlorus tropicalis* Goot, P. van der, *Rec. Indian Mus.*, **12** : 3.

1980. *Lachnus tropicalis* ; Raychaudhuri, D. N., Ghosh, L. K. and Das, S. K., *Ins. matsum.*, n. s., **20** : 38.

Material examined : Many apterae and 2 alatae, on *Quercus* sp., Solan, 25.x.1978, coll. M. R. G. and P. K. M.

Distribution : Cosmopolitan.

XXVIII. Genus *Nippolachnus* Matsumura1917. *Nippolachnus* Matsumura, *J. Coll. agric. Tohoku imp. Univ.*, 7 (6) : 382.Type-species : *Nippolachnus piri* Matsumura, 1917.

Body elongate to oval. Head smooth and without any lateral frontal tubercle ; dorsal cephalic hairs long, fine, up to about 6 times as long as b.d. III. Antennae 6-segmented, about 0.25-0.50 times as long as the body ; apterae usually with a few secondary rhinaria on segments III-IV, sometimes these may be absent, alatae with large, oval secondary rhinaria on segments III-VI ; flagellar hairs fine, 2.5-6.5 times as long as the b.d. III ; p.t. 0.25-0.40 times as long as base of segment VI. Eyes without triommatidia. Rostrum reaches near hind coxae, u.r.s. about 0.6 times as long as h.t.2 and may bear 10-20 secondary hairs. Tergum pale, membranous, sometimes with spinopleural bands on 8th tergite in apterae ; in alatae often with spinal sclerotic pattern ; dorsal hairs numerous, scattered irregularly, long, thin and with finely drawn out apices, up to 6.8 times as long as b.d. III. Siphunculi on hair-bearing cones. Cauda broadly semilunar and bears many thin long hairs. Legs pigmented, long, slender, and bearing many fine hair Wings once-or twice-branched, hind wings with 2 oblique veins.

Distribution : India ; Japan ; Korea ; Malaya and Taiwan.

Key to the species of the genus Nippolachnus Matsumura

- | | | | |
|-------|---|-----|---|
| 1 (2) | Siphuncular cone dark and sclerotic ; longest hair on a. s. III short about 2.8 times as long as b. d. III ; legs in apterae blackish | ... | <i>himalayensis</i> van der Goot |
| 2 (1) | Siphuncular cone rather pale ; longest hair on a. s. III much long, more than 4.5 times as long as b. d. III ; legs in apterae usually pale | ... | 3 |
| 3 (4) | Segment 4 of rostrum with more than 20 secondary hairs ; p. t. with 4 or more terminal spines ; legs with tibiae often brown distally ; hairs on the hind tibiae 1.7-1.8 times as long as the diameter at the middle of hind tibiae | ... | <i>piri</i> Matsumura |
| 4 (3) | Segment 4 of rostrum with less (9-14) secondary hairs ; p. t. with not more than 1 pair of terminal spines ; legs pale ; hairs on the hind tibiae 1.80-2.0 times as long as the diameter at the middle of hind tibiae | ... | <i>bengalensis</i> Basu and Hille Ris Lambers |

173. *Nippolachnus bengalensis* Basu and Hille Ris Lambers

1968. *Nippolachnus bengalensis* Basu, A. N. and Hille Ris Lambers, *Ent. Ber. Amst.*, 28 : 9.
1980. *Nippolachnus bengalensis* ; Raychaudhuri, D. N., Ghosh, L. K. and Das, S. K., *Ins. matsum.*, n. s., 20 : 38.
1982. *Nippolachnus bengalensis* ; Ghosh, A. K., *Fauna of India and its adjacent countries, Homoptera*, pt. 2, Subfam. Lachninae : 112.

Material examined : 2 apterae and 3 nymphs, *Quercus* sp., Solan, 25.x.1978, coll. M. R. G. and P. K. M.

Distribution : India : Himachal Pradesh, Meghalaya and West Bengal

174. *Nippolachnus himalayensis* (van der Goot)

1917. *Lachnus himalayensis* Goot, P. van der, *Rec. Indian Mus.*, **13** : 180.

1968. *Nippolachnus eriobotryae* Basu, A. N. and Hille Ris Lambers, *Ent. Ber. Amst.*, **28** : 11.

1976. *Nippolachnus himalayensis* ; Eastop and Hille Ris Lambers, *Survey of world's Aphids* : 321.

1982. *Nippolachnus himalayensis* ; Ghosh, A. K., *Fauna of India and its adjacent countries, Homoptera, pt. 2, Subfam. Lachninae* : 115.

Material examined : 5 apterae, on *Quercus* sp., Solan, 30.x.1978, coll. M. R. G. and P. K. M.

Distribution : India : Himachal Pradesh and West Bengal.

175. *Nippolachnus piri* Matsumura

1917. *Nippolachnus piri* Matsumura, *J. Coll. Agric. Tohoku Univ.*, **7** (6) : 382.

1980. *Nippolachnus piri* ; Raychaudhuri, D. N., Ghosh, L. K. and Das, S. K., *Ins. matsum.*, n. s., **20** : 38.

1982. *Nippolachnus piri* ; Ghosh, A. K. *Fauna of India and its adjacent countries, Homoptera, pt. 2, Subfam. Lachninae* : 118.

Material examined : 9 apterae, on *Quercus* sp., Solan, 31.x.1978, coll. M. R. G. and P. K. M.

Distribution : India ; Himachal Pradesh, Meghalaya, Nagaland, West Bengal ; Japan ; Korea ; Malaya and Taiwan.

LXXIX. Genus *Stomaphis* Walker

1870. *Stomaphis* Walker, *Zoologist*, (2) 5 : 2000.

Type-species : *Aphis quercus* Linnaeus, 1758

Body nearly oval. Head dark brown, slightly rounded, frons smooth ; dorsal cephalic hairs long and fine. Antennae 6-segmented, covered with numerous hairs ; flagellum usually with secondary rhinaria on a. s. IV in apterae, in alatae a. s. III usually with less than 20 secondary rhinaria and a. s. IV with less than 10 secondary rhinaria ; p. t. as thick as and much shorter than base of a. s. VI and bearing some short normal hairs. Rostrum extending beyond body, segment 4 and 5 distinct. Eyes with ocular tubercles. Abdominal dorsum with spinal sclerites ; 8th tergite broadly sclerotised, and with numerous hairs. Siphunculi pore-like situated on dark

brown hairy cones. Cauda dark, broadly rounded. Subanal plate broader than long ; legs with numerous hairs ; second tarsal segment of hind legs distinctly longer than those of fore and mid legs. Forewings with radial sector long and somewhat curved, media twice-branched ; hindwings with both obliques.

Takahashi (1960) has studied the genus from Japan. Key to the species of European part of U. S. S. R. has been provided by Shaposhnikov (1964). Ghosh, A. K. (1982) has discussed the genus.

Distribution : Oriental, Palaearctic and Nearctic Region.

176. *Stomaphis* sp. nr. *longirostris* Fabricius

1980. *Stomaphis* sp. ; Raychaudhuri, D. N., Ghosh, L. K. and Das, S. K., *Ins. matsum.*, n. s., 20 : 38.

Material examined : 1 aptera, on *Cedrus deodara*, Kufri (H. P.), 31.x.78, coll. M. R. G. and P. K. M.

Remarks : Due to paucity of comparable material and literature, the material could not be definitely identified up to specific level. The only species found in India is *S. mordvilko* Hille Ris Lambers, 1933 (Ghosh, A. K. 1982.).

LXXX. Genus *Tuberolachnus* Mordvilko

1908. *Tuberolachnus* Mordvilko, *Annls. Mus. Zool. Acad. Imp. Sci. ; St. Petersburg*, 5 (13) : 374.

Type-species : *Aphis viminalis* Boyer de Fonscolombe, 1841
(= *Aphis saligna* Gmelin, 1790).

Medium-sized (3.0-4.5 mm) insects. Head smooth, without lateral frontal tubercles ; dorsal cephalic hairs numerous, short and thick with blunt to subacute apices. Eyes with ocular tubercles. Antennae 6-segmented, about half as long as base of a. s. VI ; apterae without secondary rhinaria, alatae with rounded secondary rhinaria on a. s. III and IV. Rostrum extends beyond hindcoxae, u. r. s. short and blunt. Dorsum of abdomen pale, with longitudinal rows of dark muscle-plates and a single median tubercle ; dorsal hairs long but thick on lowly raised sockets and with acute to subacute apices. Siphunculi on dark hairy cones. Cauda dark, helmet-shaped, with numerous hairs. Spiracular aperture reniform. First tarsal segments with many hairs ventrally ; wing venation normal, without pigmentation, pterostigma short and blunt, radial sector slightly curved.

Heinze (1962), Pasek (1953, 1954) and Szelegiewicz (1962) have dealt with the European species. Zimmerman (1948) has given the account of Hawaiian species.

Note : The genus is characterised by its singular dorsal tubercle on abdominal segment 5. The only other lachnine genus with dorsal tubercle is *Pterochloroides* Mordvilko but there the tubercles are paired and are found on abdominal segments 1-6.

Distribution : Africa ; America ; Europe ; Far east ; India and Middle East.

177. *Tuberolachnus salignus* (Gmelin)

1790. *Aphis salignus* Gmelin Caroli a Linne Systema Naturae per regna tria nature, secundum classes, ordines, genera, species cum characterila differentis, synonymis, locis Ediliiodocima ferlia, acuta reformata, Lipgae, 1 (4) : 2209.

1918. *Tuberolachnus viminalis* ; Das, B., *Mem. Indian Mus.*, 6 : 257.

1982. *Tuberolachnus salignus* ; Ghosh, A. K., *Fauna India, Homoptera*, pt. II : 140.

Material examined : 11 apterae, on *Salix* sp., Rohroo, 24.x.1970, coll. A. N. Chowdhuri.

Distribution : India : Himachal Pradesh, Meghalaya, Uttar Pradesh, West Bengal ; Africa ; America ; Europe ; Middle East ; Salamanca and South East Asia.

Tribe : *Tramini*

LXXXI. Genus *Protrama* Baker

1920. *Protrama* Baker, *Bull. U. S. Dep. Agric.*, 826 : 19.

Type-species : *Trama radialis* Kaltenbach, 1843.

Body elongate. Head in apterae mostly distinctly divided. Antennae 6-segmented ; a. s. VI about as long as or a little longer than a. s. V ; true apterae without secondary rhinaria, in alatiform apterae secondary rhinaria usually present on distal part of a. s. III and on other flagellar segments ; p. t. about 0.5-0.7 times as long as base of a. s. VI. Eyes many-faceted, triommatidia distinctly visible from above. Ultimate rostral segment reaches 3-5 abdominal sternites, with numerous hairs and about 0.2 times as long as h. t. 2. Midthoracic furca with broad base. Dorsum of abdomen sclerotized with lateral sclerites and dorsal pigmented bars, the latter being distinct from the former on segments 1-6 fused on segments 7 and 8. Siphunculi present on slightly elevated cones. Cauda broadly rounded. Subanal plate rounded. Hindtarsi much elongated, about 0.6-0.7 times as long as hind tibia, hairs on legs numerous and with fine apices ; F. T. C. variable (9, 9, 4 or 9, 9, 2). Wing venation faint ; forewings with the media once-or twice-branched ; hindwings with both media and cubitus.

Note : The aphids belonging to this genus are mostly root feeders and are characterized by the greatly elongate second tarsal segment of the hindleg.

del Guercio (1909) and Mordvilko (1935) have made valuable contribution on the tribe Trimini. Börner (1952) has listed the European species of the genus together with their host plants. Eastop (1953) has reviewed the group. Narzikulow (1962) has revised the species from Tadzhik S. S. R. Hille Ris Lambers (1969) has worked on Italian species and discussed the affinities of allied genera. Hille Ris Lambers (*op. cit.*) while erecting a new genus, *Eotrama*, a close genus of *Protrama* Baker discussed its affinity with other related genera, viz., *Sinolachnus* Hille Ris Lambers, *Trama* Heyd and *Lachnus* Burmeister. Stroyan (1964) reported the genus for the first time from India. Subsequently, Kumar (1973) described *Protrama longitarsus sclerodensus* from Simla Himalayas.

Distribution : America ; Britain ; Eurasia ; Finland ; Germany ; Holland ; India ; Italy ; Malta ; Russia ; Sweden ; Tunisia.

178. *Protrama longitarsus sclerodensus* Kumar (Fig. 228)

1973. *Protrama longitarsus sclerodensus* Kumar, *Oriental Ins.*, 7 (1) : 11.

1982. *Protrama longitarsus sclerodensus* ; Ghosh, A. K., *Fauna of India, Homoptera*, pt. II : 149.

Material examined : 1 aptera and 5 nymphs, on *Myriactis wallichii* (Roots), Narkanda, 26.ix.1974 ; 17 nymphs, on *Erigeron canadaensis* (Roots), Narkanda, 27.ix.1974 ; 2 nymphs, on *Rumex* sp. (Roots), Baghi, 5.x.1974 ; 1 aptera, on *Cynoglossum denticulatum* (Roots), Narkanda, 28.ix.1974 ; all L. K. Ghosh coll. ; 1 aptera, on *Artemisia* sp. (Roots), Phagu, 5.ix.1972, coll. K. D. Verma.

Note : The subspecies was described by Kumar (1973) from apterae taken on roots of *Artemisia* sp. at Phagu (c 7,500) in Himachal Pradesh, India. The present material, however, was collected at an elevation of c. 10,000', on roots of *Cynoglossum denticulatum* (Boraginaceae), *Erigeron canadaensis* (Compositae), *Myriactis wallichii* (Compositae), *Rumex* sp. (Rosaceae) besides *Artemisia* sp. (Compositae).

Distribution : India : Arunachal Pradesh, Himachal Pradesh and Kashmir.

Subfamily PEMPHIGINAE

Eastop (1966) while providing an account of the Australian aphids stated that the subfamily can be distinguished into three well defined tribes, viz. Eriosomatini with Ulmaceae as primary host, Fordini with Anacardiaceae

as primary host, and Pemphigini with *Populus* and other different unrelated groups as primary hosts. But he did not attempt to subdivide the subfamily into tribes considering anatomical features. Smith (1974) used some morphological characters for differentiating the 3 tribes stated above but did not place the north American genera under any more tribes. This subfamily has been used here in the sense of Eastop (1966) and Smith (1974).

However, it may be stated that the representatives of this subfamily found in Himachal Pradesh can be placed in the following tribes and genera.

Key to the tribes

- | | |
|---|--------------|
| 1 (2) Siphunculi present as ring (Fig. 67) or rarely as lowly elevated cones, surrounded by hairs ; waxglands present, composed of a row of cells surrounding a central space (Fig. 145) ; secondary rhinaria in alatae annular ; tarsi in apterae 1-2 segmented. ... | Eriosomatini |
| 2 (1) Siphunculi absent or very indistinct, without hairs ; wax glands may be present or absent, if present, composed of a row of cells without any central space ; secondary rhinaria in alatae not annular, tarsi usually 2-segmented ... | ... 3 |
| 3 (4) Wax glands in apterae each bearing a hair (Fig. 148) ; secondary rhinaria in alatae strongly transverse and narrow (Fig. 37) ; apterae usually with trochanters and femora separate ... | Pemphigini |
| 4 (3) Wax glands absent in apterae, never with hair ; secondary rhinaria in alatae round, oval or transversely oval ; trochanters indistinctly fused with femora in apterae ... | Fordini |

Key to to the genera of the tribe Eriosomatini

(Fig. 154)

- | | |
|---|--------------------------|
| 1 (2) Tarsi in apterae 1-jointed, (Fig. 154), in alatae 2-jointed ; M in forewing simple and hindwing with 1 oblique vein ; abdominal tergites with spinal, pleural and marginal wax gland groups ... | <i>Tetraneura</i> Hartig |
| 2 (1) Tarsi in both apterae and alatae 2-jointed ; M in forewing simple but hindwing with 2 oblique veins ; abdominal tergites with spinal and marginal wax gland groups ; pleural glands absent ... | <i>Eriosoma</i> Leach |

LXXXII. Genus **Eriosoma** Leach

1818. *Eriosoma* Leach, *Trans. Hort. Soc. Lond.*, 3 : 60.

Type-species : *Eriosoma mali* Leach, 1818.

= *Aphis lanigera* Hausmann, 1802.

Body broadly oval. Head smooth and flat ; lateral frontal tubercles absent. Antennae 6-segmented, sometimes 5-segmented, shorter than body ; primary rhinaria sometimes ciliated ; apterae without secondary rhinaria, alatae with annular secondary rhinaria on a.s. III and IV ; flagellar hairs inconspicuous in spring forms but sexuparae often with conspicuous fine hairs. Eyes in apterae 3-faceted, in alatae many-faceted, with reduced triommatidia. Rostrum extends beyond midcoxae ; u.r.s. (Fig. 43) slender, about 0.13-0.23 mm long, about 1.0-1.5 times as long as h.t.2 and bearing as many as 16 hairs. Abdomen pale with indistinct segmentation ; 8th tergite with 6-9 hairs ; "sexuparae and apterous=exules with wax-plates (Fig. 146) but spring forms without wax-plates" (Eastop, 1966). Siphunculi on somewhat elevated cones or ring-like (Fig. 67). Cauda (Fig. 95) rounded, bearing 2 hairs. Spiracles normal, those on abdominal segments 1 and 2 widely spaced. F.T.C. 3,3,3 or 3,3,2. Tibiae and tarsi faintly spinulose at apices, Media of forewing (Fig. 57) once-branched ; hindwing with 2 oblique veins.

Cottier (1953) and Zimmerman (1948) discussed about the species of *Eriosoma* from New Zealand and Hawaii respectively.

Distribution : Cosmopolitan.

179. **Eriosoma lanigerum** (Hausmann)

(Fig. 197)

1802. *Aphis lanigera* Hausmann, *Illigers' Mag. Ins.*, 1 (3-4) : 440.

1918. *Eriosoma lanigerum* (Hausmann) ; Baker, *Univ. Arkansas Agr. Exp. Sta. Bull.*, 145 : 3.

1969. *Eriosoma lanigerum* (Hausmann) ; Chowdhuri, Basu, R. C. and Raychaudhuri, D. N., *Sci. Cult.*, 35 : 335.

Material examined : Many apterae, on *Pyrus* sp.. Simla, 17.vi.1968, coll. A. N. Chowdhuri ; 2 alatae and 2 nymphs, on *Cestrum nocturnum*, Sundarnagar, Mandi district, 14.x.1974, coll. A. N. Chowdhuri ; many alatae, on *Pyrus malus*, Mashobra, 15.xii.1973, coll. L. K. Ghosh.

Biological note : The yellowish brown to greyish aphids are covered with white waxy powder on body. The species usually infests the stem of apple plants. The species is kept under check by its natural enemy *Aphelinus mali* Hald. (Hymenoptera : Chalcidoidea).

Remarks : Gautam and Verma (1982) have recorded different sexual morphs and their distinguishing characteristics from Simla hills.

Distribution : India : Assam, Himachal Pradesh, Jammu and Kashmir State, Meghalaya, Mysore, Punjab, Tamil Nadu, Uttar Pradesh ; and virtually cosmopolitan.

LXXXIII. Genus *Tetraneura* Hartig

1841. *Tetraneura* Hartig, *Z. ent.* (Germar) 3 : 366.

Type-species : *Aphis ulmi* Linnaeus, 1758.

Body broadly elongate. Head smooth, without a median suture. Antennae usually 6-segmented in alatae and about 0.2-0.3 times as long as body, 4-6 segmented in apterae and about 0.10-0.16 times as long as body ; a. s. III and IV in alatae about equal in length ; the primary rhinarium usually ciliated ; secondary rhinaria absent in apterae, in alatae annular secondary rhinaria present on a. s. III-V. Ultimate rostral segment short, may be much shorter (0.25) to twice as long as h.t.2. Abdomen pale, wax-plate variously developed ; 8th tergite with 2-12 hairs. Siphunculi present as chitinized rings or as small truncate cones. Cauda (Fig. 96) rounded, bearing 2-5 hairs. Spiracles normal, those of abdominal segments 1 and 2 widely spaced. Subgenital plate at the posterior half covered rather densely with about 30 hairs. Alatae with 2-segmented strongly spinulose tarsi, in apterae tarsal segments fused, tarsi being 1-segmented, (Fig. 154). apices of tibiae spinulose, empodial hair about as long as claw. F. T. C. 3, 2, 2 or 3, 3, 2 or 4, 2, 2. Forewing with media once-branched (Fig. 56), hindwing with one oblique, rarely with 2 oblique veins.

Extreme variations are shown by the individuals collected in the same colony. Such variations are related particularly to the shape and size of the body hairs and even their distribution and to the distribution of wax-plates. Hille Ris Lambers (1970) erected a subgenus *Tetraneurella* basing on the characters of hind tarsal claw in embryo and on the distribution of marginal wax glands of sexuparae. Hille Ris Lambers (*op. cit.*) described a few species lacking siphunculi under this genus and such specimens are not available in this region.

Eastop (1966) has dealt with the species from Australian fauna ; Hille Ris Lambers (1970) has reviewed the genus ; Mordvilko (1935) and Zwölfer (1957) have discussed the European species.

Distribution : Cosmopolitan.

180. *Tetraneura indica* sp. nov.

(Figs. 181, 223)

Apterous viviparous female : Body oval, brown, about 1.95-2.28 mm long, with about 1.50-1.65 mm as its maximum width near at the middle of abdomen. Head (Fig. 181A) brown, smooth, somewhat free from prothorax, without lateral frontal tubercles ; median dorsal suture present. Antennae short, brown, 5-segmented (Fig. 181B), about 0.17-0.20 times as long as body ; processus terminalis very short, about 0.5 of base V ; primary rhinarium rounded, densely ciliated and non-protuberant ; a. s. I with 2, II with 3-4, III with 7-10 and IV with 9-12 hairs, longest hair on a. s. III a little shorter than basal diameter of the segment. Eyes with 3 facets. Rostrum reaches midcoxae ; ultimate rostral segment (Fig. 181C) brown, short, blunt, about twice as long as hind tarsus, with about 12 small hairs besides 3 preapical pairs. Abdomen (Fig. 181D) pale, smooth, with short (27μ) and long (51μ) hairs with acuminate apices, the longer ones about as long as or a little longer than b. d. III ; segments 7 and 8 distinctly separated, each with a brown transverse band, with small scattered round wax-plates and these are variously developed both on head and abdomen ; 8th tergite with 8 hairs about 1.3-1.5 times as long as dorsal hairs on head and abdomen. Siphunculi (Fig. 181D) pore-like, about 0.05 mm in diameter with well chitinized brown rims, both short (39μ) and long (77μ) hairs with fine apices present on margin of abdomen. Cauda conical with 4 hairs. Subanal plate conical, dark brown. Subgenital plate pale brown to dark brown. stout medium-sized, tarsi with one joint.

Material examined : Holotype, apterous viviparous female, INDIA : Narkanda, on *Calamagrostis pilosa* Hkf. (Roots), (Gramineae), 26.ix.1975, coll. L. K. Ghosh ; paratypes : 6 apterae, same data as for holotype.

Measurements (in mm) of the holotype : Length of body 2.28 ; width of body 1.65 ; antenna 0.39 ; a.s. III 0.09, IV 0.13, V (0.05+0.02) ; u.r.s. 0.16 ; hind tarsus 0.07.

Biological note : The colony of yellow globular aphids was found infesting roots of the host-plant growing in a place having rather loose soil where other vegetables were seen growing. The infestation was heavy. As a result, the plant was almost in withering condition. One ant species was found to attend those aphids.

Remarks : In having pale abdomen and shorter body hairs, the new species approaches *T. basui* Hille Ris Lambers but can be distinguished by more (about 12) secondary hairs on ultimate rostral segment, presence of hairs on antennal segment III (without in *basui*) besides other characters. *Tetraneura indica* sp. nov. also comes closer to another species, *kalimpongensis*

Pal and Raychaudhuri in the length of tergal hairs and in the number of secondary hairs on ultimate rostral segment but stands separate because of having lesser number (8) of hairs on 8th tergite and also fewer hairs on antennal segments II (3-4) and III (7-10). The new species is also characterized by its having short and long hairs (27μ - 51μ) on abdominal tergite.

Distribution : India : Himachal Pradesh.

Key to the genera of the tribe Pemphigini

- | | | | |
|-------|--|-----|---------------------------------------|
| 1 (2) | Antennal segment III usually with a denticle near the base ; caudal hairs numerous ; empodial hairs usually as long as claw | ... | <i>Prociphilus</i> Koch |
| 2 (1) | Antennal segment III never with a denticle ; caudal hairs never more than 4 ; empodial hairs always less than half as long as claw | ... | 3 |
| 3 (4) | Secondary rhinaria ciliated (Fig. 37) in alatae ; wax gland groups in apterae absent ; antennae 4-5 segmented in apterae ; in alatae, secondary rhinaria ciliated on a. s. III-V | ... | <i>Epipemphigus</i> Hille Ris Lambers |
| 4 (3) | Secondary rhinaria never ciliated in alatae ; wax gland groups in apterae numerous ; antennae 6-segmented in apterae, in alatae secondary rhinaria annular on a. s. III-V | ... | <i>Thecabius</i> Koch |

LXXXIV. Genus *Epipemphigus* Hille Ris Lambers

1966. *Epipemphigus* Hille Ris Lambers, *Tijdschr. Ent.*, **109** (8) : 204.

Type-species : *Pemphigus imaicus* Cholodkovsky, 1912.

Body elongate. Head smooth and without lateral frontal tubercles ; median suture absent. Antennae of apterae usually 5-segmented, in alatae 6-segmented and about 0.15-0.2 times as long as body ; secondary rhinaria (Fig. 37) annular or elongate oval on a.s. III-V ; p.t. about 0.2 times as long as base of a.s. VI ; u.r.s. about 0.05-0.08 mm long, without secondary hairs and as long as h.t.2. Abdomen pale ; hairs on anterior tergites acute to acuminate ; wax-plates present on abdomen in alatae, in apterae wax-plates absent ; 8th tergite with 4 hairs. Siphunculi apparently absent. Cauda rounded with 2-3 hairs. Rudimentary gonapophyses 2. Subgenital plate bearing 4-10 hairs on anterior half and a posterior row of 5-18 hairs. Hind tibiae smooth, F.T.C. 4,2,4 or 4,4,4 or 3,3,3 or 3,3,2 or 2,2,2. Empodial hair less than half of the claw. Media of the forewing simple, hindwing (Fig. 66) with 2 oblique veins.

Distribution : India ; Pakistan ; Japan ; U.S.S.R.

181. *Epipemphigus imaicus* (Cholodkovsky)

1912. *Pemphigus imaicus* Cholodkovsky, *Revue Russes d' Entom.* **12** 495.
 1966. *Epipemphigus imaicus* (Cholodkovsky) ; Hille Ris Lambers, *Tijdschr. Ent.*, **109** (8) : 205.
 1970. *Epipemphigus imaicus* (Cholodkovsky) ; Chakrabarti, Ghosh, A. K. and Raychaudhuri, D. N., *Oriental Ins.*, **4** (4) : 449.

Material examined : 18 alatae, on *Ailanthus glandulosa*, Mashobra, 27.vii.-1969, coll. A. N. Chowdhuri ; 2 alatae, on *Populus ciliata*, Simla, 15.iv.1966, coll. A. N. Chowdhuri ; many alatae, on *Populus* sp., Mashobra, 15.xii.1973, coll. L. K. Ghosh.

Biological notes : The pale aphids except on dark head, thorax and legs, were found to form galls on *Populus* sp. (Fig. 4).

Note : Earlier, Chakrabarti *et al.* (1970) reported the species from galls formed on the undersurface of leaves of *Ailanthus glandulosa* (Simarubaceae) at Mashobra, Himachal Pradesh, but according to Hille Ris Lambers (1966) and Ghosh *et al.* (1970), the species forms sausage-like galls on the upper surface of leaves of *Populus ciliata* (Salicaceae).

Distribution : India : Himachal Pradesh, Jammu & Kashmir State, Uttar Pradesh, Sikkim ; Japan ; Pakistan and U. S. S. R.

LXXXV. Genus *Prociphilus* Koch

1857. *Prociphilus* Koch, *Die Pflanzenlause Aphiden*, Nurnberg, **3** : 279.

Type-species : *Aphis bumeliae* Schrank, 1801.

Body oblong. Head smooth without lateral frontal tubercles and with or without wax-plates. Dorsal cephalic hairs short and fine. Antennae 5- or 6-segmented, about half as long as body ; flagellar hairs sparse, short with finely drawn out apices ; flagellum with fine spinular imbrications ; apterae without secondary rhinaria ; alatae with secondary rhinaria on a. s. III-V and sometimes also on a. s. VI ; primary rhinaria ciliated and round ; p. t. shorter than base of last antennal segment. Eyes in apterae 3-faceted, in alatae many-faceted. Rostrum reaching midcoxae ; u. r. s. shorter than or as long as h. t. 2, usually with 2 secondary hairs. Abdominal dorsum pale to pale brown ; dorsal abdominal hairs rather short and sparse ; abdomen usually with hair-bearing wax-plates ; 8th tergite with 4 hairs. Siphunculi absent. Cauda brown, semioval, with many hairs. Trochanters indistinctly fused with femora, F. T. C. 2, 2, 2. Empodial hair shorter than to as long as the claw. Media of forewing simple, cubitus and anal in forewing separated at base, hindwing with 2 oblique veins arising from the same point.

Valuable contribution has been made by Smith (1969, 1981) on the species of North America. Tao (1970) has provided a key for the Chinese species.

Distribution : America ; China ; Europe ; Far East ; India ; Puerto Rico and U.S.S.R.

Key to the species of Prociphilus Koch

Apterae viviparae :

Body with cylindrical anocaudal process ; F. T. C.
5, 5, 5 ; in alatae secondary rhinaria distributed as :
a. s. III 18-22, 1V 8-10, V 6-10, base of a. s. V1 3-5 ;
on roots of *Taxus baccata* (Gymnosperm) ...

taxus (Ghosh, Chakrabarti,
Chowdhuri & Raychaudhuri)

— Body without any anocaudal process ; F. T. C.
variable ; in alatae secondary rhinaria distributed as
: a. s. III 38-49, 1V 12-17, V 14-21, base of V1 9-14 ;
on *Pinus excelsa* (Pinaceae) ...

himalayaensis Chakrabarti

182. *Prociphilus (Stagona) himalayaensis* Chakrabarti

1976. *Prociphilus (Stagona) himalayensis* Chakrabarti, *J. Linn. Soc. (Zool.)*, **58** (3) : 263.

Material examined : 1 aptera, host unknown, Mashobra, 2.x.1970, coll. S. Chakrabarti ; 1 alata, on *Pinus excelsa* (Roots), Tolasa, Simla, 30.x.1970, coll. S. Chakrabarti ; 4 alatae, on undet. plant, Simla Hills, 1.x.1974, coll. L. K. Ghosh.

Biological notes : The light yellow aphids were collected from the under-surface of the host plant.

Distribution : India : Himachal Pradesh.

183. *Prociphilus taxus* (Ghosh, Chakrabarti, Chowdhuri and Raychaudhuri)

1969. *Anocaudus taxus* Ghosh, A. K., Chakrabarti, Chowdhuri and Raychaudhuri, D. N., *Oriental Ins.*, **3** (4) : 329.

1973. *Prociphilus taxus* Ghosh *et al.* ; Hille Ris Lambers, *Oriental Ins.*, **7** (2) : 239.

1976. *Prociphilus taxus* ; Eastop and Hille Ris Lambers, *Survey of the World's Aphids* : 360.

Material examined : 3 alatae, on snow, Kufri, January, 1975, coll. L. K. Ghosh ; an alata, on *Taxus baccata*, Khadrula, 26.xi.1968, coll. A. N. Chowdhuri.

Distribution : India : Himachal Pradesh.

LXXXVI. Genus *Thecabius* Koch

1857. *Thecabius* Koch, *Die Pflanzenlause Aphiden*, Nurnberg : 294.

Type-species : *Thecabius populneus* Koch = *Pemphigus affinis* Kaltenbach, 1843.

Body oval or elongate. Head with or without wax gland groups. Antennae 6-segmented in apterae viviparae, about half as long as body ; flagellum in fundatrices smooth on basal segments, without secondary rhinaria ; in alatae, a. s. III, IV, V and sometimes VI with series of annular secondary rhinaria ; primary rhinaria round and ciliated ; flagellar hairs short and sparse. Rostrum reaches mid coxae, ultimate rostral segment smooth or sparsely spinulose. Abdominal dorsum in fundatrices with distinct wax gland groups arranged in 6 rows (Spinal, pleural and marginal) on 1st-7th tergites, and usually with 4 wax gland groups on 8th tergite. Wax gland groups on head numerous in apterae viviparae. Dorsal gland groups usually with a distinct border ; ventral wax gland groups may be without a border. Dorsal abdominal hairs short or long and stout. Siphunculi absent. Cauda semilunar, with 2-4 hairs. Legs with tarsi often spinulose. Empodial hairs less than half as long as the claws ; Forewing with media simple, hindwing with 2 oblique veins.

Aoki (1975) has made valuable contributions on the group from Japan.

Distribution : Oriental, Palearctic and Nearctic region.

184. *Thecabius affinis* (Kaltenbach)

1843. *Pemphigus affinis* Kaltenbach, *Mon. Fam. Pflanzen.* : 182.

1857. *Thecabius populneus* Koch, *Die. Pflanzen. Aphiden* : 295.

1978. *Thecabius affinis* ; Chakrabarti and Maity, *Entomon*, 3 (2) : 27.

Material examined : Apterae viviparae, on roots of *Geranium* sp., Manali, 31.xii.1972, coll. S. Chakrabarti.

Remarks : Chakrabarti and Maity (1978) recorded the species for the first time from India.

Distribution : India : Himachal Pradesh ; Palearctic.

Key to the genera of the tribe Fordini

- 1 (2) First tarsal chaetotaxy 3, 3, 2 ; alatae with flattened, oval, large secondary rhinaria on a.s. 111-V1 covering almost the entire length of a segment (Fig. 34) ; u.r.s. distinctly shorter than h. t. 2, bearing about 6 secondary hairs ...

Kaburagia Takagi

- 2 (1) First tarsal chaetotaxy 5,5,4 ; secondary rhinaria in alatae annular and distributed on a. s. 111-V and sometimes on V1 ; empodial hairs shorter than claw ; u. r. s. about as long as or slightly longer than h. t. 2 and with about 12 secondary hairs ...

Smynthuroides Westwood

LXXXVII. **Kaburagia** Takagi

1937. *Kaburagia* Takagi, *Bull. Forest Exp. Stn. Chosen*, **26** : 20, 22.

Type-species : *Kaburagia rhusicola* Takagi, 1937.

Body elongate. Head smooth, dark brown without median longitudinal suture and lateral frontal tubercles ; median frontal prominence ill-developed when dorsally viewed. Antennae 6-segmented, about 0.30 times as long as body ; flagellum progressively imbricated from base towards apex ; p.t. much shorter than base of a.s. VI ; secondary rhinaria (Fig. 34) flattened, oval, a.s. III-VI either with single ciliated secondary rhinarium or with a large and 1-3 small circular rhinaria. Rostrum reaching midcoxae ; u.r.s. blunt with 3 pairs of secondary hairs, about 0.55-0.80 times as long as h.t.2. Abdomen pale, with areas around the stigmal pori blackish brown ; 7th and 8th tergites with 4 hairs. Wax-plates (Fig. 147) present on thorax and abdomen. Siphunculi absent. Cauda semioval and with about 10 hairs. Legs dusky. Femora almost smooth with the surface somewhat wrinkled, not spinulose. F.T.C. 3,3,3 or 3,3,2. Media of forewing simple, veins bordered brown ; hindwing with 2 oblique veins. Apterae not known.

Takahashi (1938) and Tao (1948, 1970) have dealt with this genus.

Distribution : India and China.

185. **Kaburagia ailanthis** Chowdhuri, Basu, Chakrabarti & Raychaudhuri

1969. *Kaburagia ailanthis* Chowdhuri, Basu, R. C., Chakrabarti and Raychaudhuri, D. N., *Oriental Ins.*, **3** (1) : 86.

1975. *Kaburagia ailanthis* Chowdhuri *et al.* ; Chakrabarti and Raychaudhuri, D. N., *Oriental Ins.*, **9** (2) : 210.

Material examined : Many alatae, on *Ailanthus glandulosa*, Simla, August 1966, coll. A. N. Chowdhuri.

Distribution : India : Himachal Pradesh and Uttar Pradesh.

LXXXVIII. Genus **Smynthuroides** Westwood

1849. *Smynthuroides* Westwood, *Gdnr's chron.*, **27** : 420.

Type-species : *Smynthuroides betae* Westwood, 1849.

Body broadly oval (Fig. 177). Head smooth, pale brown, with ill-developed median longitudinal suture on venter ; dorsal cephalic hairs numerous, long with finely drawn out apices. Antennae 5-segmented, short, stout, about 0.3 times as long as body ; p. t. very short with a few spinules ; apterae without secondary rhinaria ; primary rhinaria protuberant and non-ciliated ; flagellar hairs numerous. Eyes in apterae 3-faceted. Rostrum long, reaching hindcoxae ; u. r. s. as long as or slightly longer than h. t. 2, bearing about 12 secondary hairs. Dorsum of abdomen in apterae pale excepting tergite 8

which bears a brownish transverse band (Fig. 177) ; dorsal hairs numerous and long. Siphunculi absent. Cauda semilunar (Fig. 177). Subanal plate entire. Subgenital plate light brown. Legs brownish with tarsi darker ; hairs on legs with fine apices ; first tarsal segments of fore-and midlegs with 4 long hairs and a short peg-like hair and that on hindleg with 3 long and fine hairs and a short blunt peg-like hair. Empodial hairs fine, a little longer than half the length of claw. Media of forewing simple, hindwing with 2 oblique veins.

Davatchi (1958) and Eastop (1966) have dealt with the genus.

Distribution : Cosmopolitan.

186. *Smynthuroides betae* Westwood

(Fig. 177)

1849. *Smynthuroides betae* Westwood, *Gdnr's Chron.*, 27 : 420.

1961. *Smynthuroides betae* Westwood ; Basu, A. N., *Sci. Cult.*, 27 (9) 456.

Material examined : 4 apterae, on roots of *Galinsuga parviflora* (Compositae), Thanedar, 1.x.1974, coll. L. K. Ghosh.

Biological note : Colony of dull yellow to cream coloured apterae was found on the roots of the host-plant. Small black ants were found in association with these sluggish aphids.

Note : So far, this species in India was known to infest the roots of graminaceous plants. However, present record of the species on Compositae is an addition to the knowledge of host plant families infested by this insect in India. But elsewhere in the world, plants of Compositae are already known to be attacked by this species.

This species is a new record from North-west India.

Distribution : Cosmopolitan.

APHIDS NOT EXAMINED

The following list embodies the names of the species of aphids that have been reported or described by other workers from Himachal Pradesh but could not be collected by the author nor could be obtained from the authors who reported or described them. Therefore, the actual taxonomic position of such material is not known to the present author.

1969. *Acyrtosiphon moltshanovi* Mordvilko ; Bindra and Sekhon, *Bull. Ent.*, 10 (2) : 157.

1969. *A. soldatovi* ? Mordvilko ; David, Narayanan and Rajasingh, *Bull. Ent.*, 10 (2) : 158.

1970. *Aiceona pseudosugii* David, Sekhon and Bindra, *Bull. Ent.*, **11** (2) : 150.
1974. *Aphis affinis* del Guercio ; David and Ghorpade, *Oriental Ins.*, **8** (2) : 196.
1969. *A. eugeneae* van der Goot ; David, Narayanan and Rajasingh, *Bull. Ent.*, **10** (2) : 158.
1970. *A. leptorhyncha* David, Sekhon and Bindra, *Bull. Ent.*, **11** (2) : 152.
1971. *A. rhamnifila* David, Narayanan and Rajasingh, *Oriental Ins.*, **5** (2) : 52.
1971. *A. rhoicola* Hille Ris Lambers ; David, Narayanan and Rajasingh, *Madras agric. J.*, **58** (5) : 373.
1976. *Brachycaudus* (*Mordvilkomemor*) *pilosus* (Mordvilko, 1929) : Eastop and Hille Ris Lambers, *Survey of world's Aphids* : 287.
(=*Brachycaudus pilosus* Mordvilko ; 1969. Bindra and Sekhon, *Bull. Ent.*, **10** (2) : 156.)
1973. *Capitophorus formosartemisiae* (Takahashi) ; Kumar, *Oriental. Ins.*, **7** (1) : 11.
1969. *Capitophorus hippophaes javanicus* Hille Ris Lambers ; Bindra and Sekhon, *Bull. Ent.*, **10** (2) : 156.
1976. *Chaitophorus niger* Mordvilko ; 1969. Verma, *Sci. Cult.*, **35** : 28.
1969. *Chaitophorus* sp. ; Bindra and Sekhon, *Bull. Ent.*, **10** (2) : 157.
1974. *Cavariella araliae* Takahashi ; Chakrabarti, Chowdhuri and Raychaudhuri D. N., *Sci. Cult.*, **40** : 461.
1968. *Cavariella salicicola* Matsumura ; Chowdhuri, Ghosh, A. K., Banerjee and Raychaudhuri, *Sci. Cult.*, **36** : 550.
1975. *Cavariella* (*Cavariella*) *aquatica* (Gillette and Bragg) ; David and Hameed, *Oriental Ins.*, **9** (2) : 217.
1976. *Chaetosiphon* (*Pentatrachopus*) *fragaefolii* (Cockerell) : Eastop and Hille Ris Lambers, *Survey of the world's Aphids* : 135.
1970. *Chaetosiphon* (*Chaetosiphon*) sp. ; David, Rajasingh and Narayanan, *Oriental Ins.*, **4** (4) : 400.
1970. *Chaetosiphon* (*Pentatrachopus*) *tetrarhodum* (Walker) ; David, Rajasingh and Narayanan, *Oriental Ins.*, **4** (4) : 404.
1976. *Cinara* (*Lachniella*) *atroalbipes* David *et al.* ; Eastop and Hille Ris Lambers, *Survey of the world's Aphids* : 174.
(=*Cinara atroalbipes* David, Narayanan and Rajasingh, 1970. *Oriental Ins.*, **4** (4) : 415-416.)

1969. *Cinara* sp. ; Chowdhuri, Basu, Chakrabarti and Raychaudhuri, *Oriental Ins.*, **3** (1) : 85.
1971. *Cinara* (*Lachniella*) *comata* Doncaster ; David, Narayanan and Rajasingh, *Madras agric. J.*, **58** (5) : 373.
1971. *Doraphis populi* (Maskell) ; David, Narayanan and Rajasingh, *Madras agric. J.*, **58** (5) : 373.
1969. *Dysaphis longipilosa* ? Mordvilko ; David, Narayanan and Rajasingh, *Bull. Ent.*, **10** (2) : 158.
1976. *Eriosoma* (*Schizoneura*) *phoenax* Mordvilko ; Eastop and Hille Ris Lambers, *Survey of the world's Aphids* : 191.
1969. *Eriosoma* ? *phoenax* (Mordvilko) ; David, Narayanan and Rajasingh, *Bull. Ent.*, **10** (2) : 158.
1976. *Eutrichosiphum assamense* (Ghosh, A. K. and Raychaudhuri, D. N., 1962) : Eastop and Hille Ris Lambers, *Survey of the World's Aphids* : 337.
(= *Paratrichosiphum tattakanum* Takahashi ; Bindra and Sekhon, 1969, *Bull. Ent.*, **10** (2) : 157).
1969. *Hayhurstia atriplicia* (Linn.) ; Bindra and Sekhon, *Bull. Ent.*, **10** (2) : 156.
1971. *Impatientinum* ? *asiaticum* Nevsky ; David, Narayanan and Rajasingh, *Madras agric. J.*, **58** (5) : 374.
1917. *Lachnus similis* van der Goot, *Rec. Indian Mus.*, **13** (4) : 175-183.
1976. *Aphis* (*Longirostris*) *raji* (Kumar & Burkhardt, 1970) ; Eastop and Hille Ris Lambers, *Survey of the World's Aphids* : 77.
(= *Longirostrina raji* Kumar and Burkhardt, 1970. *J. Kans. ent. Soc.*, **44** (3) : 419.)
1958. *Liosomaphis berberidis* (Kaltenbach) ; David, *Indian J. Ent.*, **19** (4) : 289-299.
1969. *Macrosiphoniella hiskosanensis* Moritsu ; Bindra and Sekhon, *Bull. Ent.*, **10** (1) : 104.
1970. *Macrosiphum aulacorthoides* David, Narayanan and Rajasingh, *Oriental Ins.*, **4** (4) : 420.
1973. *M.* (*Siphonophora*) *euphorbiae* (Thomas) : Kumar, *Oriental Ins.*, **7** (1) : 11:
1970. *M.* (*Sitobion*) *smilacicola* Takahashi ; Chakrabarti, Ghosh, A. K and Raychaudhuri, D. N., *Oriental Ins.*, **4** (4) : 449.

1969. *Maculolachnus submacula* (Walker) ; David, Narayanan and Rajasingh ; *Bull. Ent.*, **10** (2) : 158.
1969. *Macromyzus indicus* David and Narayanan, *Bull. Ent.*, **9** (2) : 100-102.
1969. *Megoura* sp. ; Bindra and Sekhon, *Bull. Ent.*, **10** (2) : 157.
1969. *Metopolophium* sp. ; Bindra and Sekhon, *Bull. Ent.*, **10** (2) : 157.
1976. *Metopolophium longicaudatum* (David and Hameed, 1976) ; Eastop and Hille Ris Lambers, *Survey of the world's Aphids* : 279.
(= *Acyrtosiphon* (*Metopolophium*) *longicaudatum* David and Hameed, 1975. *Oriental Ins.*, **9** (2) : 214-215.)
1970. *Myzaphis avariola* David, Rajasingh and Narayanan, *Oriental Ins.*, **4** (4) : 397.
1971. *Myzocallis* (*Agrioaphis*) *aptera* Richards and Kumar, *Can. Ent.*, **103** : 116-118.
1969. *Myzus* sp. ; Bindra and Sekhon, *Bull. Ent.*, **10** (2) : 157.
1976. *Myzus cerasi* subsp. *umefoliae* (Shinji, 1941) ; Eastop and Hille Ris Lambers, *Survey of the World's Aphids* : 297.
(= *Myzus umefoliae* Shinji ; Bindra and Sekhon, 1969, *Bull. Ent.*, **10** (2) : 157)
1981. *Nippolachnus* sp. ; Das, S. K., Raychaudhuri, D. and Raychaudhuri, D. N. *Entomon*, **6** (1) : 54.
1969. *Prociphilus* sp. ; Chowdhuri, Basu, R. C., Chakrabarti and Raychaudhuri, D. N., *Oriental Ins.*, **3** (1) : 90.
1969. *Prociphilus* sp. ; Verma, *Sci. Cult.*, **35** : 28.
1971. *Pterocomma* ? *pilosum* Buckton ; David, Narayanan and Rajasingh, *Madras agric. J.*, **58** (5) : 374.
1971. *Pyrolachnus imbricatus* David, Narayanan and Rajasingh, *Oriental Ins.*, **5** (4) : 565.
1973. *Sappaphis piri* Matsumura ; Kumar, *Oriental Ins.*, **7** (1) : 13.
1969. *Schizaphis rotundiventris* (Signoret) ; Bindra and Sekhon, *Bull. Ent.*, **10** : (1) : 104.
1969. *Semiaphis* sp. (Fundatrix) ; Chowdhuri, Basu, R. C., Chakrabarti and Raychaudhuri, D. N., *Oriental Ins.*, **3** (1) : 90.
1973. *Sinomegoura citricola* (v. d. Goot) ; Kumar, *Oriental Ins.*, **7** (1) : 14.
1973. *S. lespedazae* (Essig & Kuwana) ; Kumar, *Oriental Ins.*, **7** (1) : 14.
1973. *Tetraneura* of the *nigriabdominalis* (Sasaki) Group ; Kumar, *Oriental Ins.*, **7** (1) : 14.

HOST PLANT—APHID CATALOGUE

Abies sp. (Abiaceae)

Cinara confinis tenuipes (Chakrabarti & Ghosh)

Rhopalosiphum rufiabdominalis (Sasaki)

Acer sp. (Aceraceae)

Periphyllus vandenboschi Hille Ris Lambers

P. himalayensis Chakrabarti

Aesculus sp. (Sapindaceae)

Periphyllus aesculi Hille Ris Lambers

Ageratum sp. (Compositae)

Vesiculaphis peridis Basu

Ailanthus glandulosa (Simarubaceae)

Epipemphigus imaicus (Cholodkovsky)

Ailanthus glandulosa (Limarubaceae)

Kaburagia ailanthi Chowdhuri *et al.*

Ailanthus sp. (Simarubaceae)

Micromyzodium sp.

Alnus nepalensis (Betulaceae)

Euceraphis chuansiensis Tao

Paratrichosiphum tattakanum (Takahashi)

Althaea rosaea (Malvaceae)

Acyrtosiphon (Metopolophium) sp.

Macrosiphum euphorbiae (Thomas)

Amaranthus viridis (Amaranthaceae)

Aphis citricola van der Goot

Amaranthus (Indet.)

Hyperomyzus lactucae (Linnaeus)

Anaphalis cinnamomea (Compositae)

Brachycaudus helichrysi (Kaltenbach)

Anaphalis contorta (Compositae)

Aphis gossypii Complex

Aphis citricola van der Goot

Anaphalis triplinervis (Compositae)

Brachycaudus helichrysi (Kaltenbach)

Anaphalis sp. (Compositae)

Aphis gossypii Complex

Brachycaudus helichrysi (Kaltenbach)

Anemone sp. (Ranunculaceae)

Himalayaphis anemones Ghosh & Verma

Antirrhinum sp. (Scrophulariaceae)

Nasonovia (Kakimia) jammuensis Verma

Nasonovia (Neokakimia) rostrata David and Hameed

Apluda mutica (Gramineae)

Macrosiphum (Sitobion) rosaeiformis Das

Myzus obtusirostris David *et al.**Argyrophyton* sp. (Compositae)

Macrosiphum sp.

Artemisia vestita (Compositae)

Aphis sp.

Brachycaudus helichrysi (Kaltenbach)

Artemisia vulgaris (Compositae)

Aphis kurosawai Takahashi

Macrosiphoniella hiskosanensis Moritsu

Macrosiphoniella yomogifoliae Shinji

Artemisia sp. (Compositae)

Aphis kurosawai Takahashi

Capitophorus formosartemisiae Takahashi

Macrosiphoniella kalimpongense Basu & Raychaudhuri

Protrama longitarsus sclerodensus Kumar (Roots)

Sappaphis piri (Matsumura) (Roots)

Arundinaria jounsarensis (Gramineae)

Takecallis affinis sp. nov.

Asplenium sp. (Filicinae)

Amphorophora ampullata bengalensis Hille Ris Lambers & Basu

Micromyzodium filicium David

Macrosiphum (Sitobion) fragariae (Walker)

[Vagrant ; host doubtful]

Vesiculaphis verbasci Chowdhuri *et al.*

Asplenium trichomones (Filicinae)

Micromyzodium filicium David

Arena sativa (Gramineae)

Sipha (Rungsia) maydis (Passerini)

Balsum sp. (Balsaminaceae)

Impatientinum impatiensae dalhousiensis Verma

Bambusa sp. (Gramineae)

Macrosiphum (Sitobion) bambusicola sp. nov.

Takecallis affinis sp. nov.

Berberis aristata (Berberidaceae)

Liosomaphis atra Hille Ris Lambers

Berberis umbellata (Berberidaceae)

Tricaudatus polygoni (Narzikulov)

Berberis vulgaris (Berberidaceae)

Brevicoryne barbareae Nevsky

Myzocallis (Agrioaphis) aptera Richards & Kumar

Berberis sp. (Berberidaceae)

Liosomaphis atra Hille Ris Lambers

Liosomaphis sp. nr. himalayensis Basu

Liosomaphis himalayensis Basu

Nippolachnus sp.

Betula utilis (Betulaceae)

Eutrichosiphum sp.

Betula sp. (Betulaceae)

Euceraphis pilosa Nevsky

Neobetulaphis pusilla Basu

Bidens sp. (Compositae)

Aulacorthum solani (Kaltenbach)

Bidens bipinnata (Compositae)

Aphis gossypii Glover

Aphis gossypii Complex

Bidens pilosa (Compositae)

Aphis citricola van der Goot

Myzus persicae (Sulzer)

Rhopalosiphum rufiabdominalis (Sasaki)

Bidens wallichii (Compositae)

Aphis citricola van der Goot

Macrosiphoniella artemisiae yomogifoliae Shinji

Brachiaria sp. (Gramineae)

Hysteroneura setariae (Thomas)

Brassica sp. (Cruciferae)

Myzus persicae (Sulzer)

Brevicoryne barbareae Nevsky

Brassica oleracea (Cruciferae)

Brevicoryne brassicae (Linnaeus)

Lipaphis erysimi (Kaltenbach)

Briza minor (Gramineae)

Sipha (Rungsia) maydis (Passerini)

Buddelia paniculata (Loganiaceae)

Aphis verbasci Schrank

Buddelia sp. (Loganiaceae)

Myzus persicae (Sulzer)

Buddleja sp. (Loganiaceae)

Myzus persicae (Sulzer)

Buxus wallichiana (Euphorbiaceae)

Amphicercidus sp.

Amphicercidus tuberculatus David *et al.*

Calamogrostris pilosa (Gramineae)

Tetraneura indica sp. nov.

Calendula sp. (Compositae)

Aphis gossypii Glover

Aphis gossypii frangulae group

Campanula colorata (Campanulaceae)

Uroleucon kashmiricus Verma

Canna sp. (Cannaceae)

Rhopalosiphum padi (Linnaeus)

Cannabis sativa (Moraceae)

Phorodon (Diphorodon) cannabis Passerini

- Cardamine hirsuta* (Cruciferae)
 Aulacorthum solani (Kaltenbach)
 Myzus persicae (Sulzer)
Carex filicina (Cyperaceae)
 Acutosiphon obliquoris Basu *et al.*
Catamixis baccariodes (Compositae)
 Acyrtosiphon rubi Narzikulov
Cedrus deodara (Abiaceae)
 Aphis citricola van der Goot
 Aphis verbasci Schrank
Celtis australis (Ulmaceae)
 Shivaphis celti Das
Celtis sp. (Ulmaceae)
 Shivaphis celti Das
 Sinomegoura photiniae (Takahashi)
Cestrum nocturnum (Rosaceae)
 Eriosoma lanigerum (Hausmann)
Cestrum sp. (Solanaceae)
 Aphis citricola van der Goot
 Aphis fabae Complex
 Macrosiphum (Sitobion) *rosaeiformis* Das
Chenopodium sp. (Chenopodiaceae)
 Hayaurstia atriplicis (Linnaeus)
Chrysanthemum sp. (Compositae)
 Aulacorthum solani (Kaltenbach)
 Coloradoa rufomaculata (Wilson)
 Macrosiphoniella sanborni (Gillette)
 Macrosiphoniella yomogifoliae (Shinji)
Citrus sp. (Rutaceae)
 Toxoptera citricidus (Kirkaldy)
Cnicus wallichii (Compositae)
 Aphis fabae Scopoli
 Dysaphis atinus Ghosh *et al.*
 Dysaphis sp.
 Toxoptera citricidus (Kirkaldy)

Clematis sp. (Ranunculaceae)

Aphis clematidis simlaensis Kumar and Burkhardt

Aphis nasturtii Kaltenbach

Clerodendron infortunatum (Verbenaceae)

Nasonovia (Kakimia) *rostata* David & Hameed

Aphis citricola van der Goot

Clinopodium umbrosum (Labiatae)

Myzus ornatus Laing

Compositae (Indet.)

Aulacorthum rhamni Ghosh *et al.*

Aphis fabae solanella Theobald

Aphis citricola van der Goot

Baizongia pistaciae Linnaeus

Brachycaudus helichrysi (Kaltenbach)

Hyperomyzus carduellinus (Theobald)

Macrosiphoniella kikungshana Takahashi

Macrosiphoniella sanborni (Gillette)

Uroleucon (Uromelan) *compositae* (Theobald)

Uroleucon (Uromelan) *himachali* Ghosh

Uroleucon sonchi (Linnaeus)

Consularia sp. (Compositae)

Aulacorthum solani (Kaltenbach)

Conyza japonica (Compositae)

Aphis gossypii Complex

Conyza stricta (Compositae)

Pilorostris simlaensis Raychaudhuri *et al.*

Cornus sp. (Cornaceae)

Anoecia cornii (Fabricius)

Coriander sp. (Umbelliferae)

Hyadaphis coriandri (Das)

Cosmos sp. (Compositae)

Aphis citricola van der Goot

Uroleucon kashmiricus Verma

Cotoneaster bacillaris (Rosaceae)

Dysaphis ghanii Stroyan

Cotoneaster (Rosaceae)

Euessigia indica David *et al.*

Creeper (Indet.)*Acyrtosiphon* (*Aulacorthum*) *sensoriatus* David *et al.**Aphis gossypii* Glover*Cucumis sativus* (Cucurbitaceae)*Acyrtosiphon* (*Aulacorthum*) *spinacaudatus* Kumar & Burkhardt*Aulacorthum magnoliae* (Essig & Kuwana)*Cucurbita* sp. (Cucurbitaceae)*Aphis gossypii* Complex*Cyathula tomentosa* (Amaranthaceae)*Aphis leptorhyncha* David *et al.**Cymbalaria muralis* (Scrophulareaceae)*Myzus persicae* (Sulzer)*Cynodon dactylon* (Gramineae)*Hysteroneura setariae* (Thomas)*Cynoglossum denticulatum* (Boraginaceae)*Protrama longitarsus sclerodensus* Kumar*Cyperus* sp. (Cyperaceae)*Acutosiphon obliquoris* Basu *et al.**Dactylis* sp. (Gramineae)*Acyrtosiphon* (*Metopolophium*) *dirhodum* (Walker)*Acyrtosiphon* (*Metopolophium*) *spiraea indicum* Ghosh *et al.**Takecallis arundinariae* (Essig & Kuwana)*Dahlia* sp. (Compositae)*Aulacorthum* (*Neomyzus*) *circumflexus* (Buckton)*Delphinium ajacis* (Ranunculaceae)*Aulacorthum delphinae* Das *et al.**Delphinium* sp. (Ranunculaceae)*Dactynotus minatii* Das *et al.**Dendrocalamus* sp. (Gramineae)*Takecallis arundinariae* (Essig & Kuwana)*Desmodium* sp. (Leguminosae)*Metopolophium rubi* (Narzikulov)*Dipsacus inermis* (Dipsaceae)*Aphis eugineae* van der Goot

Duranta sp. (Verbenaceae)

Aphis gossypii Complex

Elsholtzia polystochya (Labiatae)

Aphis gossypii Glover

Epilobium hirsutum (Scrophulariaceae)

Aphis pollinosa Walker

Erigeron canadensis (Roots) (Compositae)

Protrama longitarsus sclerodensus Kumar

Erigeron sp. (Compositae)

Impatientinum impatiensae dalhousiensis Verma

Macrosiphum smilacicola Takahashi

Macrosiphum (Sitobion) *miscanthi* Takahashi

Uroleucon simlaensis Chakrabarti *et al.*

Fagopyrum cymosum (Polygonaceae)

Uroleucon fagopyri Chowdhuri *et al.*

Fagopyrum esculentum (Polygonaceae)

Metopolophium rubi (Narzikulov)

Fagopyrum tartaricum (Polygonaceae)

Metopolophium rubi (Narzikulov)

Fern (Indet.)

Amphorophora ampullata bengalensis Hille Ris Lambers & Basu

Ficus sp. (Moraceae)

Aphis citricola van der Goot

Fragaria sp. (Rosaceae)

Chaetosiphon (Pentatrachopus) *fragaefolii* (Cockerell)

Dysaphis ghanii Stroyan

Hyalomyzus fragaricola sp. nov.

Myzus ? *ascalonicus* Doncaster

Galinsuga parviflora (Roots) (Compositae)

Smynthuroides betae Westwood

Galium aparaine (Rubiaceae)

Myzus umefoliae Shinji

Galium verbum (Rubiaceae)

Myzus ornatus Laing

Geranium sp. (Geraniaceae)Macrosiphum pseudogeranii Chowdhuri *et al.*

Thecabius affinis (Kaltenbach)

Geranium divaricatum (Gramineae)

Cavariella aegopodii (Scopoli)

Macrosiphus geranii Chowdhuri *et al.*

Micromyzodium filicium David

Goldfussia dalhousiana (Acanthaceae)

Aphis gossypii Complex

Geranium wallichianum (Geraniaceae)Macrosiphum pseudogeranii Chowdhuri *et al.*

Gramineae (Indet.)

Ceratovacuna lanigera Zehntner

Hysteroneura setariae (Thomas)

Macrosiphum (Sitobion) indicum (Basu)

Myzus ornatus Laing

Rhopalosiphum maidis (Fitch)

Grass (Gramineae)

Acyrtosiphon (Metopolophium) graminum sp. nov.

Anoecia corni (Fabricius)

Anoecia himalayensis Chakrabarti & Maity (Roots)

Jacksonia papillata Theobald

Macrosiphum (Sitobion) miscanthi Takahashi

Macrosiphum (Sitobion) pseudoalpecuri Chakrabarti

Myzus obtusirostris David *et al.*

Myzus ornatus Laing

Sipha (Rungsia) maydis (Passerini)

Gynura nepalensis (Compositae)

Aphis gossypii Complex

Hibiscus rosasinensis (Malvaceae)

Aphis gossypii Complex

Hieracium vulgatum (Compositae)

Metopolophium rubi (Narzikulov)

Hippophae salicifolia (Elaeagnaceae)

Capitophorous sp.

Hypericum oblongifolium (Hypericaceae)

Aphis gossypii Complex

Hypericum sp. (Hypericaceae)

Aphis citricola van der Goot

Iberis emera (Cruciferae)

Lipaphis erysimi (Kaltenbach)

Impatiens sp. (Balsaminaceae)

Aphis citricola van der Goot

Impatientinum impatiens Shinji

Impatientinum asiaticum dalhousiensis Verma

Impatiens bicornata (Balsaminaceae)

Impatientinum asiaticum dalhousiensis Verma

Impatiens scabrida (Balsaminaceae)

Impatientinum impatiens dalhousiensis Verma

Indigofera gerardiana (Leguminosae)

Cavariella indica sp. nov.

Indigofera (?) sp.

Nudisiphon chitinicauda Chakrabarti & Bhattacharya

Inula cappa (Compositae)

Neomasonaphis anaphilidis (Basu)

Inula caspidata (Compositae)

Aphis citricola van der Goot

Indumasonaphis inulae (Ghosh & Raychaudhuri)

Ipomoea sp. (Convolvulaceae)

Aphis gossypii group

Macrosiphum (Sitobion) indicum Basu

Jasminum sp. (Oleaceae)

Toxoptera aurantii Boyer

Jatropha sp. (Euphorbiaceae)

Brachycaudus helichrysi (Kaltenbach)

Juglans regia (Juglandaceae)

Chromaphis hirsutustibis Kumar & Lavigne

Panaphis juglandis (Goeze)

Labiatae (Indet.)

Aphis paraverbaschi Chakrabarti*Aulacorthum* (*Perillaphis*) *perillae* Shinji*Cryptaphis rostrata* Chakrabarti & Raychaudhuri*Lactuca haustata* (Compositae)*Uroleucon longisetosus* Chakrabarti & Verma*Lactuca sativa* (Compositae)*Acyrtosiphon* ? *moltshanovi* Mordvilko*Myzus ornatus* Laing

Leguminosae (Indet.)

Megouroparsus dooarsis Ghosh & Raychaudhuri

Liliaceae (Indet.)

Macrosiphum (*Sitobion*) *smilacicola sikkimensis* Ghosh and Ray-
chaudhuri*Lindenbergia* sp. (Scrophulariaceae)*Myzus ornatus* Laing*Myzus persicae* (Sulzer)*Lonicera quinquelocularis* (Caprifoliaceae)*Amphicercidus tuberculatus* David *et al.**Prociphilus* sp.*Lonicera angustifolia* (Caprifoliaceae)*Semiaphis* sp. (? Fundatrix)*Lycopersicum esculentum* (Solanaceae)*Brachycaudus helichrysi* (Kaltenbach)*Machilus odoratissima* (Lauraceae)*Aiceona pseudosugii* David *et al.*

Malvaceae (Indet.)

Aphis gossypii Glover*Mentha arvensis* (Labiatae)*Aphis nasturtii* (Kaltenbach)*Mentha sylvestris* (Labiatae)*Aphis affinis* del Guercio*Aphis gossypii* Glover*Minispermaceae* (Indet.)*Aiceona retipennis* David *et al.*

Mirabilis jalapa (Nyctaginaceae)

Myzus persicae (Sulzer)

Morus sp. (Moraceae)

Aphis citricola van der Goot

Myriactis wallichii (Roots)

Protrama longitarsus sclerodensus Kumar

Nasturtium sp. (Cruciferae)

Brevicoryne barbareae Nevsky

Nepeta sp. (Labiatae)

Acyrtosiphon (Aulacorthum) sclerodorsi Kumar & Burkhardt

Origanum vulgare (Labiatae)

Aphis gossypii Complex

Ornamental plant (Indet.)

Brachycaudus helichrysi (Kaltenbach)

Oryzopsis lateralis (Gramineae)

Macrosiphum (Sitobion) himalayaensis sp. nov.

Oxalis latifolia (Oxalidaceae)

Micromyzodium filicium David

Myzus persicae (Sulzer)

Panicum sp. (Gramineae)

Hysteroneura setariae (Thomas)

Palak (Punicaceae)

Myzus persicae (Sulzer)

Pedicularis gracilis (Scrophulariaceae)

Brachycaudus helichrysi (Kaltenbach)

Dysaphis stroyani sp. nov.

Phalaris tuberosa (Gramineae)

Rhopalosiphum padi (Linnaeus)

Phaseolus sp. (Leguminosae)

Acyrtosiphon phaseoli Chakrabarti *et al.*

Aphis craccivora Koch

Picea morinda (Pinaceae)

Cinara sp. (A).

Picea sminthiana (Pinaceae)Cinara atroalbipes David *et al.**Pimpinella diversifolia* (Umbelliferae)

Cavariella aegopodii (Scopoli)

Pimpinella umbellata (Umbelliferae)

Cavariella konoii Takahashi

Pinus excelsa (Pinaceae)

Cinara maculipes Hille Ris Lambers

Prociphilus (Stagona) himalayaensis Chakrabarti

Pinus patula (Pinaceae)

Cinara maculipes Hille Ris Lambers

Pinus sp. (Pinaceae)Cinara atroalbipes David *et al.*

Cinara maculipes Hille Ris Lambers

Cinara sp. (A)

Cinara (Lachniella) comata Doncaster

Pistacia fastula (Anacardiaceae)

Baizongia pistaciae Linnaeus

Plectranthus coetza (Labiatae)

Cinara sp.

Indocinara hottesis Ghosh *et al.*Macrosiphum aulacorthoides David *et al.*

Myzus sp.

Myzus ascalonicus Doncaster

P. japonicus (Labiatae)Indocinara hottesis Ghosh *et al.**Poa annua* (Gramineae)Acyrtosiphon (Metopolophium) chandrani David *et al.**Poa* sp. (Gramineae)

Macrosiphum sp.

Polygonum alatum (Polygonaceae)

Aphis verbasci Schrank

Vesiculaphis verbasci Chowdhuri *et al.**Polygonum amplexicaule* (Polygonaceae)

Tricaudatus polygoni (Narzikulov)

Polygonum barbatum (Polygonaceae)

Tricaudatus polygona (Narzikulov)

Polygonum sp. (Polygonaceae)

Aphis citricola van der Goot

Aphis gossypii Complex

Aulacorthum nipponicum (Essig and Kuwana)

Capitophorus hippophaes javanicus Hille Ris Lambers

Capitophorus hippophaes mitegoni Eastop

Cavariella aegopodii (Scopoli)

Liosomaphis atra Hille Ris Lambers

Macrosiphum pseudogeranii Chakrabarti & Raychaudhuri

Metopolophium rubi (Narzikulov)

Myzus persicae (Sulzer)

Tricaudatus polygona (Narzikulov)

Tricaudatus polygona tuberculatus Hille Ris Lambers & Basu

Populus ciliata (Salicaceae)

Epipemphigus imaicus (Cholodkovsky)

Pemphigus sp. (Fundatrix)

Populus sp. (Salicaceae)Chaitophorus indicus Ghosh *et al.*

Chaitophorus kapuri Hille Ris Lambers

Doraphis populi Maskel

Epipemphigus imaicus (Cholodkovsky)

Tetraneura of nigriabdominalis group

Potentilla argyrophylla (Rosaceae)

Macrosiphum pachysiphon Hille Ris Lambers

Potentilla nepalensis (Rosaceae)

Metopolophium (Microlophium) rubifoliae Raychaudhuri *et al.**Potentilla nepalensis* (Rosaceae)Metopolophium (Microlophium) rubifoliae Raychaudhuri *et al.**Prinsepia utilis* (Rosaceae)Tricaudatus indicus Ghosh *et al.**Prenanthus bruniana* (Polypodiaceae)

Uroleucon longisetosus Chakrabarti & Verma

Prinsepia sp. (Rosaceae)

Liosomaphis sp.

Tricaudatus indicus Ghosh *et al.*

Prunus cerasus (Rosaceae)

Pemphigus sp.

Prunus cornuta (Rosaceae)

Myzus mumecola Matsumura

Pyrolachnus imbricatus David *et al.*

Prunus persica (Rosaceae)

Brachycaudus helichrysi (Kaltenbach)

Prunus puddum (Rosaceae)

Therioaphis riehi (Börner)

Tinocalloides montanus Basu

Myzus (*Prunomyzus*) sp.

Prunus sp. (Rosaceae)

Aphis gossypii Glover

Aulacorthum (*Perillaphis*) *perillae* Shinji

Tinocalloides montanus Basu

Tuberdefectus eastopi Kumar & Lavigne

Toxoptera aurantii Boyer de Fonscolombe

Punica granatum (Punicaceae)

Aphis gossypii Glover

Aphis punicae Passerini

Pyrus malus (Rosaceae)

Aphis citricola van der Goot

Baizongia pistaceae (Linnaeus)

Epipemphigus imaicus (Cholodkovsky)

Eriosoma lanigerum (Hausmann)

Pyrus paspistia (Rosaceae)

Schizaphis rotundiventris (Signoret)

Pyrus sp. (Rosaceae)

Aphis gossypii Complex

Epipemphigus imaicus (Cholodkovsky)

Eriosoma lanigerum (Hausmann)

Quercus dialbata (Fagaceae)

Lachnus acutihirsutus Kumar and Burkhardt

Myzocallis polychaetus David

Paratrichosiphum tattakanum assamensis Ghosh and Raychaudhuri

Quercus incana (Fagaceae)

Lachnus acutihirsutus Kumar and Burkhardt

Quercus sp. (Fagaceae)

Eutrichosiphum (Eutrichosiphum) simlaensis sp. nov.

Eutrichosiphum (Paratrichosiphum) khasyanum (Ghosh & Raychaudhuri)

Eutrichosiphum (Eutrichosiphum) neoalnicola Raychaudhuri *et al.*

Lachnus acutihirsutus Kumar and Burkhardt

Lachnus tropicalis (van der Goot)

Longicaudus himalayensis Hille Ris Lambers

Nippolachnus bengalensis Basu and Hille Ris Lambers

Nippolachnus eriobotryae Basu and Hille Ris Lambers

Nippolachnus piri Matsumura

Paratrichosiphum tattakanum (Takahashi)

Pseudothoracaphis himachali Raychaudhuri *et al.*

Reticulaphis distylli rotifera Hille Ris Lambers and Takahashi

Raphanus sativus (Cruciferae)

Brevicoryne barbareae Nevsky

Ranunculus sp. (Ranunculaceae)

Macrosiphum (Sitobion) miscanthi Takahashi

Ranunculaceae (Indet.)

Dactynotus minatii Das *et al.**Rhamnus nepalensis* (Rhamnaceae)

Myzus ornatus Laing

Rhamnus sp. (Rhamnaceae)

Aphis fabae Complex

Myzus ornatus Laing

Rhododendron arboreum (Ericaceae)

Chaetomyzus rhododendri Ghosh and Raychaudhuri

Rhododendron sp. (Ericaceae)*Aphis kurosawai* Takahashi*Chaetosiphon rhododendri* Ghosh and Raychaudhuri*Indumasonaphis inulae* Ghosh and Raychaudhuri*Indumasonaphis tuberculatus* Chakrabarti *et al.**Neoacyrthosiphon indicum* Ghosh *et al.**Neomasonaphis rhododendri* Chakrabarti *et al.**Rosa macrophylla* (Rosaceae)*Chaetosiphon gracilicornis* David *et al.**Chaetosiphon glaber* David *et al.**Chaetosiphon tetrarhoda* (Walker)*Myzaphis avariola* David *et al.**Rosa brunonii* (Rosaceae)*Chaetosiphon gracilicornis* David *et al.**Maculolachnus submacula* (Walker)*Rosa* sp. (Rosaceae)*Aulacorthum solani* (Kaltenbach)*Chaetosiphon gracilicornis* David *et al.**Macrosiphum pachysiphon* Hille Ris Lambers*Macrosiphum rosae* (Linnaeus)*Macrosiphum* (Sitobion) *rosaeiformis* Das*Myzaphis rosarum* (Kaltenbach)*Myzaphis turanica* Nevsky*Maculolachnus submacula* (Walker)*Rosa* (Wild) (Rosaceae)*Acyrtosiphon* (Metopolophium) *chandrani* David & Narayanan*Chaetosiphon gracilicornis* David *et al.**Chaetosiphon tetrarhoda* (Walker)*Impatiensium impatiensae dalhousiensis* Verma*Longicaudus himalayensis* Hille Ris Lambers*Macrosiphum pachysiphon* Hille Ris Lambers*Matsumuraja capitophoroides* Hille Ris Lambers*Myzaphis turanica* Navsky

Rosaceae (Indet.)

- Macrosiphum (Sitobion) rosaeiformis Das
- Metopolophium sonchifoliae Raychaudhuri *et al.*
- Myzus ornatus Laing

Rubus lasiocarpus (Rosaceae)

- Macrosiphum pachysiphon Hille Ris Lambers

Rubus cordifolius (Rubiaceae)

- Myzus cerasi umefoliae (Shinji)
- Vesiculaphis verbasci Chowdhuri *et al.*

Rubus ellipticus (Rosaceae)

- Aphis longisetosa Basu
- Metopolophium rubi (Narzikulov)

Rubus macilentus (Rosaceae)

- Matsumuraja capitophoroides Hille Ris Lambers

Rubus sp. (Rosaceae)

- Metopolophium rubi (Narzikulov)
- Aphis longisetosa Basu
- Macrosiphum pachysiphon Hille Ris Lambers
- Metopolophium rubi (Narzikulov)
- Metopolophium sp.
- Senisetotarsaphis jakhuensis Raychaudhuri *et al.*

Ruellia tuberosa (Acanthaceae)

- Micromyzodium strobilanthi Ghosh

Rumex acetosella (Polygonaceae)

- Aphis polygonaceae (Matsumura)

Rumex hastatus (Polygonaceae)

- Aphis fabae solanella Theobald
- Brachycaudus (Thuleaphis) rumexicolens Patch
- Macrosiphum pachysiphon Hille Ris Lambers
- Tricaudatus polygoni (Narzikulov)

Rumex nepalensis (Polygonaceae)

Brachycaudus (Thuleaphis) rumexicolens Patch

Dysaphis emicis (Mimeur)

Dysaphis foeniculus (Theobald)

Myzus ornatus Laing

Rumex sp. (Polygonaceae)

Metopolophium rubi (Narzikulov)

Aphis rhoicola Hille Ris Lambers

Dysaphis emicis (Mimeur)

Protrama longitarsus sclerodensus Kumar (Roots)

Sappaphis piri Matsumura (Roots)

Secale sp. ("Rye") Gramineae

Macrosiphum (Sitobion) miscanthi Takahashi

Macrosiphum (Sitobion) rosaeiformis Das

Saccharum officinarum (Gramineae)

Sipha (Rungsia) maydis (Passerini)

Salix sp. (Salicaceae)

Cavariella aegopodii (Scopoli)

Cavariella (Cavariella) aquatica (Gillette & Bragg)

Chaitophorus manaliensis Chakrabarti

Chaitophorus salijaponicus niger (Mordvilko)

Chaitophorus pakistanicus Hille Ris Lambers

Chaitophorus simlaensis Chakrabarti

Raychaudhuriella myzaphoides Chakrabarti

Tuberolachnus salignus (Gmelin)

Salix fragilis (Salicaceae)

Lachnus longirostris David and Ghosh

Salvia glandulosa (Labiatae)

Acyrtosiphon malvae (Mosley)

Salvia sp. (Labiatae)

Aulacorthum solani (Kaltenbach)

Longirostris raji Kumar & Burkhardt

Sanicula europea (Umbelliferae)Cavariella simlaensis Chowdhuri *et al.*

Cavariella salicicola Matsumura

Saussurea lappa (Compositae)

Metopolophium rubi (Narzikulov)

Brachycaudus helichrysi (Kaltenbach)

Selinum tenuifolium (Umbelliferae)

Acyrtosiphon ? moltshanovi Mordvilko

Hyalomyzus sp.

Senecio chrysanthemoides (Compositae)

Aphis verbasci Schrank

Brachycaudus helichrysi (Kaltenbach)

Setaria sp. (Gramineae)

Hysteroneura setariae (Thomas)

Rhopalosiphum maidis (Fitch)

Shrub (Indet.)

Acyrtosiphon (Metopolophium) simlaensis Chakrabarti &

Raychaudhuri

Smilax sp. (Smilacaceae)

Aphis citricola van der Goot

Aphis gossypii Complex

Macrosiphum smilacifoliae Takahashi

Macrosiphum (Sitobion) miscanthi Takahashi

Macrosiphum (Sitobion) rosaeiformis Das

Smilax parviflora (Smilacaceae)

Impatiens impatiensae dalhousiensis Verma

"Snow" : Brachycaudus helichrysi (Kaltenbach)

Cinara confinis tenuipes Chakrabarti & Ghosh

Cinara chaetorostrata Ghosh & Raychaudhuri

Liosomaphis himalayaensis Basu

Macrosiphum (Sitobion) miscanthi Takahashi

Macrosiphum (Sitobion) rosaeiformis Das

Indumasonaphis inulae Ghosh *et al.*

Myzocallis (Hoplocallis) pictus (Ferrari)

Prociphilus taxus Ghosh *et al.*

Rhopalosiphum maidis (Fitch)

Rhopalosiphum nymphaeae (Linnaeus)

Rhopalosiphum rufiabdominalis (Sasaki)

Rhopalosiphoninus latysiphon (Davidson)

Solanum tuberosum (Solanaceae)

Macrosiphum euphorbiae (Thomas)

Myzus ornatus Laing

Sonchus arvensis (Compositae)

Hyperomyzus carduellinus (Theobald)

Uroleucon sonchi (Linnaeus)

Sonchus sp. (Compositae)

Aphis fabae solanella Theobald

Hyperomyzus carduellinus (Theobald)

Metopolophium sonchifoliae Raychaudhuri *et al.*

Uroleucon sonchi (Linnaeus)

Spiraea bella (Rosaceae)

Aphis citricola van der Goot

Aphis fabae Complex

Spiraea canescens (Rosaceae)

Acyrtosiphon (*Metopolophium*) *spirae indicum* Ghosh *et al.*

Cavariella indica sp. nov.

Spiraea chanoidri (Rosaceae)

Aphis citricola van der Goot

Spiraea sorbifolia (Rosaceae)

Myzus ornatus Laing

Spiraea sp. (Rosaceae)

Aphis citricola van der Goot

Tricaudatus polygoni (Narzikulov)

Xenosiphonaphis folisacculatus Kumar and Burkhardt

Stellaria media (Caryophyllaceae)

Sipha (*Rungsia*) *maydis* (Passerini)

Strobilanthes atropurpureus (Acanthaceae)

Aphis fabae Complex

Aphis gossypii Glover

Aulacorthum (Neomyzus) strobilantheae sp. nov.

Tricaudatus polygoni (Narzikulov)

Strobilanthes sp. (Acanthaceae)

Aulacorthum (Neomyzus) strobilantheae sp. nov.

Strobilanthes dalhousianus (Acanthaceae)

Micromyzodium strobilanthi Ghosh

Nasonovia (Neokakimia) rostrata David and Hameed

"Talle" (Wild bush)

Baizongia pistacea Linnaeus

Taxus buccata (Taxaceae)Anocaudus taxus Ghosh *et al.*

Hyperomyzus lactucae Linnaeus

Prociphilus taxus Ghosh *et al.**Thalictrum pauciflorum* (Ranunculaceae)

Acyrtosiphon (Metopolophium) ranunculum sp. nov.

Tricholepis elongata (Compositae)

Uroleucon sonchi (Linnaeus)

Triticum aestivum (Gramineae)

Macrosiphum (Sitobion) miscanthi Takahashi

Rhopalosiphum maidis (Fitch)

Tree (Indet.)

Anoecia corni (Fabricius)

Lachnus acutihirsutus Kumar and Burkhardt

Shivaphis celti Das

Tridax procumbens (Compositae)

Aphis gossypii Complex

Triticum sp. (Gramineae)

Acyrtosiphon (Metopolophium) longicaudatum David and Hameed

Rhopalosiphoninus latysiphon (Davidson)

Umbelliferae (Indet.)

Amphorophora ampullata bengalensis Hille Ris Lambers and Basu

Indet. plant

- Acyrtosiphon soltatovi* Mordvilko
Amphicercidus tuberculatus David *et al.*
Aphis citricola van der Goot
Aphis gossypii Complex
Aphis paraverbasci Chakrabarti
Aspidophorodon harvensis Verma
Aulacorthum solani (Kaltenbach)
Cinara similis (van der Goot)
Diphorodon cannabis (Passerini)
Eoessigia indica David *et al.*
Epipemphigus imaicus (Cholodkovsky)
Impatiensium ? *asiaticum* Nevsky
Lachnus acutihirsutus Kumar and Burkhardt
Lachnus longisetosus Ghosh
Macrosiphum aulacorthoides David *et al.*
Macrosiphoniella sanborni (Gillette)
Matsumuraja capitophoroides Hille Ris Lambers
Melanaphis meghalayensis Raychaudhuri and Banerjee
Metopolophium graminum Raychaudhuri *et al.*
Micromyzodium filicium David
Myzus cerasi umefoliae (Shinji)
Myzus dycei Carver
Myzus obtusirostris David *et al.*
Myzus persicae (Sulzer)
Prociphilus (Stagona) *himalayaensis* Chakrabarti
Pterocomma ? *pilosum* (Buckton) (Roots)
Pyrolachnus imbricatus David *et al.*
Rhopalosiphoninus latysiphon (Davidson)
Rhopalosiphoninus longisetosus Chakrabarti and Ghosh
Rhopalosiphum padi (Linnaeus)
Sinomegoura citricola (van der Goot)
Uroleucon kashmiricum (Verma)

Urticaceae (Indet.)

- Myzus dycei* Carver

Urtica parviflora (Urticaceae)

Aphis gossypii Glover

Myzus ascalonicus Doncaster

Myzus cerasi umefoliae (Shinji)

Myzus dycei Carver

Urtica sp. (Urticaceae)

Aphis citricola van der Goot

Aphis gossypii Complex

Aphis rhamnifila David *et al.*

Myzus dycei Carver

Myzus persicae (Sulzer)

Verbena sp. (Verbenaceae)

Macrosiphum euphorbiae (Thomas)

Verbena officinalis (Verbenaceae)

Aphis gossypii Glover

Verbascum thapsus (Scrophulariaceae)

Aphis verbasci Schrank

Vesiculaphis verbasci Chawdhuri *et al.**Veronica agrestis* (Scrophulariaceae)

Aphis clematidis simlaensis Kumar and Burkhardt

Brevicoryne brassicae (Linnaeus)

Viburnum sp. (Caprifoliaceae)

Dysaphis ghanii Stroyan

Viburnum sp. (Caprifoliaceae)Vesiculaphis verbasci Chowdhuri *et al.**Vinca* sp. (Apocynaceae)

Brachycaudus helichrysi (Kaltenbach)

Viola sp. (Violaceae)

Aulacorthum solani (Kaltenbach)

Myzus ornatus Laing

Y. P. T.

Chaitophorus kapuri Hille Ris Lambers

Hyadaphis coriandri (Das)

Hyalopterus pruni (Linnaeus)

Walnut

Chromaphis hirsutustibis Kumar and Burkhardt

Water trap

Acyrtosiphon (Aulacorthum) sclerodorsi Kumar & Burkhardt

Chaitophorus indicus Ghosh *et al.*

Cryptomyzus taoi Hille Ris Lambers

Micromyzus nigrum van der Goot

Weed (Indet.)

Aphis verbenae Nevsky

Wild grass (Gramineae)

Sipha (Rungia) maydis (Passerini)

Zea mays (Gramineae)

Rhopalosiphum padi (Linnaeus)

Rhopalosiphoninus indicus sp. nov.

Zinnia sp. (Compositae)

Aphis citricola van der Goot

Aphis sp. ? *gossypii* Glover

Uroleucon kashmiricum (Verma)

SUMMARY AND CONCLUSION

A retrospect of the work reveals that a total of 251 species of aphids belonging to about 102 genera distributed over 7 subfamilies of the family Aphididae occur in Himachal Pradesh. These are known to infest about 252 plant species in 175 genera belonging to 65 Natural Orders (*vide* Host plant-Aphid catalogue). Out of the total number of aphid species so far known from the state, chiefly 12 species infest the economically important plant species. Of these, plants belonging to Cereals, Oil seed crops, vegetables and fruit trees are mostly affected by *Hysteroneura setariae* (Thomas); *Lipaphis erysimi* (Kaltenbach); *Myzus persicae* (Sulzer); *Brevicoryne brassicae* (Linnaeus); *Toxoptera aurantii* (Boyer de Fonscolombe); *T. citricidus* (Kirkaldy) and *Eriosoma lanigerum* (Hausmann) respectively. The family Aphididae, as understood here, includes Anoeciinae, Aphidinae, Callipterinae, Greenideinae, Hormaphidinae, Lachninae and Pemphiginae.

A break up of the species and subspecies known so far from Himachal Pradesh has been given in the following table : (*vide* page 210).

Of these species, specimens of nearly 56 species including 10 partly identified ones have not been available for examination. So, these have just been listed separately along with original references and synonymy, if

TABLE 1. A subfamilywise break up of Aphididae of Himachal Pradesh

Subfamilies	Species		Genera		Total no. of		New	New	Unidentified
	recorded till date	considered at present	recorded till date	considered at present	Species	Genera	Species	Genus	
Anoeciinae									
Tribes (i) Aiceonini	1	1	1	1	3	2	—	—	—
(ii) Anoecini	2	2	1	1					
Aphidinae									
Tribes (i) Aphidini	37	22	8	6					
(ii) Macrosiphini	146	109	57	49	185	66	9	1	15
(iii) Pterocommatini	2	1	1	1					
Callipterinae	24	18	12	10	24	12	1	—	2
Greenideinae	6	6	1	1	6	1	1	—	1
Hormaphidinae	6	5	6	5	6	6	—	—	—
Lachninae									
Tribes (i) Cinarini	6	4	2	2					
(ii) Lachnini	9	9	4	4	16	7	—	—	2
(iii) Tramini	1	1	1	1					
Pemphiginae	11	8	8	7	11	8	1	—	3
Total	251	186	102	88	251	102	12	1	23

any. Out of the remaining 186 species belonging to 88 genera dealt with in this contribution, 12 species, namely, *Acyrtosiphon* (*Metopolophium*) *ranunculum*, *Aulcaorthum* (*Neomyzus*) *strobilantheae*, *Cavariella himachali*, *Dysaphis stroyani*, *Eutrichosiphum simlaensis*, *Hyalomyzus fragaricola*, *Macrosiphum* (*Sitobion*) *bambusicola*, *M. (S.) himalayensis*, *Rhopalosiphoninus indicus*, **Spinaphis multisetosa*, *Takecallis affinis* and *Tetraneura indica* are new to science and one of the above new species (marked*) has been accommodated in one new genus. 3 other species, *Aphis pollinosa* Walker, *Cavariella konoi* Takahashi and *Myzocallis* (*Hoplocallis*) *pictus* (Ferrari) are new records from India.

Out of the sexuales of 37 species/subspecies apparently known from the area, the author collected sexuales of 26 species which include only males of 13 species/subspecies and oviparae of 13 other species/subspecies. Of these, males of 3 species viz., *Hyperomyzus lactucae* (Linnaeus), *Indumasonaphis inulae* (Ghosh and Raychaudhuri) and *Takecallis affinis* sp. nov. and oviparae of 6 species viz., *Amphicercidus indicus* David *et al.*, *Aphis pollinosa* Walker, *Cavariella nigra* Basu, *Myzaphis turanica* Nevsky, *Periphyllus aesculi* Hille Ris Lambers and *Takecallis affinis* sp. nov. are described for the first time from India. Besides, for 11 other species of both males and oviparae are known. Males are generally alate except *Aphis clematidis simlaensis* Kumar and Burkhardt where male is apterous. Similarly, females are apterous oviparous except *Eutrichosiphum* (*P.*) *alnicola* Basu which has alate ovipara. Find of sexuales for some species/subspecies in the area hints at the possibility of completion of holocyclic life cycle by them. From this data on the sexuales, it is apparent that low temperature and short day length favour production of sexuales.

A look into Host plant-Aphid catalogue clearly depicts polyphagism for some of these species and host restriction for the quite a few.

A critical analysis of the data reveals that aphids of Himachal Pradesh constitute about 05% of the total species known from the world, 24.5% of the species from the oriental and 35.7% of the species from the Indian aphid fauna. Of the 251 species known from Himachal Pradesh, 97 species constituting 38.5% are endemic in origin, of the remaining 154 exotic species, about 33% are Palearctic, 3.5% Ethiopian, 12% Oriental, 4.4% Malayan, 7.5% Nearctic and 01% Australian in origin.

In conclusion, it may be said that Himachal Pradesh presents a rather rich aphid fauna and these insects resemble more closely the palearctic fauna. Further, endemism of the state can well be judged from the aphids so far reported from there. Moreover, the present work has helped in extending the knowledge of distribution of already known species.

REFERENCES

- AOKI, SHIGEYUKI 1975. Descriptions of the Japanese species of *Pemphigus* and allied genera (Homoptera : Aphidoidea). *Insecta matsum.*, n. s., **5** : 1-63.
- AYYAR, T. V. R. 1932. Annotated list of insects affecting important cultivated plants of South India, Madras : 1-95.
- BALTZER, CLARE R. 1965. The rusty plum aphid in the Philippines. *Philipp. J. Pl. Ind.*, **30** : 159-163.
- BARKER, A. C. 1920. Generic classification of the hemipterous family Aphididae. *Bull. U. S. Dep. Agric.*, Washington, **826** : 1-109.
- BASU, A. N. 1961. Additions to the Aphid fauna of West Bengal. *Sci. Cult.*, **27** : 456.
- BASU, A. N. 1964. New genera and species of Aphids from the Darjeeling district, India (Homoptera : Aphididae). *J. Linn. Soc. (Zool.)*, **45** : 223-243.
- BASU, A. N. 1967. One new genus and seven new species of aphids from Darjeeling district, West Bengal (Homoptera : Aphididae). *Bull. Ent.*, **8** (2) : 143-157.
- BASU, A. N. AND BANERJEE, S. N. 1958. Aphids of economic plants of West Bengal. *Indian Agric.*, **2** : 89-112.
- BASU, R. C., GHOSH, A. K. AND RAYCHAUDHURI, D. N. 1970. A new genus and records of some sexual forms from Assam. *Proc. zool. Soc. Calcutta*, **23** : 83-91.
- BASU, R. C. AND RAYCHAUDHURI, D. N. 1976. Studies on the Aphids (Homoptera : Aphididae) from India. XXV. The genus *Myzus* with five new species from Eastern India. *Oriental Ins.*, **10** (1) : 93-112.
- BASU, R. C. AND RAYCHAUDHURI, D. N. 1976a. Studies on the Aphids (Homoptera : Aphididae) from Eastern India. XXIX. Genus *Macrosiphoniella*. *Oriental Ins.*, **10** (2) : 295-306.
- BASU, R. C. AND RAYCHAUDHURI, D. N. 1976b. Studies on the aphids (Homoptera : Aphididae) from Eastern India. XXXI. The genus *Capitophorus*. *Oriental Ins.*, **10** (4) : 567-577.
- BEHURA, B. K. AND BOHIDAR, KALYANI. 1970. Studies on the Aphididae of India V. On the Morphology of the lotus aphid, *Rhopalosiphum nymphaeae* (Linnaeus). *Prakruti-Utkal University Journal Science*, **7** (1) : 57-76.
- BEHURA, B. K. AND MAHAPATRA SUSHAMA, 1968. Studies on the Aphididae of India. II. On the Morphology of *Hysteroneura setariae* Thomas. *Prakruti-Utkal University Journal Science*, **5** (2) : 63-87.

- BHALLA, O. P. 1971. Addition to the Aphid fauna of Himachal Pradesh. *Himachal J. agric. Res.*, **1** : 51-52.
- BINDRA, O. S., SEKHON, S. S. 1969. New records of Aphids from the Punjab and Kulu valley. *Bull. Ent.*, **10** (1) : 103-104.
- BINDRA, O. S. AND SEKHON, S. S. 1969a. Additional new records of aphids from the Kangra, Kulu and Lahaul valleys (India). *Bull. Ent.*, **10** (2) : 156-157.
- BODENHEIMER, F. S. AND SWIRSKI, E. 1957. The Aphidoidea of the Middle East, Weizmann, Jerusalem : 1-378.
- *BÖRNER, C. 1920. Wanderungen der Johannisbeer-und Kirschenblattläuse. *Mitt. Biol. Reichsanst. Land-Forst-Wirtsch.*, **18** : 119-120.
- BÖRNER, C. 1952. Die Blattläuse Mitteleuropas Schr. thuring. Land Arb. Gemeinsh. Heilpflanzank. 4 (=Mitt. thuring. bot. Ges. Beih. 3) : 484.
- BUCKTON, G. B. 1876-1883. Monograph of the British Aphides, London, I-IV, **1** : 1-193 (I-1876) ; **2** : 1-176 (II-1879) ; **3** : 1-142 (III-1881) ; **4** : 1-128 (IV-1883).
- BUCKTON, G. B. 1893. A new gall making aphid. *Indian Mus. Notes*, Calcutta, **3** : 71-73.
- BUCKTON, G. B. 1896. Notes on Indian aphids. *Indian Mus. Notes*, Calcutta, **3** : 87-88.
- BUCKTON, G. B. 1897. Notes on two new species of gall aphides from the North Western Himalayan region. *Indian Mus. Notes*, **4** (2) : 50-51.
- CARVER, MARRY, 1976. New and recent additions to the aphid fauna of Australia (Homoptera : Aphididae). *J. Aust. ent. Soc.*, **15** : 461-465.
- CHAKRABARTI, S. 1972. Aphids of North Western India, with special reference to Kumaon range, Uttar Pradesh. Ph. D. Thesis, Calcutta University : 1-435.
- CHAKRABARTI, S. 1976. Two new species of Aphids (Homoptera : Aphididae) from North Western Himalaya, India. *J. Linn. Soc. (Zool.)*, **58** (3) : 263-271.
- CHAKRABARTI, S. 1977. Chaitophorinae (Aphididae : Homoptera) of India with descriptions of three new species from Northwest India. *Oriental Ins.*, **11** (2) : 205-224.
- CHAKRABARTI, S., CHOWDHURI, A. N. AND RAYCHAUDHURI, D. N. 1974. Further records of aphids (Homoptera : Aphididae) from Himachal Pradesh, India. *Sci. Cult.*, **40** : 461-462.

- CHAKRABARTI, S., GHOSH, A. K. AND CHOWDHURI, A. N. 1970. Aphids (Homoptera) of Himachal Pradesh, India. III. *Oriental Ins.*, **4**(4) : 447-452.
- CHAKRABARTI, S., GHOSH, A. K. AND RAYCHAUDHURI, D. N. 1971. New records of aphids (Insecta : Homoptera) from Uttar Pradesh, India. *Sci. Cult.*, **37** (5) : 247-248.
- CHAKRABARTI, S., GHOSH, A. K. AND RAYCHAUDHURI, D. N. 1972. A new genus, a new species and further records of aphids (Homoptera : Aphididae) from the Kumaon Hills, Northwest Himalaya, India. *Oriental Ins.*, **6** (3) : 387-400.
- CHAKRABARTI, S., GHOSH, A. K. AND RAYCHAUDHURI, D. N. 1972a. On some undescribed morphs and new records of Aphids (Homoptera : Insecta) from Kumaon Himalaya, India. *Curr. Sci.*, **41** (2) : 70-71.
- CHAKRABARTI, S., GHOSH, A. K. AND RAYCHAUDHURI, D. N. 1974. Some new aphids (Homoptera : Aphididae) from Himachal Pradesh, India. *Oriental Ins.*, **8** (4) : 521-530.
- CHAKRABARTI, S. AND RAYCHAUDHURI, D. N. 1974. A new subspecies and some synonymies of aphid species (Homoptera : Aphididae) from India. *Oriental Ins.*, **8** (3) : 303-305.
- CHAKRABARTI, S. AND RAYCHAUDHURI, D. N. 1975. Aphids (Homoptera : Aphididae) from Sundardunga valley in Kumaon Himalaya (Uttar Pradesh), India. *Oriental Ins.*, **9** (2) : 195-211.
- CHAKRABARTI, S. AND VERMA, K. D. 1975. A new species of aphid (Homoptera : Aphididae) from North Western Himalaya. *Oriental Ins.*, **9** (2) : 167-171.
- CHAKRABARTI, S. AND MAITY, S. P. 1978. Aphids (Homoptera : Aphididae) of Northwest India : New subgenus, New species and New records of root inhabiting Aphids. *Entomon*, **3** (2) : 265-272.
- CHOWDHURI, A. N., BASU, R. C., CHAKRABARTI, S. AND RAYCHAUDHURI, D. N. 1969. Aphids of Simla (Himachal Pradesh), India—I. *Oriental Ins.*, **3** (1) : 83-92.
- COTTIER, W. 1953. Aphids of New Zealand. *Bull. N. Z. Dep. Sci. industr. Res.*, **106** : 1-382.
- DAS, S. K., RAYCHAUDHURI, D. AND RAYCHAUDHURI, D. N. 1981. Some new species and hitherto unknown morphs of aphids (Homoptera : Aphididae) from Himachal Pradesh, Northwest India. *Entomon*, **6** (1) : 47-56.
- DAS, B. 1918. The Aphididae of Lahore, *Mem. Indian Mus.*, **6** (4) : 135-274.
- DAVATCHI, A. G. 1958. Etude biologique de la faune entomologique des *Pistacea* sauvages et cultivées. *Rev. Path. Geg. Ent. Agr. Fr.*, **37** : 1-166.

- DAVID, S. K. 1956. Notes on south Indian Aphids. I. Description of four new species. *Indian J. Ent.*, **18** (1) : 1-9.
- DAVID, S. K. 1957. Notes on south Indian Aphids. IV. Aphidinae. *Indian J. Ent.*, **19** (4) : 289-299.
- DAVID, S. K. 1958. Some rare Indian Aphids. *J. Bombay nat. Hist. Soc.*, **55** (1) : 110-116.
- DAVID, S. K. 1969. Some rare aphids in new regions in India. *J. Bombay nat. Hist. Soc.*, **66** (2) : 323-326.
- DAVID, S. K. 1969a. Two new species of Aphids (Homoptera) from India. *Oriental Ins.*, **3** (1) : 79-82.
- DAVID, S. K. 1975. A Taxonomic Review of *Macrosiphum* (Homoptera : Aphididae) in India. *Oriental Ins.*, **9** (4) : 461-493.
- DAVID, S. K. AND HAMEED, S. F. 1975. One new species and two new records of aphids (Homoptera : Aphididae) from Lahaul in N. W. Himalaya. *Oriental Ins.*, **9** (2) : 213-219.
- DAVID, S. K. AND NARAYANAN, K. 1968. Three new species of Aphids from South Western Himalayas in India. *Bull. Ent.*, **9** (2) : 99-103.
- DAVID, S. K., NARAYANAN, K. AND RAJASINGH, S. G. 1969. New records of Aphids (Homoptera : Aphididae) in India. *Bull. Ent.*, **10** (2) : 158-159.
- DAVID, S. K., NARAYANAN, K. AND RAJASINGH, S. G. 1970. Five new species of aphids (Homoptera) from North Western India, *Oriental Ins.*, **4** (4) : 413-426.
- DAVID, S. K., RAJASINGH, S. G. AND NARAYANAN, K. 1967. Notes on the taxonomy and other aspects of certain species of aphids in India. *J. Bombay nat. Hist. Soc.*, **65** (2) : 508-512.
- DAVID, S. K., RAJASINGH, S. G. AND NARAYANAN, K. 1970. The Myzaphidines (Homoptera) of India with description of three new species. *Oriental Ins.*, **4** (4) : 395-406.
- DAVID, S. K., RAJASINGH, S. G. AND NARAYANAN, K. 1972. New genus, new species and new morphs of aphids (Homoptera) from India, *Oriental Ins.*, **6** (1) : 41-42.
- DEL GUERCIO, G. 1909. Concerning two new genera and three new species of aphids of California. *Pomona J. Ent.*, **1** : 73-75.
- DESHPANDE, V. G. 1937. A preliminary account of the Aphididae of Poona. *J. Bombay nat. Hist. Soc.*, **39** : 740-744.
- DONCASTER, J. P. 1954. Notes on the genus *Lipaphis* Mordvilko, 1928 (Homoptera : Aphididae) and description of a new species. *Proc. R. ent. Soc. Lond.*, (B) **23** : 83-88.

- DONCASTER, J. P. 1956. Two aphids from the Indian Region. *Proc. R. ent. Soc. Lond.* (B) **25** (7-8) : 111-116.
- EASTOP, V. F. 1953. A study of the Tramini (Homoptera : Aphididae). *Trans. R. ent. Soc. Lond.*, **104** (1) : 385-413.
- EASTOP, V. F. 1954. Notes on the East African Aphids V. Aphids of Citrus, Coffee and Tea. *East African Agricultural Journal*, **19** : 193.
- EASTOP, V. F. 1955. Two new species and two new subgenera of *Micromyzus* van der Goot 1917 (Hem., Aphididae) from East Africa. *Entomologist's mon. Mag.*, **91** : 203-206.
- EASTOP, V. F. 1958. A study of the Aphididae (Homoptera) of East Africa. (H. M. S. O. London) : 1-126.
- EASTOP, V. F. 1961. A study of the Aphididae (Homoptera) of West Africa. British Museum (Natural History). London : 1-93.
- EASTOP, V. F. 1966. A taxonomic study of Australian Aphidoidea (Homoptera). *Aust. J. Zool.*, **14** : 399-592.
- EASTOP, V. F. 1972. A Taxonomic review of the *Cinara* Curtis occurring in Britain (Hemiptera : Aphididae). *Bull. Br. Mus. nat. Hist. (Ent.)*, **27** : 106-186.
- EASTOP, V. F. 1976. A review of *Cinara* subgenus *Cinariella* (Hemiptera : Aphididae). *Bull. Br. Mus. nat. Hist. (Ent.)*, **35** (1) : 1-23.
- EASTOP, V. F. AND HILLE RIS LAMBERS, D. 1976. A survey of the world's Aphids. Dr. W Junk b. v. Publishers, The Hauge : 1-586.
- EASTOP, V. F. AND VAN EMDEN, H. F. 1972. Aphid technology. ed. H. F. Van Emden. Academic Press, London : 1-344.
- ESSIG, E. O. AND ABERNATHY, F. 1952. The Aphid genus *Periphyllus*. (University of California Press).
- ESSIG, E. O. AND KUWANA, S. L. 1918 Some Japanese Aphididae. *Proc. Calif. Acad. Sci., 4th Ser.*, **8** (3) : 35-112.
- GAUTAM, D. C. AND VERMA, L. R. 1982. Occurrence of Sexuparae and sexual morphs of Woolly Apple Aphid (*Eriosoma lanigerum* Hausmann) in Simla Hills, India. *Curr. Sci.*, **51** (9) : 431.
- GEORGE, C. J. 1925. The Root sucking Aphids of Coimbatore. *J. Asiat. Soc. Beng.*, **20** : 307-310.
- GEORGE, C. J. 1928. South Indian Aphididae. *J. Asiat. Soc. Beng.*, **23** : 1-22.
- GHOSH, A. K. 1969. New Aphids (Insecta : Homoptera) from North Bengal, India. *Proc. zool. Soc. Calcutta*, **22** : 121-127.

- GHOSH, A. K. 1980. The Fauna of India and adjacent countries, Homoptera, Aphidoidea, pt. I. General introduction and Subfamily Chaitophorinae : 1-124 (11 plates). Zoological Survey of India.
- GHOSH, A. K. 1982. The Fauna of India and adjacent countries, Homoptera, Aphidoidea, pt. 2, Subfamily Lachninae : 1-167 (81 plates). Zoological Survey of India.
- GHOSH, A. K. 1984. The Fauna of India and adjacent countries, Homoptera, Aphidoidea, pt. 3, Subfamily Pemphiginae : 1-429 (500 figs.). Zoological Survey of India.
- GHOSH, A. K., BASU, R. C., AND RAYCHAUDHURI, D. N. 1969. A new genus and seven new species of aphids (Homoptera) from India. *Oriental Ins.*, **3** (3) : 245-254.
- GHOSH, A. K., CHAKRABARTI, S., CHOWDHURI, A. N. AND RAYCHAUDHURI, D. N. 1969. Aphids (Homoptera) of Himachal Pradesh, India-II. *Oriental Ins.*, **3** (4) : 327-334.
- GHOSH, A. K., GHOSH, M. R. AND RAYCHAUDHURI, D. N. 1970. Studies on the aphids (Homoptera : Aphididae) from Eastern India. II. Some new species and new records from north Bengal. *Oriental Ins.*, **4** (2) : 193-203.
- GHOSH, A. K., GHOSH, M. R. AND RAYCHAUDHURI, D. N. 1971. Studies on the aphids (Homoptera : Aphididae) from Eastern India. VII. New species and New Records from West Bengal. *Oriental Ins.*, **5** (2) : 209-222.
- GHOSH, A. K., GHOSH, M. R. AND RAYCHAUDHURI, D. N. 1972. Studies on the aphids (Homoptera : Aphididae) from Eastern India. XI. Description of hitherto unknown or newly recorded sexual morphs of some species from West Bengal. *Oriental Ins.*, **6** (3) : 333-342.
- GHOSH, A. K. AND RAYCHAUDHURI, D. N. 1962. A preliminary account of bionomics and taxonomy of aphids from Assam. II. *J. Asiat. Soc. Beng.*, **4** (3-4) : 101-113.
- GHOSH, A. K. AND RAYCHAUDHURI, D. N. 1962a. A preliminary account of the bionomics and taxonomy of aphids from Assam. *J. Bombay nat. Hist. Soc.*, **59** (1) : 238-253.
- GHOSH, L. K. 1969. Notes on two new records of aphids (Homoptera : Aphididae) from India. *Bull. Ent.*, **10** (2) : 107-109.
- GHOSH, L. K. 1969a. Notes on the male of *Rhopalosiphum rufiabdominalis* (Sasaki) (Homoptera : Aphididae) from Uttar Pradesh, India. *Indian J. Sci. & Indust.*, **3** (4) : 215-217.
- GHOSH, L. K. 1969b. On a collection of aphids (Homoptera : Aphididae) from Uttar Pradesh, India. *Sci. Cult.*, **35** : 493.

- GHOSH, L. K. 1970. Description of a new species of *Micromyzodium* David (Homoptera) from the Western Himalaya. *Oriental Ins.*, **4** (4) : 435-439.
- GHOSH, L. K. 1971. New records and a new subspecies of Aphids (Homoptera) from India. *Oriental Ins.*, **5** (1) : 129-133.
- GHOSH, L. K. 1972. On a collection of aphids (Homoptera : Aphididae) from Himachal Pradesh, India. *Oriental Ins.*, **6** (2) : 169-178.
- GHOSH, L. K. 1975. A new species of *Uroleucon* (Homoptera : Aphididae) from Western Himalaya. *Oriental Ins.*, **9** (2) : 135-138.
- GHOSH, L. K. 1976. On oviparous morph of *Periphyllus aesculi* Hille Ris Lambers (Insecta : Hemiptera : Aphididae). *Newsl. zool. Surv. India*, **2** (5) : 210-211.
- GHOSH, L. K. AND PRAMANIK, N. K. 1976. First record of sexuelle of *Liosomaphis himalayensis* Basu and hitherto undescribed morph of *L. atra* H. R. L. from India (Insecta : Aphididae). *Newsl. zool. Surv. India*, **2** (3) : 108-109.
- GHOSH, L. K. 1977. Record on oviparous female of Mustard aphid from the Western Himalayas (Insecta : Hemiptera : Aphididae). *Newsl. zool. Surv. India*, **3** (1) : 26-27.
- GHOSH, L. K., RAYCHAUDHURI, D., RAYCHAUDHURI, D. N. AND RAHA, S. K. 1980. An account of the genus *Brevicoryne* van der Goot (Homoptera : Aphididae) in India with description of a sexual morph of *Brevicoryne barbareae* Nevsky, *Bull. zool. Surv. India*, **3** (1 & 2) : 63-68.
- GHOSH, M. R., BASU, R. C. AND RAYCHAUDHURI, D. N. 1976. Studies on the Aphids (Homoptera : Aphididae) from Eastern India. XXVIII. *Acutosiphon*, *Akkaia* and *Vesiculaphis*. *Oriental Ins.*, **10** (2) : 267-276.
- GHOSH, M. R., GHOSH, A. K. AND RAYCHAUDHURI, D. N. 1971. Studies on the aphids (Homoptera : Aphididae) from Eastern India. *Proc. zool. Soc., Calcutta*, **24** : 163-168.
- GHOSH, M. R. AND RAYCHAUDHURI, D. N. 1973. A study of the genus *Aiceona* Takahashi (Homoptera : Aphididae) with descriptions of two new species and hitherto unknown oviparous morph of *Aiceona litseae* Basu and Hille Ris Lambers from Eastern India. XXII. *Oriental Ins.*, **7** (4) : 547-555.
- GHOSH, M. R., PAL, P. K. AND RAYCHAUDHURI, D. N. 1976. Studies on the Aphid (Homoptera : Aphididae) from Eastern India. *Proc. zool. Soc., Calcutta*, **27** : 81-116.
- GILLETTE, C. P. AND PALMER, M. A. 1931-1932. The Aphididae of Colorado. *Ann. ent. Soc. Am.*, **24** : 827-934 (1931) ; **25** : 369-496 (1932).

- Goot, P. VAN DER, 1917. Notes on some Indian aphids. *Rec. Indian Mus.*, Calcutta, **13** (4) : 175-183.
- HEIE, O. E. 1967. Studies on fossil aphids (Homoptera : Aphidoidea) especially in the Copenhagen collection of fossils in Baltic amber. *Spolia Zool. Mus. Hauniensis*, **26** : 1-274.
- HEINZE, K. 1960-61. Systematik der mitteleuropäischen Myzineen. *Beitr. Z. Ent.*, **10** : 744-842 (1960). **11** : 24-96 (1961).
- *HEINZE, K. 1962. Pflanzenschädliche Blattlausarten der Familien Lachnidae, Adelgidae und Phylloxeridae, eine Systematisch-faunistische studie. *Dt. Ent. Z. Iris*, **9** : 143-227.
- HIGUCHI, H. 1968. A revision of the genus *Takecallis* Matsumura (Homoptera : Aphididae) *Insecta matsum.*, **31** (4) : 25-34.
- HIGUCHI, H. 1972. Taxonomic study of subfamily Callipterinae in Japan (Homoptera : Aphididae). *Insecta matsum.*, **35** : 19-126.
- HILLE RIS LAMBERS, D. 1933. Notes on Theobald's "The plant lice or Aphididae of Great Britain." *Stylops*, **2** (8) : 169-176.
- HILLE RIS LAMBERS, D. 1938. Contributions to a monograph of the Aphididae of Europe. I. *Temminckia*, **3** : 1-44.
- HILLE RIS LAMBERS, D. 1939. Contributions to a monograph of the Aphididae of Europe. II. *Temminckia*, **4** : 1-138.
- HILLE RIS LAMBERS, D. 1947. Contributions to a monograph of the Aphididae of Europe. III. *Temminckia*, **7** : 179-319.
- HILLE RIS LAMBERS, D. 1948. On Palestine aphids with descriptions of new subgenera and new species. *Trans. R. ent. Soc. Lond.*, **99** : 269-289.
- HILLE RIS LAMBERS, D. 1949. Contributions to a monograph of the Aphididae of Europe. IV. *Temminckia*, **8** : 182-323.
- HILLE RIS LAMBERS, D. 1953. Contributions to a monograph of the Aphididae of Europe. V. *Temminckia*, **9** : 1-176.
- HILLE RIS LAMBERS, D. 1956. Two new genera of Aphididae. *Boll. Lab. agr. Portici*, **14** : 292-297.
- HILLE RIS LAMBERS, D. 1960. The genus *Chaitophorus* Koch in North America (Homoptera : Aphididae). *Tijdschr. Ent.*, **103** : 1-30.
- HILLE RIS LAMBERS, D. 1965. On some Japanese Aphididae (Homoptera). *Tijdschr. Voor Ent.*, **108** (7) : 189-203.
- HILLE RIS LAMBERS, D. 1966. New and little known aphids from Pakistan (Homoptera : Aphididae). *Tijdschr. Voor Ent.*, **109** (8) : 193-220.

- HILLE RIS LAMBERS, D. 1969. A new species of *Tactilotrampa* Börner, 1950 ? (Aphididae, Homoptera). *Boll. Sedute Accad. Gioenia. Sci. Natur. Catania*, (4) 9 (10) : 657-661.
- HILLE RIS LAMBERS, D. 1969a. Four new species of *Cavariella* del Guercio, 1911. (Homoptera, Aphididae). *Mem. Soc. Entomol. Ital.*, 48 : 285-299.
- HILLE RIS LAMBERS, D. 1969b. *Eotrampa* gen. nov. (Aphididae, Homoptera), a link between two aphid groups. *Bulletin de la Societe Entomologique Suisse*, 42 (3) : 181-184.
- HILLE RIS LAMBERS, D. 1970. A study of *Tetraneura* Hartig, 1841 (Homoptera : Aphididae) with descriptions of a new subgenus and new species. *Boll. Zool. agric. Bachic*, 2 : 21-101.
- HILLE RIS LAMBERS, D. 1973. Notes on some oriental aphids, with description of a new genus and four new species (Homoptera : Aphididae). *Oriental Ins.*, 7 (2) : 239-259.
- HILLE RIS LAMBERS, D. AND BASU, A. N. 1966. Some new or little known genera, subgenera, species and subspecies of Aphididae from India (Homoptera : Aphididae). *Ent. Bericht.*, 26 (1) : 12-20, 27-36.
- HOTTES, F. C. 1955. *Cinara* descriptions. (Aphididae). *Proc. Biol. Soc. Wash.*, 68 : 67-77.
- HOTTES, F. C. 1957. Four new species of Conifer feeding aphids. *Proc. Biol. Soc. Wash.*, 70 : 1-8.
- HOTTES, F. C. AND ESSIG, E. O. 1953. Descriptions of new species of *Cinara* from Western United States, *Proc. Biol. Soc. Wash.*, 66 : 159-172.
- JOSHI, H. C. AND MATHUR, Y. K. 1967. Aphids of Rajasthan. *Madras agric. J.*, 54 : 239-243.
- KRISHNAMURTI, B. 1928. Aphididae of Mysore. *J. Bombay nat. Hist. Soc.*, 33 : 211-215.
- KRISHNAMURTI, B. 1930. Aphididae of Mysore. *J. Bombay nat. Hist. Soc.*, 34 : 411-419.
- KUMAR, R. 1973. New Records and a new subspecies of aphids (Homoptera) from Himachal Pradesh, India. *Oriental Ins.*, 7 (1) : 11-14.
- KUMAR, R. AND BURKHARDT, C. C. 1970. A new genus *Longirostris*, a new species and a new subspecies of aphids from India (Homoptera : Aphididae). *J. Kans. Ent. Soc.*, 43 : 458-464.
- KUMAR, R. AND BURKHARDT, C. C. 1971. A new species of genus *Xenosiphonaphis* with four siphunculi and two new species of subgenus *Aulacorthum* (Homoptera : Aphididae). *J. Kans. Ent. Soc.*, 44 : 172-181.

- KUMAR, R. AND LAVIGNE, R. 1970. A new genus and a new species of Callipterinae from India (Homoptera : Aphididae). *Pan. pacif. Ent.*, **46** (2) : 120-124.
- MACGILLIVRAY, M. E. 1958. A study of the genus *Masonaphis* Hille Ris Lambers, 1939 (Homoptera : Aphididae). *Temminckia*, **10** : 1-131.
- *MAMONTOVA, V. A. 1955. Dendrophilous Aphids of the Ukraine. Ukranian Academy of Science (*Inst. Zool. Kiev.*) : 1-91 (In Russian).
- MASON, A. C. 1940. A revision of the North American aphids of the genus *Myzus*. *U. S. Dep. Agr. Misc. Publ.*, **371** : 1-30.
- MENON, M. G. R. AND GHAI, SWARAJ. 1969. The oviparous form of *Rhopalosiphum maidis* (Fitch) (Homoptera). *Oriental Ins.*, **3** (4) : 383-388.
- MONDAL, P. K., BASU, R. C. AND RAYCHAUDHURI, D. N. 1976. Studies on the Aphids (Homoptera : Aphididae) from Eastern India. XXX. The genus *Toxoptera*. *Oriental Ins.*, **10** (4) : 533-540.
- MISRA, P. K. AND BEHURA, B. K. 1969. Studies on the Aphididae of India. IV. On the Morphology of *Aphis nerii* Fonsc. *Prakruti-Utkal University Journal Science*, **6** (1) : 79-93.
- MIYAZAKI, M. 1971. A revision of the Tribe Macrosiphini of Japan (Homoptera : Aphididae, Aphidinae), *Insecta matsum.*, **34** (1) : 1-247.
- MIYAZAKI, M. 1980. A revision of the genus *Vesiculaphis* del Guercio with description of four new species (Homoptera : Aphididae). *Insecta matsum.*, *N. S.*, **20** : 43-83.
- MORDVILKO, A. 1914 AND 1919. Faune de la Russie. Insects Hemipteres, **1** (1), pp.i-clxiv, 1-236, +9 pp. of addenda (1914) ; pt. 2, 237-508 (1919) (*Zool. Mus. Acad. Sci.* : Petrograd).
- *MORDVILKO, A. 1935. Die blattlause mit unvollständigem. Generationszyklus und ihre Entstehung. *Ergebh. Fortschr. Zool.*, **8** : 36-328.
- NARZIKULOV, M. N. 1957. New Plant lice (Hom., Aphididae) from mountain region of Tadzikistan (in Russian). *Ent. Obozr.*, **36** (3) : 671-694.
- NARZIKULOV, M. N. 1962. *Fauna of the Tadzhik S. S. R.* (in Russian), **9** (1) : 125-135.
- NARZIKULOV, M. N. AND UMAROV, S. A. 1969. *Fauna of the Tadzhik S. S. R.* (2). Danish, Dushanbe, **9** (2) [in Russian].
- NEVSKY, V. P. 1929. Aphids of Central Asia. *Bull. Pl. Protection Sta., Uzbekistan*, **16** : 1-425.
- OLIVE, A. T. 1963. The genus *Dactynotus* Rafinesque in North Carolina (Homoptera : Aphididae). *Misc. Pub. Ent. Soc. Am.*, **4** : 32-66.

- PAL, P. K. 1975. Studies on the aphids of graminaceous plants in the North Eastern Himalaya with special reference to those infesting the subaerial plants. Ph. D. (Sc.) thesis, Calcutta University.
- PALMER, M. A. 1952. Aphids of the Rocky Mountain Region. *Thomas Say Foundation*, 5 : 1-452.
- *PASEK, V. 1953. Beitrag zur einer Klassifikation der mitteleuropaischen Lachniden. *Vest. Csl zemed. Mus.*, 17 : 149-177.
- PASEK, V. 1954. Aphids attacking coniferous trees in Czechoslovakian forest. *Vydavat. Slov. Akad. Vied*, Bratislava, (in Czech.) : 1-319.
- QUEDNAU, F. W. 1954. Monographic der mitteleuropaischen Callaphididae unter besonderer Berucksichtigung des ersten Jugenstadium Mitt. *Biol. Zent. Aust. Berlin*, 78 : 1-52.
- QUEDNAU, F. W. 1973. Taxonomic notes on aphids from Nepal and India with descriptions of a new genus and two new species (Homoptera : Aphididae). *Can. Ent.*, 105 : 217-230.
- QUEDNAU, F. W. AND CHAKRABARTI, S. 1976. A new genus and three new species of aphids (Homoptera : Aphididae) from northwest India. *Can. Ent.*, 108 : 461-468.
- RAO, S. N. AND KULKARNI, P. P. 1977. Studies on the Aphid fauna (Homoptera : Aphididae) from Marathwada, (Maharashtra)—II, *Marathwada Univ. J. Sci.*, 11 (4) : 141-150.
- RAYCHAUDHURI, D. N. 1956. Revision of Greenidea and related genera (Homoptera : Aphididae). *Zool. Verh.*, 31 : 1-106.
- RAYCHAUDHURI, D. N. AND BANERJEE, C. 1974. A study on the genus *Melanaphis* (Homoptera : Aphididae) with descriptions of new taxa from India. *Oriental Ins.*, 8 (3) : 365-384.
- RAYCHAUDHURI, D. N., PAL, P. K. AND GHOSH, A. K. 1980. Subfamily Pemphiginae : 409-433 : In "Aphids of North East India and Bhutan" ed. D. N. Raychaudhuri, The Zoological Society, Calcutta : 1-521.
- RICHARDS, W. R. 1958. A new aphid genus (Homoptera : Aphididae). *Florida Ent.*, 41 (4) : 169-172.
- RICHARDS, W. R. 1960. A synopsis of the genus *Rhopalosiphum* in Canada (Homoptera : Aphididae). *Can. Ent.*, 92 : 1-51.
- RICHARDS, W. R. 1963. The myzaphidines of Canada (Homoptera : Aphididae). *Can. Ent.*, 95 : 680-704.
- RICHARDS, W. R. 1965. The Callaphidini of Canada (Homoptera : Aphididae). *Mem. ent. Soc. Can.*, 44 (1) : 1-149.

- RICHARDS, W. R. 1966. Systematics of fossil aphids from Canadian amber (Homoptera : Aphididae). *Can. Ent.*, **98** : 746-760.
- RICHARDS, W. R. 1967. The Pterocomma of Canada and Greenland with notes on the phyletic position of the Pterocommatini (Homoptera ; Aphididae). *Can. Ent.*, **99** : 1015-1040.
- RICHARDS, W. R. 1968. A synopsis of the world fauna of *Myzocallis* (Homoptera : Aphididae). *Mem. ent. Soc. Can.*, **57** : 1-76.
- RICHARDS, W. R. 1972. The Chaitophorinae of Canada (Homoptera : Aphididae). *Mem. ent. Soc. Can.*, **87** : 1-109.
- RICHARDS, W. R. AND KUMAR, RABINDER, R. 1971. *Myzocallis (Agrioaphis) aptera*, a new *berberis*—infesting aphid from India (Homoptera : Aphididae). *Can. Ent.*, **103** : 116-118.
- SAMUEL, C. K. 1940. Plant hosts of two important aphids, *Myzus persicae* (Sulzer) and *Aphis maidis* (Fitch) at Pusa. *Indian J. Ent.*, **2** : 244-245.
- SHAPOSHNIKOV, G. KH. 1964. In Bey-Bienko, G.Y "Keys to the Insects of European part of the U. S. S. R." **1** : 489-616.
- SHARMA, P. L. AND BHALLA, O. P. 1964. A survey study of insects pests of economic importance in Himachal Pradesh. *Indian J. Ent.*, **26** : 318-331.
- SHINJI, G. O. 1935. Key to Japanese species of *Acyrtosiphon* with description of a new species. *Kontyu*, **9** : 249-253. (In Japanese).
- SHINJI, G. O. 1941. Monograph of Japanese Aphididae, Tokyo : 1-1215. (In Japanese).
- SMITH, C. F. 1969. Pemphigidae associated with the notes of conifers in North America (Homoptera : Aphididae). *Ann. ent. Soc. Am.*, **62** (5) : 1128-1152.
- SMITH, C. F. 1972. Bibliography of the Aphididae of the world. *N. Carol. agric. Exp. Sta. Tech. Bull.*, **216** : 1-717.
- SMITH, C. F. 1974. Keys to and descriptions of the genera of Pemphigini in North America (Homoptera : Aphididae : Pemphiginae). *N. Carol. agric. Exp. Sta. Tech. Bull.*, **226** : 1-61.
- SMITH, C. F. 1981. Pemphiginae in North America. *Symp. Evolution and Biosystematics of Aphids*, Warszawa, 1981 : 1-26.
- SORIN, M. 1970. *Longiunguis* of Japan. *Insecta matsum.*, **8** : 1-17.
- STROYAN, H. L. G. 1950. *Jacksonia papillata* Theobald (Hemiptera : Aphididae) ; a redescription with biological and taxonomic notes. *Proc. R. ent. Soc. Lond.* (B) **19** : 90-95.
- STROYAN, H. L. G. 1954. A new subgenus and species of *Myzus* Passerini, 1860. (Hem. : Aphididae). *Proc. R. ent. Soc. Lond.*, **23** : 10-16.

- STROYAN, H. L. G. 1957. Further additions to the British aphid fauna. *Trans. R. ent. Soc. Lond.*, **109** : 311-360.
- STROYAN, H. L. G. 1957a. A revision of the British species of *Sappaphis* Matsumura, pt.i. Introduction and subgenus *Sappaphis sensu stricto* H.M.S.O. London : 1-59.
- STROYAN, H. L. G. 1958. A cotribution to the taxonomy of some British species of *Sappaphis* Matsumuna, 1918 (Homoptera, Aphidoidea). *J. Linn. Soc. (Zool.)*, **43** : 644-713.
- STROYAN, H. L. G. 1961. Identification of Aphids living on Citrus. *Pl. Prot. Bull. F. A. O.*, **9** : 45-65.
- STROYAN, H. L. G. 1963. A new genus and species of Eriosomatinae (Homoptera : Aphidoidea) from North West Himalayas. *Proc. R. ent. Soc. Lond.*, (B), **32** : 81-85.
- STROYAN, H. L. G. 1964. A new species of *Protrama* Baker (Aphididae : Traminae) from Northwestern India. *Indian J. Ent.*, **26** (2) : 211-214.
- STROYAN, H. L. G. 1964a. Notes on hitherto unrecorded or over looked British species. *Trans. R. ent. Soc. Lond.*, **116** : 29-72.
- STROYAN, H. L. G. 1969. Notes on some species of *Cavariella* del Guercio, 1911 (Homoptera : Aphididae). *Proc. R. ent. Soc. Lond.* (B), **38** (1-2) : 7-19.
- SZELEGIEWICZ, H. 1959. Notaki afidologiczne I—VI. (Homoptera, Aphididae). Aphidological notes. I—V (Homoptera : Aphididae). *Annls. zool.*, **18** : 191-219 (English with polish and Russian Summeries).
- SZELEGIEWICZ, H. 1961. Die polnischen Arten der Gattung *Chaitophorus* Koch s. lat. (Homoptera : Aphididae). *Annls. zool., Warsz.*, **19** : 229-350.
- SZELEGIEWICZ, H. 1962. Materiały do poznania mszyc (Homoptera : Aphididae). Polski I. Podrodzina Lachninae. *Fragm. faun.*, **10** : 63-98.
- *SZELEGIEWICZ, H. 1968. Katalog fauny Polski, Catalogue faunae Poloniae. Polska Akademia Nauk. Instytut Zoologicznoi. *Panstwowe Wydawnictwo Naukowe, Warsz.*, **21** (4) : 1-361.
- SZELEGIEWICZ, H. 1968a. Notes on some aphids from Vietnam, with description of a new species (Homoptera, Aphidoidea). *Annls. zool., Warsz.*, **25** (12) : 459-471.
- *SZELEGIEWICZ, H. 1969. Bibliographia Mszyee Szkodniki Roslin wektory Choral. Wirusowych I producenci spadzi. *Panstwowe Wydawnictwo Rolnicze Lesne, Warsz.* 1969 : 1-250.
- SZELEGIEWICZ, H. 1974. Materiały do poznania moszye (Homoptera : Aphidoidea) Polsko, II Rodzina Chaitophoridae. *Fragm. faun.*, **10** : 63-98.

- TAKAHASHI, R. 1921. Aphididae of Formosa, Pt. I. *Taihoku agric. exp. Sta. Rep. Special number*, 1-97.
- TAKAHASHI, R. 1931. Aphididae of Formosa Pt. 6. *Dep. Agr. Govt. Res. Ins. Formosa, Rep., Japan*, **53** : 1-127.
- TAKAHASHI, R. 1936. A new genus and species of Aphididae from China (Homoptera). *Lingnan Sci. J.*, **15** (2) : 197-200.
- TAKAHASHI, R. 1937. Some Aphididae from South China and Hainan (Homoptera) II. *Lingnan Sci. J.*, **16** : 199-208.
- TAKAHASHI, R. 1938. List of Aphid genera proposed in recent years (Hemiptera). *Tenthredo*, **2** : 1-18.
- TAKAHASHI, R. 1939. Some Aphididae from Hokkaido. *Insecta matsum.*, **13** : 114-128.
- TAKAHASHI, R. 1951. List of Aphididae of the Malay peninsula with description of new species. *Ann. ent. Soc. Am.*, **43** : 587-607.
- TAKAHASHI, R. 1960. *Kurisakia* and *Aiceona* of Japan (Homoptera : Aphididae). *Insecta matsum.*, **23** (1) : 1-10.
- TAKAHASHI, R. 1960a. *Stomaphis* of Japan (Aphididae : Homoptera). *Bull. Univ. Osaka Prefect.*, (B) **10** : 1-10.
- TAKAHASHI, R. 1961. Three new genera of the subfamily Aphidinae from Japan (Aphididae : Homoptera). *Bull. Univ. Osaka Pref.*, Ser. B, **11** : 1-10.
- TAKAHASHI, R. 1961a. Some species of *Capitophorus* of Japan (Homoptera : Aphididae). *Trans. Shikoku ent. Soc.*, **7** : 1-4.
- TAKAHASHI, R. 1962. Key to Japanese species of *Dactynotus* with descriptions of four new species (Aphididae : Homoptera). *Kontyu*, **30** (2) : 73-81.
- TAKAHASHI, R. 1963. Two new genera and five new or little known species of Aphididae from Japan (Homoptera). *Kontyu*, **31** (3) : 159-168.
- TAKAHASHI, R. 1964. *Macrosiphum* of Japan (Aphididae). *Kontyu*, **32** (3) : 353-359.
- TAKAHASHI, R. 1965. Some species of *Aulacorthum* of Japan (Aphididae : Homoptera). *Insecta matsum.*, **27** : 99-113.
- TAKAHASHI, R. 1965a. *Myzus* of Japan. *Mushi*, **38** (9) : 43-78.
- TAKAHASHI, R. 1966. Description of some new and little known species of *Aphis* of Japan, with key to species. *Trans. Am. Ent. Soc.*, **92** : 519-556.

- TAKAHASHI, R. AND MORITSU, M. 1963. Key to Japanese species of *Macrosiphoniella* with descriptions of four species from Japan and Formosa (Aphididae : Homoptera). *Mushi*, **37** : 1-11.
- TANAKA, T. 1961. The rice root aphids, their ecology and control. *Spec. Bull. Coll. Agric. Utsunemiya*, **10** : 1-83.
- TAO, C. C. C. 1948. Revision and artificial culture of gall aphids inhabiting of *Rhus* spp. Nungpao (Taiwan). **2** (9-10) : 398-405 [in Chinese].
- TAO, C. C. C. 1961. Revision of the genus *Toxoptera* Koch, 1856 (Homoptera : Aphididae). *Quart. J. Taiwan Mus.*, **14** : 257-260.
- TAO, C. C. C. 1962. Revision on Chinese Aphinae. *Plant Protect. Bull.* (Taiwan), **4** : 95-110.
- TAO, C. C. C. 1963. Revision of Chinese Macrosiphinae (Aphididae : Homoptera). *Plant Protect. Bull.* (Taiwan), **5** : 162-205.
- TAO, C. C. C. 1963a. Aphid fauna of China. *Sci. Yb. Taiwan Mus.*, **6** : 36-82.
- TAO, C. C. C. 1964. Revision of Chinese Callipterinae (Aphidae : Homoptera). *Quart. J. Taiwan Mus.*, **17** : 209-226.
- TAO, C. C. C. 1970. Revision of Chinese Eriosomatinae, Aphididae, Homoptera. *Quart. J. Taiwan Mus.*, **23** (2-4) : 135-149.
- THEOBALD, F. V. 1927. The Plant lice or Aphididae of Great Britain, **2** : 1-411. (Headley Bros.), London.
- UMAROV, A. 1964. New species of aphids (Homoptera : Aphididae) from Central Asia (in Russian). *Dokl. Akad. Nauk. tadshik. S. R. R.* No. **3** : 45-49.
- VAN HEERDEN, H. P. 1969. Previously unrecorded aphid species from South Africa. *Phytophylactica*, **1** : 177-184.
- VERMA, A. N. AND KHURANA, A. D. 1974. Sexualls of *Aphis craccivora* Koch on Green Gram in India. *Entomologists' Newsletter*, **4** (October) : 53.
- VERMA, K. D. 1965. Additions to the Aphid fauna of North West India. *Sci. Cult.*, **31** : 389.
- VERMA, K. D. 1966. A new aphid from North Western India (Homoptera : Aphididae). *Indian J. Ent.*, **28** (2) : 265-267.
- VERMA, K. D. 1969. A new genus and three new species of aphids from N. W. India (Homoptera : Aphididae). *Bull. Ent.*, **10** (2) : 134-140.

- VERMA, K. D. 1969a. A new subspecies of *Impatiensium impatiensae* (Shinji) and the male of *Protrama penecaeca* Stroyan from N. W. India (Homoptera : Aphididae). *Bull. Ent.*, **10** (1) : 102-103.
- VERMA, K. D. 1970. Two new species of aphids from North-West India (Homoptera : Aphididae). *Bull. Ent.*, **11** (2) : 95-97.
- VERMA, K. D. 1971. A new genus and two new species of aphids from N. W. India (Homoptera : Aphididae). *Bull. Ent.*, **12** (2) : 97-99.
- VERMA, K. D. 1971a. Additional records of Jammu and Kashmir Aphids. *Sci. Cult.*, **37** : 248-249.
- VERMA, K. D. 1974. A new species and two undescribed morphs of aphids (Homoptera : Aphididae) from North-West India. *Indian J. Ent.*, **36** (3) : 200-202.
- VERMA, K. D. AND DAS, S. M. 1966. The aphids of Kashmir. *Nat. Acad. 35th Ann.*, **80** : 44-46.
- VERMA, K. D. AND MATHUR, A. C., 1966. First record of two species and males of *Lipaphis pseudobrassicae* Davis and *Protrama panecaeca* Stroyan (Homoptera : Aphididae) from India. *Indian J. Ent.*, **28** (2) : 277-279.
- WADHI, S. R., MISRA, S. S. AND VERMA, B. R. 1973. First record of *Rhopalosiphum maidis* (Fitch) as a pest of Nepier grass from India. *Indian J. Ent.*, **35** (3) : 273-274.
- YOUNG, W. R., BHATIA, S. K. AND PHADKE, K. G. 1971. Rice Root Aphid observed on Barley at Delhi. *Entomologists' Newsletter*, **1** : 53.
- ZIMMERMAN, E. C. 1948. *Homoptera : Sternorhyncha. Insects of Hawaii, Univ. Hawaii Press, Honolulu*. **5**, i-vii : 1-464.
- ZWÖLFER, H. 1957. Zur Systematik Biologie und Ökologie unterirdisch lebender Aphiden (Homoptera : Aphidoidea). I. Anoeciinae. II. Tetraneurini und Pemphiginae. *Z. angew. Ent.*, **40** : 182-221 : 528-575.

* not consulted in original.

INDEX TO GENERA, SPECIES AND SUBSPECIES

A

acutihirsutus, Lachnus 166
 Acutosiphon 40, 46
 Acyrthosiphon 44, 47, 49
 aegopodi, Cavariella 68
 ?aesculi, Periphyllus 143, 144
 affinis, Aphis 182
 affinis, Takecallis 147, 148
 affinis, Thecabius 179
 Aiceona 18
 ailanthi, Kaburagia 180
 alnicola, Eutrichosiphum
 (Paratrichosiphum) 155
 Amhicercidus 39, 52, 53
 Amphorophora 41, 54
 ampullata bengalensis,
 Amphorophora 54
 amygdalinus, Brachycaudus 61
 anemones, Himalayaphis 82
 Anoecia 19
 Aphis 22, 29
 aptera, Myzocallis (Agrioaphis) 184
 aquatica, Cavariella (Cavariella) 182
 araliae, Cavariella 182
 ascalonicus, Myzus 114, 115
 asiaticum, Impatientinum 183
 Aspidophorodon 42, 55
 assamense, Eutrichosiphum 153, 183
 Astegopteryx 156
 atini, Eutrichosiphum
 (Neoparatrachosiphum) 154
 atinus, Dysaphis 78, 79
 atra, Liosomaphis 94
 atriplicea, Hayhurstia 183
 atroalbipes, Cinara (Lachniella) 182
 Aulacorthum 44, 55, 56
 aulacorthoides, Macrosiphum 183
 aurandinae, Takecallis 147, 149
 aurantii, Toxoptera 30, 31
 avariola, Myzaphis 184

B

bambusicola, Macrosiphum
 (Sitobion) 101, 103
 barbareae, Brevicoryne 64
 bengalensis, Amphorophora
 ampullata 54
 bengalensis, Nippolachnus 167
 berberidis, Liosomaphis 183
 betae, Smynthuroides 181
 Brachycaudus 40, 61
 Brevicoryne 39, 63
 bucktoni, Pseudoregma 159

C

campanullata, Jacksonia 92
 canescentis, Acyrthosiphon spirae
 49
 cannabis, Diphorodon 77
 capitophoroides, Matsumuraja 108
 Capitophorus 43, 65
 carduellinus, Hyperomyzus 86, 87
 Cavariella 39, 66
 celti, Shivaphis 145
 cerasi, Myzus 114, 115
 cerasi, Myzus umefoliae 184
 Ceratovacuna 156, 157
 chaetorostrata, Cinara 161, 162
 Chaetosiphon (Chaetosiphon) sp.
 182
 Chaetomyzus 41, 71
 Chaetosiphon 44, 72
 Chaitophorus 135, 136
 Chaitophorus sp. 182
 chitinicauda, Nudisiphon 121
 Chromaphis 136, 139
 chuansiensis, Euceraphis 140
 Cinara 160, 161
 Cinara sp. 183
 circumflexus, Neomyzus
 (Neomyzus) 120

harvensis, *Aspidophorodon* 55
 helichrysi, *Brachycaudus* 62
 himachali, *Cavariella* 69
 himachali, *Pseudoacyrthosiphon* 159
 himachali, *Uroleucon* 129, 130
 Himalayaphis 41, 82
 himalayensis, *Anoecia* 21
 himalayensis, *Liosomaphis* 94, 95
 himalayensis, *Longicaudus* 97
 himalayensis, *Macrosiphum*
 (*Sitobion*) 101, 104
 himalayensis, *Nippolachnus* 167, 168
 himalayensis, *Periphyllus* 143, 144
 himalayensis, *Periphyllus* (*Stagona*)
 144
 hippophaes javanicus,
 Capitophorus 66, 182
 hippophaes mitegoni, *Capitophorus*
 66
 hirsutustibis, *Chromaphis* 139
 hiskosanensis, *Macrosiphoniella*
 183
 hottesis, *Indocinara* 163

Hyadaphis 44, 82

Hyalomyzus 145, 83

Hyalopterus 32

Hyperomyzus 44, 86

Hysteroneura 31, 33

I

imbricatus, Pyrolachnus 184

Impatientinum 88

impatiensae dalhousiensis,

Impatientinum 44, 88

imaicus, Macromyzus 184

indica, Eoessigia 82

indica, Tetraneura 175

indicum, Macrosiphum

(Sitobion) 101, 102, 105

indicum, Neoacyrthosiphon 118

indicus, Aesculus 144

indicus, Chaitophorus 137, 138

indicus, Macromyzus 188

indicus, Rhopalosiphoninus 122, 123

indicus, Tricaudatus 127

Indocinara 160, 163

Indoidiopterus 43, 89

Indumasonaphis 41, 89

inulae, Indumasonaphis 90, 91

J

Jacksonia 45, 92

jakhuensis, Senisetotarsaphis 125

javanicus, Capitophorus

hippophaes 66, 182

K

Kaburagia 179, 180

Kalimpongense, Macrosiphoniella

98

kapuri, Chaitophorus 137, 138

kashmiricus, Uroleucon 129, 130

khasyanum, Eutrichosiphum

(Neopatrachosiphum) 154

konoii, Cavariella 70

kurosawai, Aphis 22, 27

L

Lachnus 165

lactucae, Hyperomyzus 86, 87

lanigera, Ceratovacuna 158

lanigerum, Eriosoma 173

latysiphon, Rhopalosiphoninus 124

leptorhyncha, Aphis 182

lespedezae, Sinomegoura 184

Liosomaphis 44, 93

Lipaphis 44, 95

longicaudatum, Metopolophium 184

Longicaudus 42, 97

?longipilosa, Dysaphis 183

longirostris, Stomaphis 169

longirostrum, Lachnus 166

longisetosus ruborum, Aphis 29

longisetosus, Lachnus 165, 166

longisetosus, Rhopalosiphoninus

122, 124

longisetosus, Uroleucon 129, 130

longitarsus sclerodensis, Protrama

171

M

Macrosiphoniella 40, 97

Macrosiphum 40, 99, 100

maculipes, Cinara 161, 163

magnoliae, Aulacorthum 57, 58

maidis, Rhopalosiphum 36

malvae, Acyrthosiphon 48

manaliensis, Chaitophorus 137, 138

Matsumuraja 41, 107

maydis, Siphia (Rungsia) 146

meghalayensis meghalayensis,

Melanaphis 35

Megoura sp. 184

Melanaphis 32, 34

Metopolophium 118

Metopolophium sp. 49, 184

Micromyzodium 45, 108

Micromyzus 43, 110

minatii, Uroleucon 129, 130

minuta, *Astegopteryx* 157
miscanthi, *Macrosiphum*
 (Sitobion) 101, 102, 106
mitegoni, *Capitophorus*
hippophaes 66
moltshanovi, *Acyrtosiphon* 181
montanus, *Tinocalloides* 150
multisetosa, *Spinaphis* 125
mumecola, *Myzus* 114, 115
Myzaphis 42, 111
myzaphoides, *Raychaudhuriella* 121
Myzocallis 136, 140, 141
Myzus 45, 113
Myzus sp. 184

N

Nasonovia 42, 116
nasturtii, *Aphis* 24, 27
Neoacyrtosiphon 41, 118
neoalnicola *Eutrichosiphum*
 (*Paratrichosiphum*) 155
Neobetulaphis 136, 142
Neomasonaphis 41, 119
Neomyzus 23, 56, 119
nerii, *Aphis* 27, 45
niger, *Chaitophorus* 182
niger, *Chaitophorus salijaponicus*
 137, 138
nigra, *Cavariella* 70
nigriabdominalis group,
Tetraneura 184
nigrum, *Micromyzus* 111
Nippolachnus 164, 167
Nippolachnus sp. 184
nipponicum, *Aulacorthum* 57, 58
Nudisiphon 42, 120
nymphaeae, *Rhopalosiphum* 36, 37

O

obliquoris, *Acutosiphon* 46
obtusirostris, *Myzus* 114, 116
ornatus, *Myzus* 114, 116

P

pachysiphon, *Macrosiphum*
 (*Macrosiphum*) 101, 102
padi, *Rhopalosiphum* 38
pakistanicus, *Chaitophorus* 137, 138
papillata, *Jacksonia* 92, 93
paraverbasci, *Aphis* 23, 28
perillae, *Aulacorthum* 60
Periphyllus 135, 143
persicae, *Myzus* 114, 116,
phaseoli, *Acyrtosiphon* 48
phoenax, *Eriosoma* (*Schizoneura*)
 183
?phoenax, *Eriosoma* 183
?pictus, *Myzocallis* (*Hoplocallis*) 141
pieridis, *Vesiculaphis* 132
?pilosum, *Pterocomma* 184
pilosus, *Brachycaudus*
 (*Mordwilkomemor*) 182
piri, *Nippolachnus* 167, 168
piri, *Sappaphis* 184
pollinosa, *Aphis* 23, 28
polychaetus, *Myzocallis* 141
polygonaceae, *Aphis* 26
polygoni, *Tricaudatus* 127
populi, *Doraphis* 183
populifoliae, *Pterocomma* 134
primulum, *Aulacorthum*
 (*Neomyzus*) 60
Prociphilus 176, 177
Prociphilus sp. 184
Protrama 170
pruni, *Hyalopterus* 32
pseudoalupescuri, *Macrosiphum*
 (*Sitobion*) 101, 106
pseudogeranii, *Macrosiphum*
 (*Macrosiphum*) 100, 102
Pseudoregma 156, 158
pseudosugii, *Aiceona* 182
Pseudothorcapis 156, 159
Pterocomma 134

punicae, *Aphis* 23, 28
pusilla, *Neobetulaphis* 142

R

raji, *Aphis* (*Longirostris*) 183
ranunculum, *Acyrtosiphon* 49, 50
Raychaudhuriella 39, 121
Reticulaphis 156, 159
retipennis, *Aiceona* 19
rhamni, *Aulacorthum* 58
rhamnifila, *Aphis* 182
rhododendri, *Chaetomyzus* 72
rhododendris, *Neomasonaphis* 119
rhoicola, *Aphis* 182
Rhopalosiphoninus 42, 121
Rhopalosiphum 31, 35
rosarum, *Myzaphis* 111
rosae, *Macrosiphum* (*Macrosiphum*)
101, 103
rosaeiformis, *Macrosiphum* (*Sito-*
bion) 101, 105, 106
rostrata, *Cryptaphis* 75
rostrata, *Nasonovia* (*Neokakimia*)
117
rotundiventris, *Schizaphis* 184
rubi, *Acyrtosiphon* 49
rubi elliptici, *Acyrtosiphon* 49
rubifoliae, *Acyrtosiphon* 52
ruborum longisetosus, *Aphis* 23, 29
rufiabdominalis, *Rhopalosiphum*
35, 38
rufomaculata, *Coloradoa* 74

S

salicicola, *Cavariella* 182
salignus, *Tuberolachnus* 170
salijaponicus niger, *Chaitophorus*
138
sanborni, *Macrosiphonicella* 98, 99
scabripes, *Hyalomyzus* 84, 85
sclerodensus, *Protrama longitarsus*
171

sclerodorsi, *Aulacorthum* 57, 58
Semiaphis sp. 184
Senisetotarsaphis 42, 124
sensoriatus, *Rhopalosiphoninus*
122, 124
setariae, *Hysteroneura* 33, 34
Shivaphis 136, 145
sikkimensis, *Macrosiphum* (*Sito-*
bion) 102, 106
similis, *Lachnus* 183
simlaensis, *Acyrtosiphon*
(*Metopolophium*) 51
simlaensis, *Aphis clematidis* 24
simlaensis, *Cavariella* 71
simlaensis, *Eutrichosiphum* (*Eutri-*
chosiphum) 152
simlaensis, *Uroleucon* 129, 131
Sipha 135, 146
smilacicola, *Macrosiphum* (*Sito-*
bion) 183
Smynthuroides 179, 180
solanella, *Aphis fabae* 26
solani, *Aulacorthum* 59
soldatovi, *Acyrtosiphon* 181
sonchi, *Uroleucon* 129, 131
sonchifoliae, *Acyrtosiphon* 49
Spinaphis 39, 125
spirae canescentis *Acyrtosiphon*
49
spinacaudatus, *Acyrtosiphon*
(*Aulacorthum*) 58
Stomaphis 165, 168
strobilantheae, *Aulacorthum* 59
strobilanthi, *Micromyzodium* 109
stroyani, *Dysaphis* 78, 80
submacula, *Maculolachnus* 184

T

Takecallis 135, 147
taoi, *Cryptomyzus* 76
taxus, *Prociphilus* 178
tenuipes, *Cinara confinis* 161, 162

Tetraneura 172, 174

tetrarhodum, Chaetosiphon
(Pentatrichopus) 182

Thecabius 176, 178

Tinocalloides 136, 150

Toxoptera 30

Tuberculatus 52

tuberculatus, Amphicercidus 53

tuberculatus, Indumasonaphis 90, 91

Tuberolachnus 164, 169

turanica, Myzaphis 111, 112

Tricaudatus 39, 126

tropicalis, Lachnus 166

Tuberdefectus 150

U

umefoliae, Myzus cerasi 184

Uroleucon 128

V

vandenboschi, Periphyllus 143, 144

vandergooti, Eutrichosiphum
152, 153

verbasci, Aphis 29

verbasci, Vesiculaphis 132

Vesiculaphis 45, 131

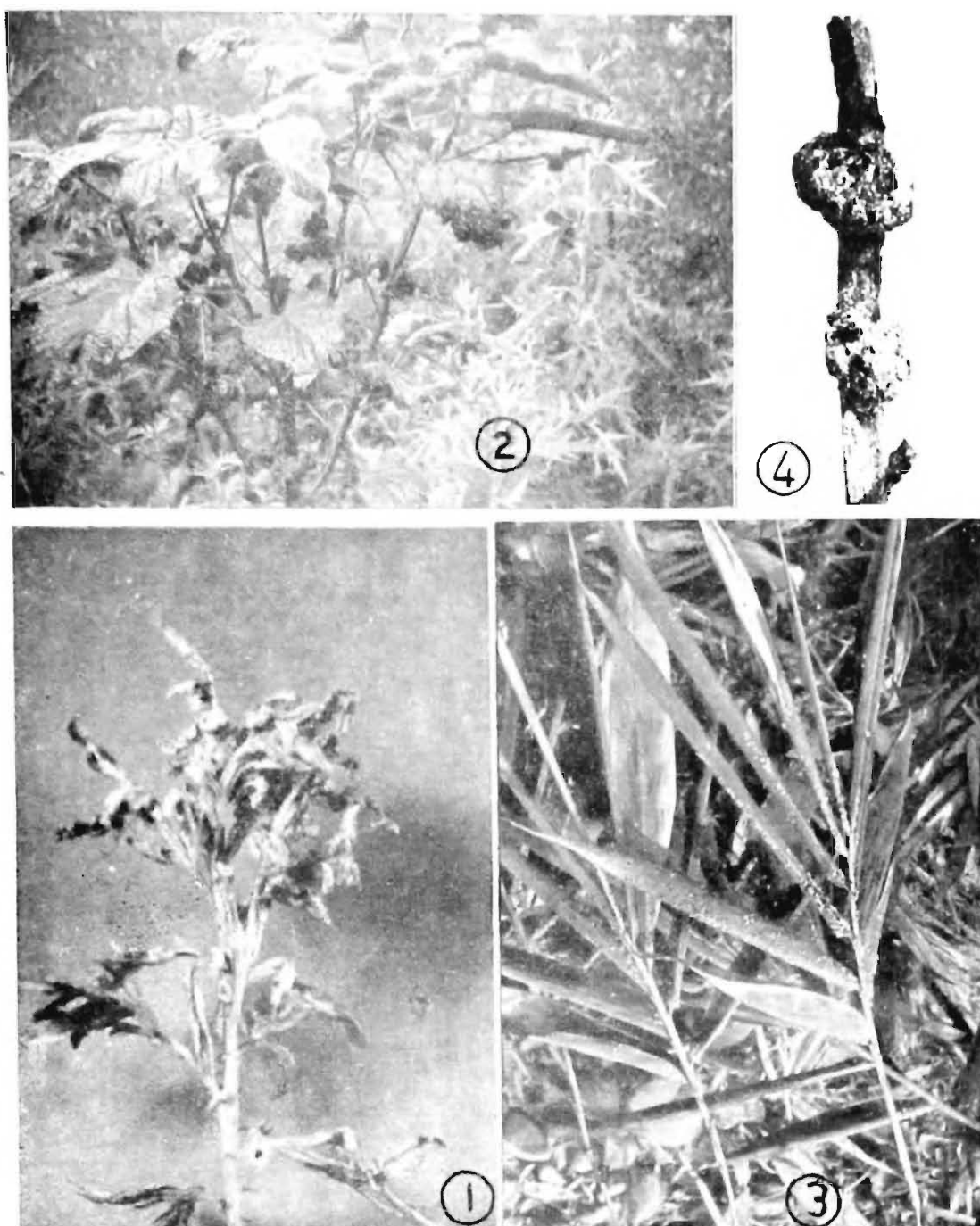
X

Xenosiphonaphis 45, 133

Y

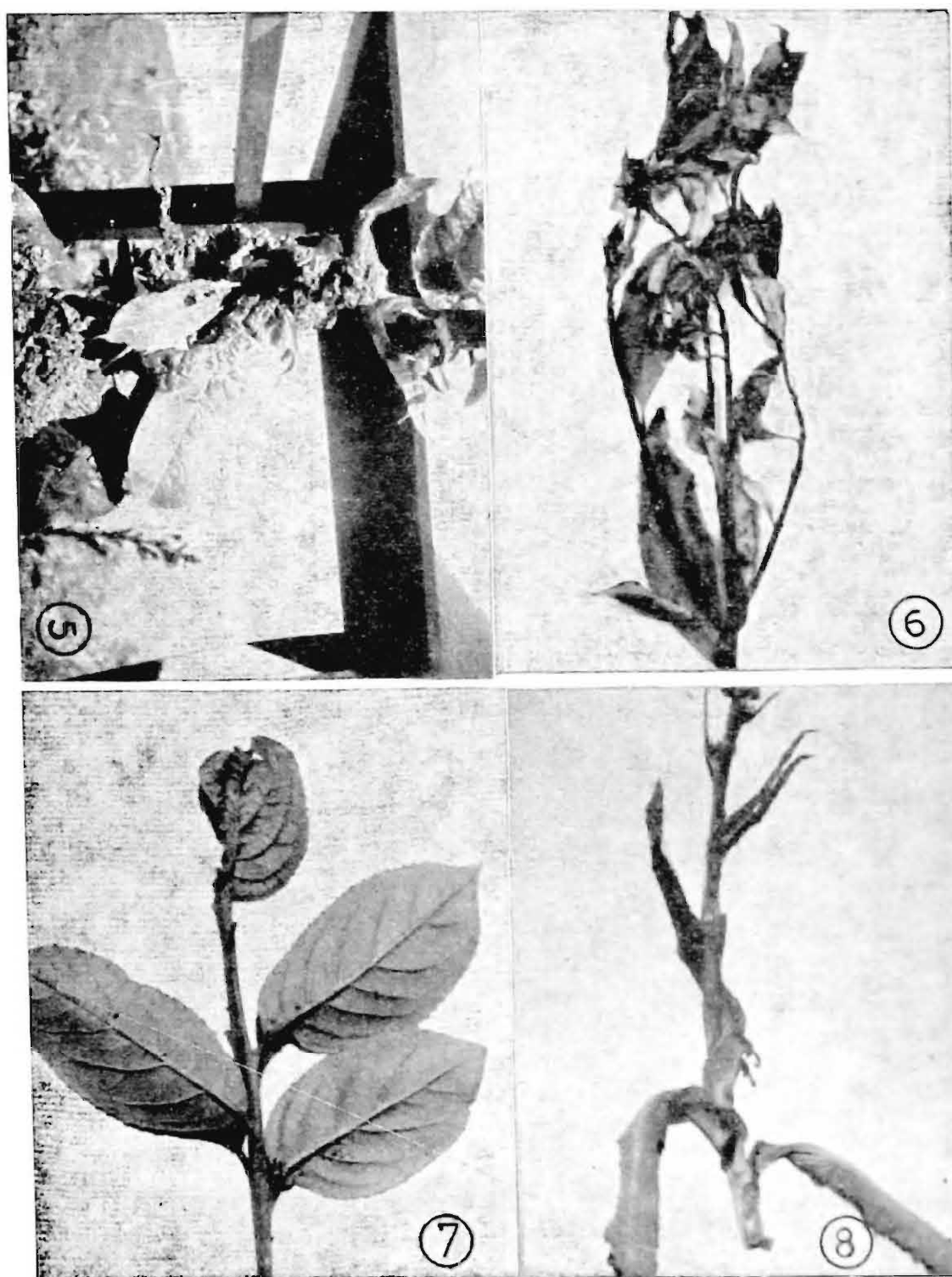
yomogifoliae, Macrosiphoniclla
98, 99

ILLUSTRATIONS



Figs. 1-8. A few aphid infestations and malformations

- Fig. 1. *Artemisia vestita* (Compositae) : damage symptoms—Curling up of leaves affected by *Brachycaudus helichrysi* (Kaltenbach).
- Fig. 2. *Clerodendron infortunatum* (Verbenaceae) : mild infestation by *Aphis citricola* van der Goot
- Fig. 3. *Bambusa* sp. (Gramineae) : infestation by *Ceratovacuna* sp.
- Fig. 4. *Populus* sp. (Salicaceae) : Stem gall formed by *Eupemphigus imaicus* Cholodkovsky



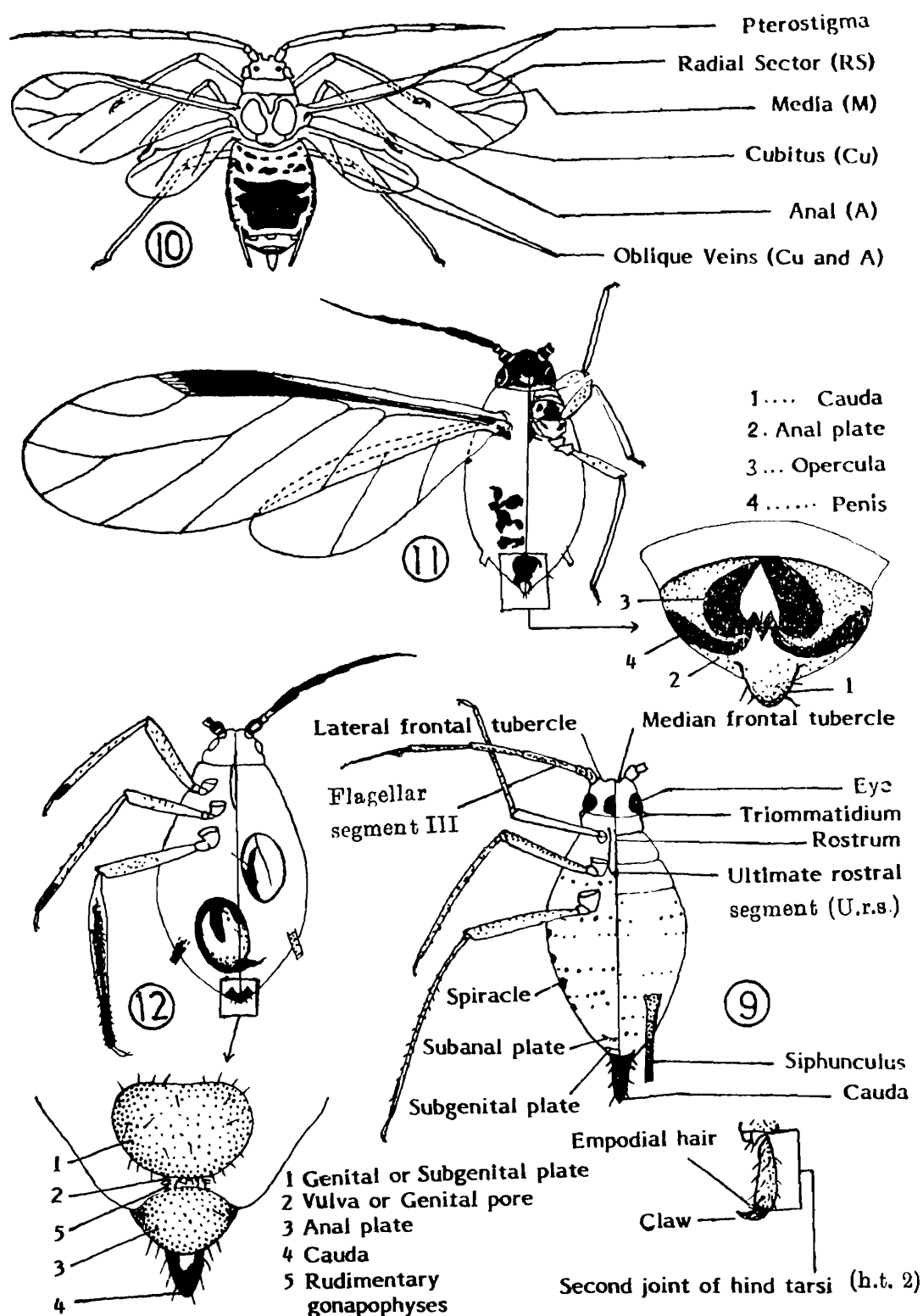
Figs. 5-8. A few aphid infestations and malformations

Fig. 5. *Prunus persica* (Rosaceae): Severe deformation of leaves and young growth by *Brachycaudus helichrysi* (Kaltenbach).

Fig. 6. *Prunus* sp. (Rosaceae): Devitalisation and curling of leaves by *Aphis gossypii* Glover

Fig. 7. *Rubus* sp. (Rosaceae); Solitary habit of *Metopolophium rubi* (Narzikulov)

Fig. 8. *Sonchus arvensis* (Compositae): gregarious habit of colonisation by *Uroleucon sonchi* (Linnaeus).



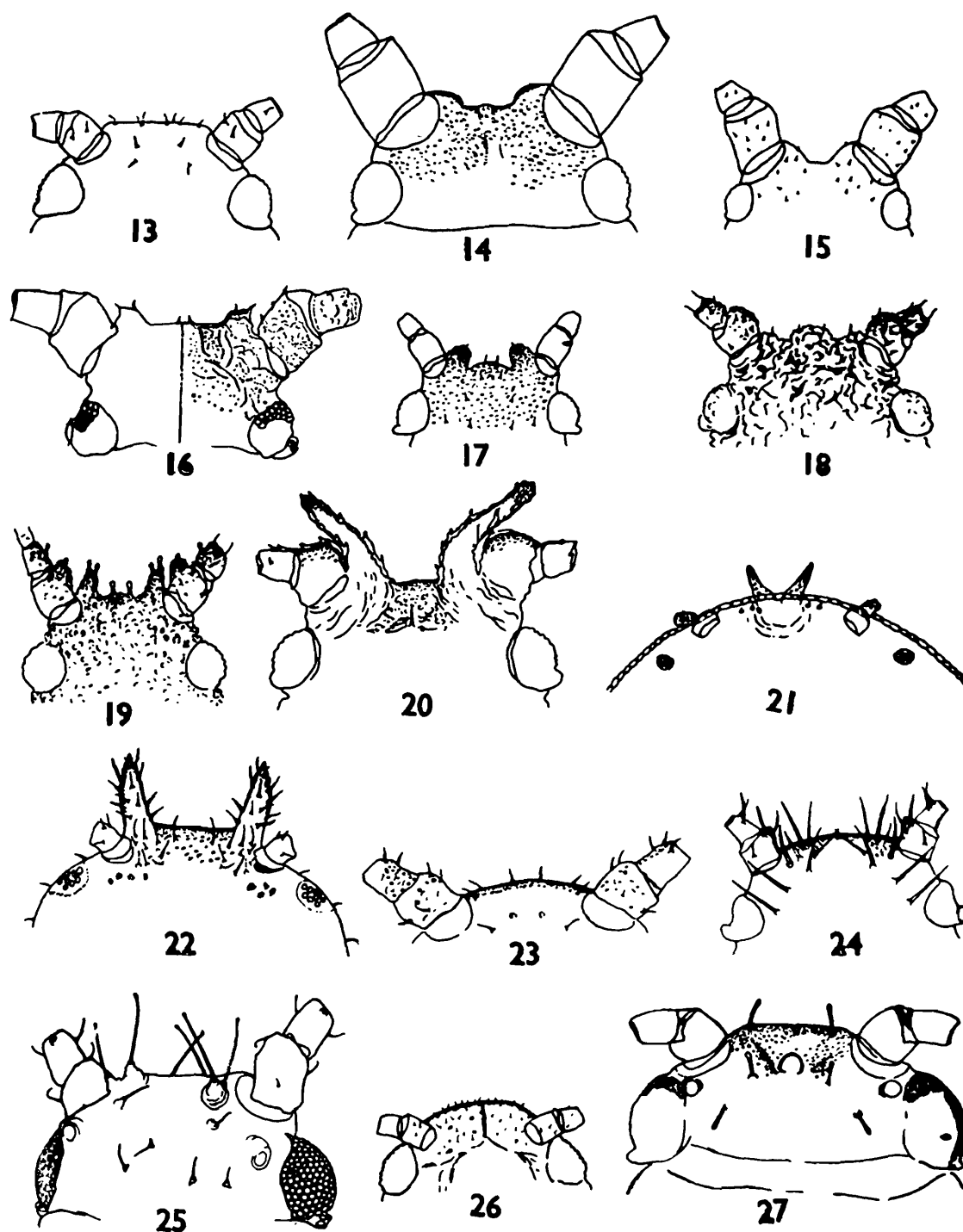
Figs. 9-12. External morphology

Fig. 9. *Macrosiphum (Sitobion) rosaeiformis* Das : Aptera showing different parts of a typical aphid.

Fig. 10. *Myzus persicae* (Sulzer) : Alata showing general morphology of a typical aphid.

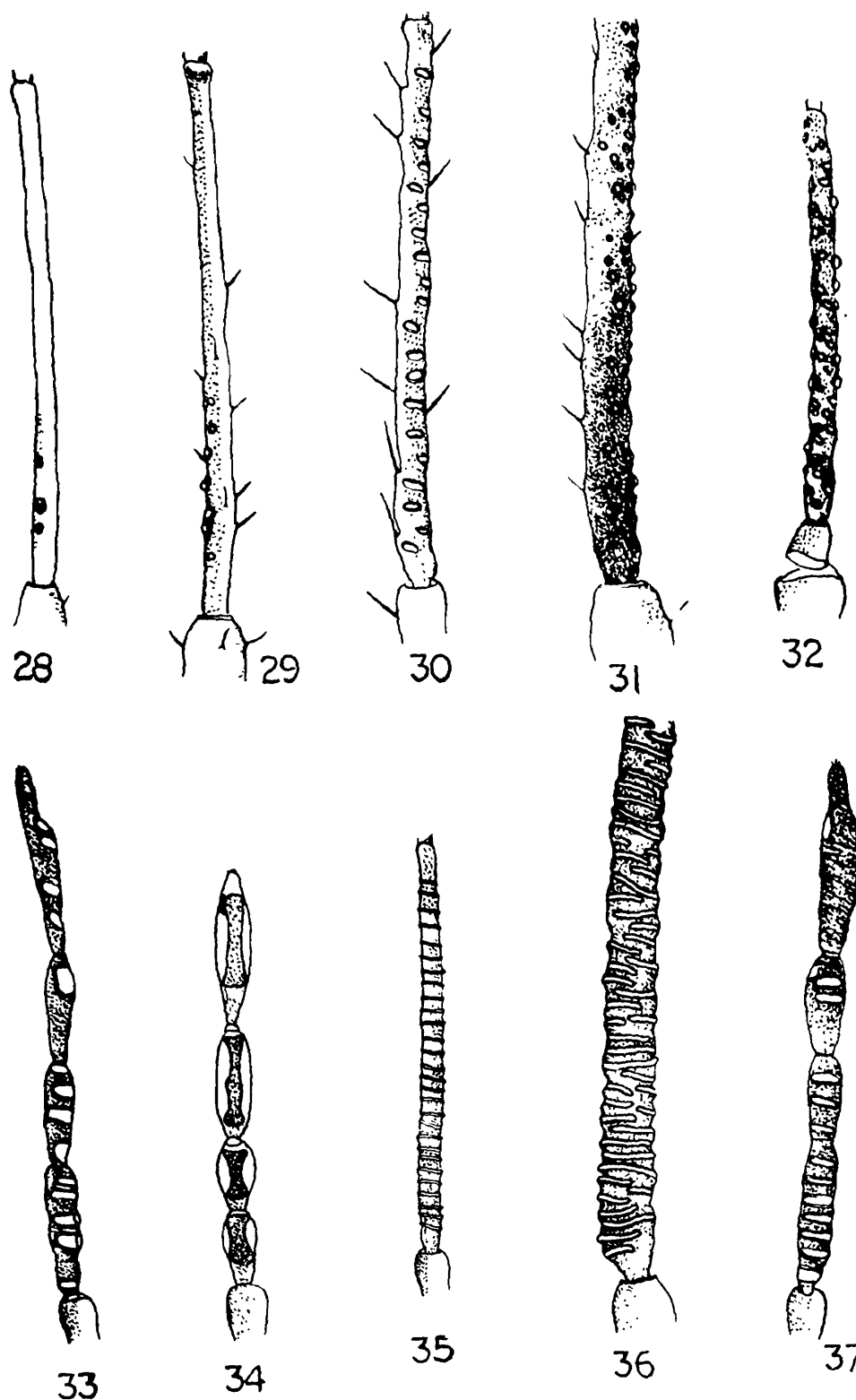
Fig. 11. *Brachycaudus helichrysi* (Kaltenbach) : Alate male showing genitalia.

Fig. 12. *Lipaphis erysimi* (Kaltenbach) : Apterous oviparous female showing hind tibia and genitalia.



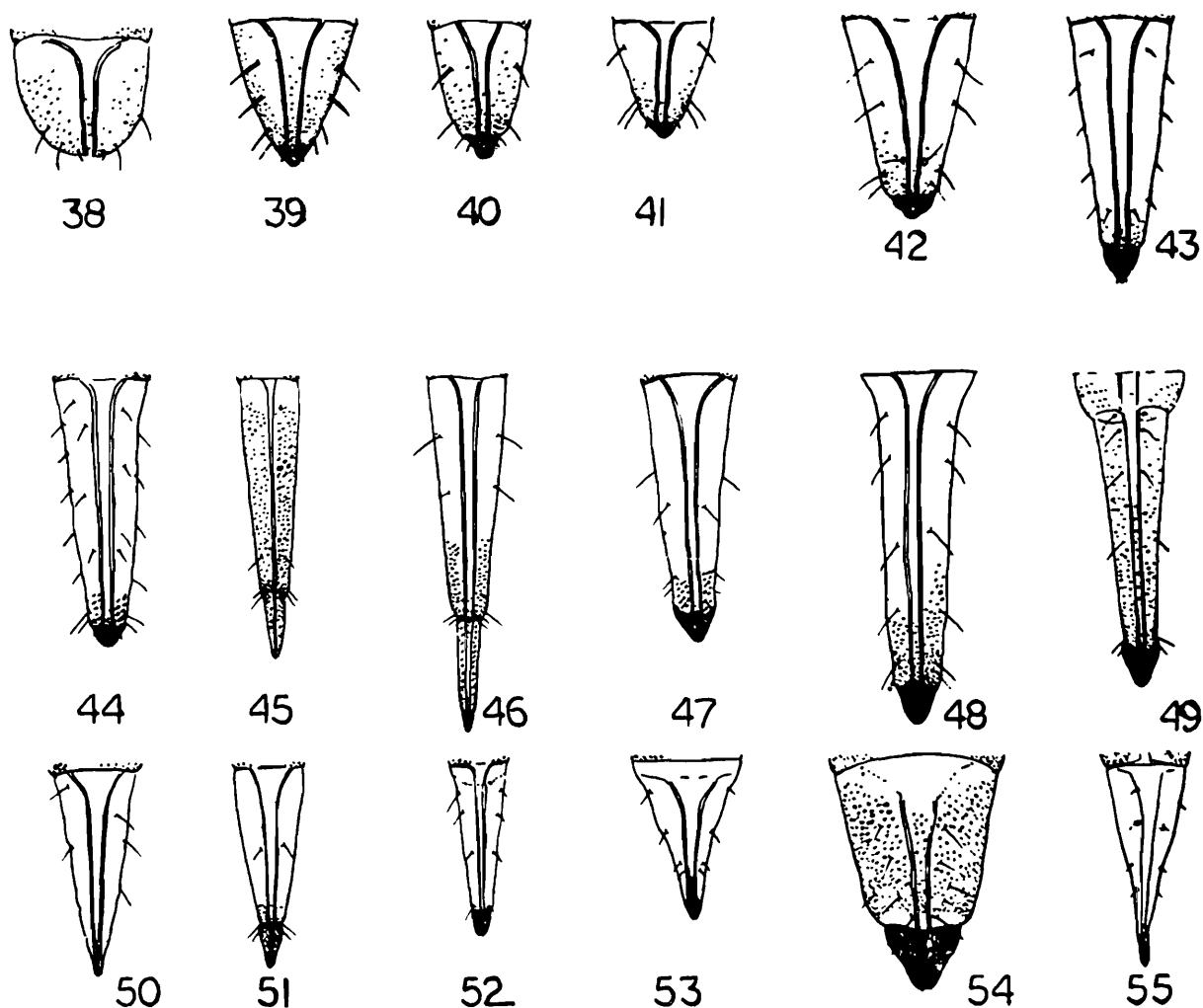
Figs. 13-27. Different types of head

- Fig. 13. *Aphis gossypii* Glover : Apter.
 Fig. 14. *Aulacorthum magnoliae* (Essig and Kuwana) : Apter.
 Fig. 15. *Acyrtosiphon pisum* (Harris) : Apter.
 Fig. 16. *Pentalonia nigronervosa* Coquerel : Apter.
 Fig. 17. *Myzus persicae* (Sulzer) : Apter.
 Fig. 18. *Vesiculaphis pieridis* Basu : Apter.
 Fig. 19. *Diphorodon cannabidis* (Passerini) : Apter.
 Fig. 20. *Akkaia neopolygona* Ghosh, Ghosh and Raychaudhuri : Apter.
 Fig. 21. *Cerataphis ? variabilis* Hille Ris Lambers : Apter.
 Fig. 22. *Ceratoglyphina bambusae bengalensis* Ghosh : Apter.
 Fig. 23. *Dysaphis atinus* Ghosh, Basu and Raychaudhuri : Apter.
 Fig. 24. *Sipha (Rungsia) maydis* (Passerini) : Apter.
 Fig. 25. *Tuberculatus (Acanthocallis) indicus* Ghosh : Apter.
 Fig. 26. *Cinara* sp.
 Fig. 27. *Tinocallis himalayensis* Ghosh, Ghosh and Raychaudhuri : Alata.



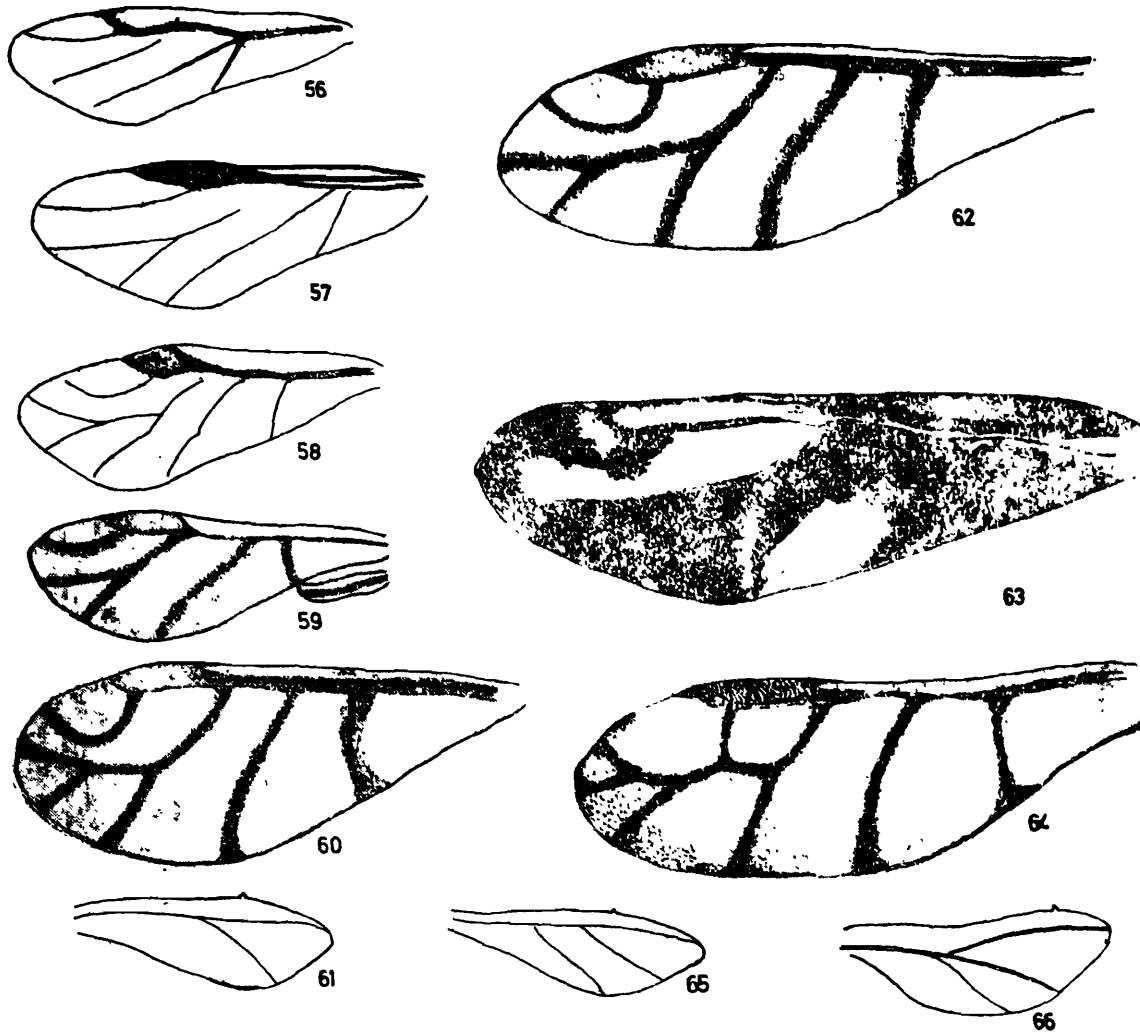
Figs. 28-37. Shape and arrangement of rhinaria.

- Fig. 28. *Metopolophium dirhodum* (Walker) : Aptera, a.s. II+III.
 Fig. 29. *Nasonovia strobilanthidis* Chakrabarti and Raychaudhuri : Aptera, a.s. II+III.
 Fig. 30. *Callaphis juglandis* (Goetze) : Alata, a.s. II+III.
 Fig. 31. *Macrosiphum rosae* (Linnaeus) : Alata, portion of a.s. III.
 Fig. 32. *Neoacyrthosiphon* (*Pseudoacyrthosiphon*) *takahashii* Ghosh : Alate male, a.s. I, II+III.
 Fig. 33. *Baizongia pistaciae* (Linnaeus) : Alata, a.s. III-VI.
 Fig. 34. *Kaburagia ailanthi* Chowdhuri, Basu, Chakrabarti and Raychaudhuri : Alata, a.s. II-VI.
 Fig. 35. *Tinocallis distincta* Ghosh, Ghosh and Raychaudhuri : Alata, a. s. II+III.
 Fig. 36. *Eriosoma lanigerum* (Hausmann) : Alata, a.s. II and portion of a.s. III
 Fig. 37. *Epipemphigus imaicus* (Cholodkovsky) : Alata, a.s. II-VI.



Figs. 38-55. Types of ultimate rostral segments

- Fig. 38. *Ceratovacuna lanigera* Zehntner : Apter.
 Fig. 39. *Macrosiphum (Sitobion) miscanthi* (Takahashi) : Apter.
 Fig. 40. *Liosomaphis himalayensis* Basu : Apter.
 Fig. 41. *Rhopalosiphum maidis* (Fitch) : Apter.
 Fig. 42. *Macrosiphum rosae* (Linnaeus) : Apter.
 Fig. 43. *Eriosoma lanigerum* (Hausmann) : Apter.
 Fig. 44. *Nasonovia strobilanthidis* Chakrabarti and Raychaudhuri : Apter.
 Fig. 45. *Greenidea (Trichosiphum) heeri* Raychaudhuri, Ghosh, Banerjee and Ghosh : Apter.
 Fig. 46. *Cinara comata* Doncaster : Apter.
 Fig. 47. *Neomasonaphis rumicis* Chakrabarti and Raychaudhuri : Alate male.
 Fig. 48. *Uroleucon (Uromelan) compositae* (Theobald) : Apter.
 Fig. 49. *Packzoscia budhium* Banerjee, Ghosh and Raychaudhuri : Apter.
 Fig. 50. *Serratocallis takahashii* Quednau and Chakrabarti : Apter.
 Fig. 51. *Capitophorus tricholepidis* Chakrabarti : Apter.
 Fig. 52. *Macrosiphoniella sanborni* (Gillette) : Apter.
 Fig. 53. *Pleotrichophorus glandulosus* (Kaltenbach) : Apter.
 Fig. 54. *Lachnus tropicalis* (van der Goot) : Apter.
 Fig. 55. *Hoplocallis quedenai* Chakrabarti : Alata.



Figs. 56-66. Types of wings and venation

Fig. 56. *Tetraneura (Tetraneurella) nigriabdominalis* (Sasaki) : Fore wing.

Fig. 57. *Eriosoma lanigerum* (Hausmann) : Fore wing.

Fig. 58. *Serratocallis takahashii* Quednau and Chakrabarti : Fore wing.

Fig. 59. *Schoutedenia lutea* (van der Goot) : Fore wing.

Fig. 60. *Micromyzus kalimpongensis* Basu : Fore wing.

Fig. 61. *Cryptosiphum artemisiae* Buckton : Fore wing.

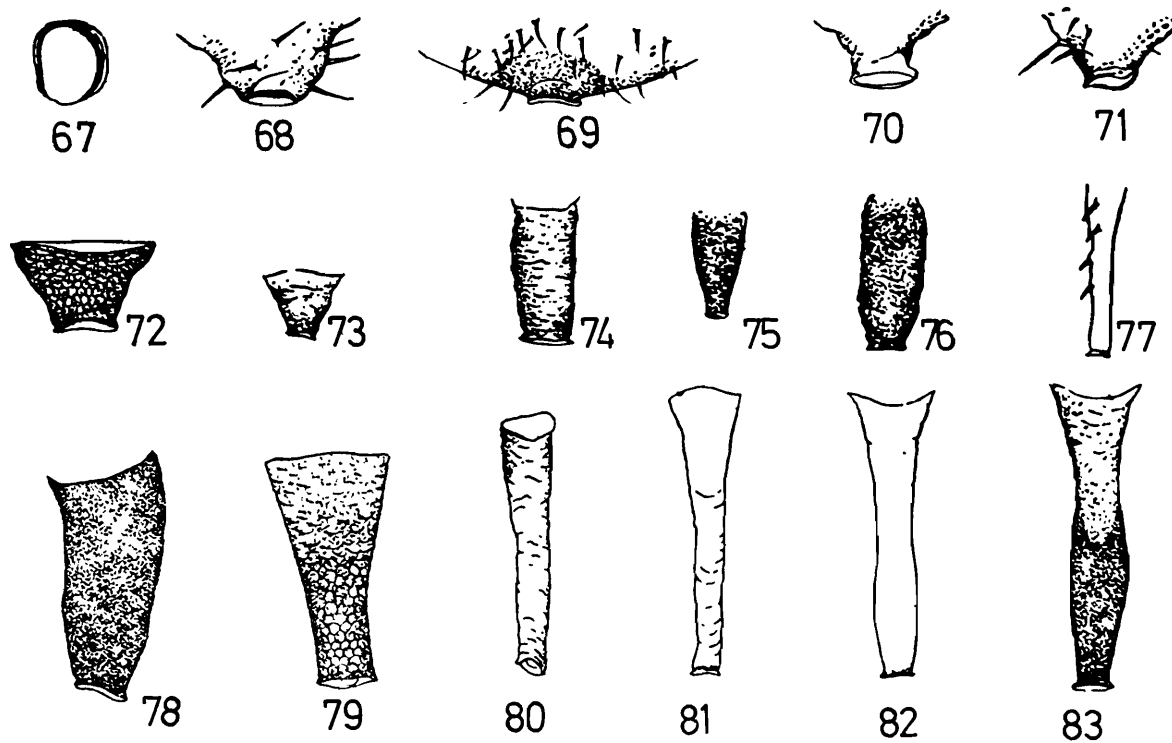
Fig. 62. *Lachnus tropicalis* (van der Goot) : Fore wing.

Fig. 63. *Pentalonia nigronervosa* Coquerel : Fore wing.

Fig. 64. *Hysteroneura setariae* (Thomas) : Hind wing.

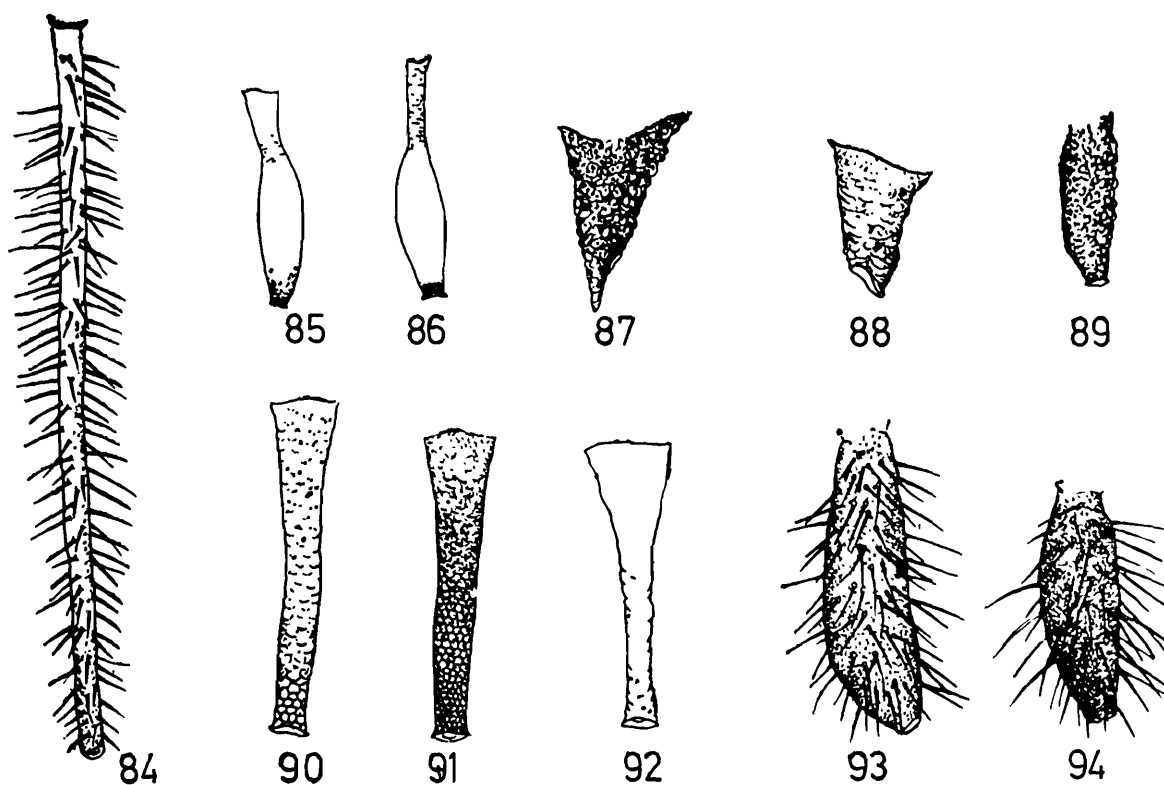
Fig. 65. *Melanaphis sacchari* (Zehntner) : Hind wing.

Fig. 66. *Epipemphigus imaicus* (Cholodkovsky) : Hind wing.



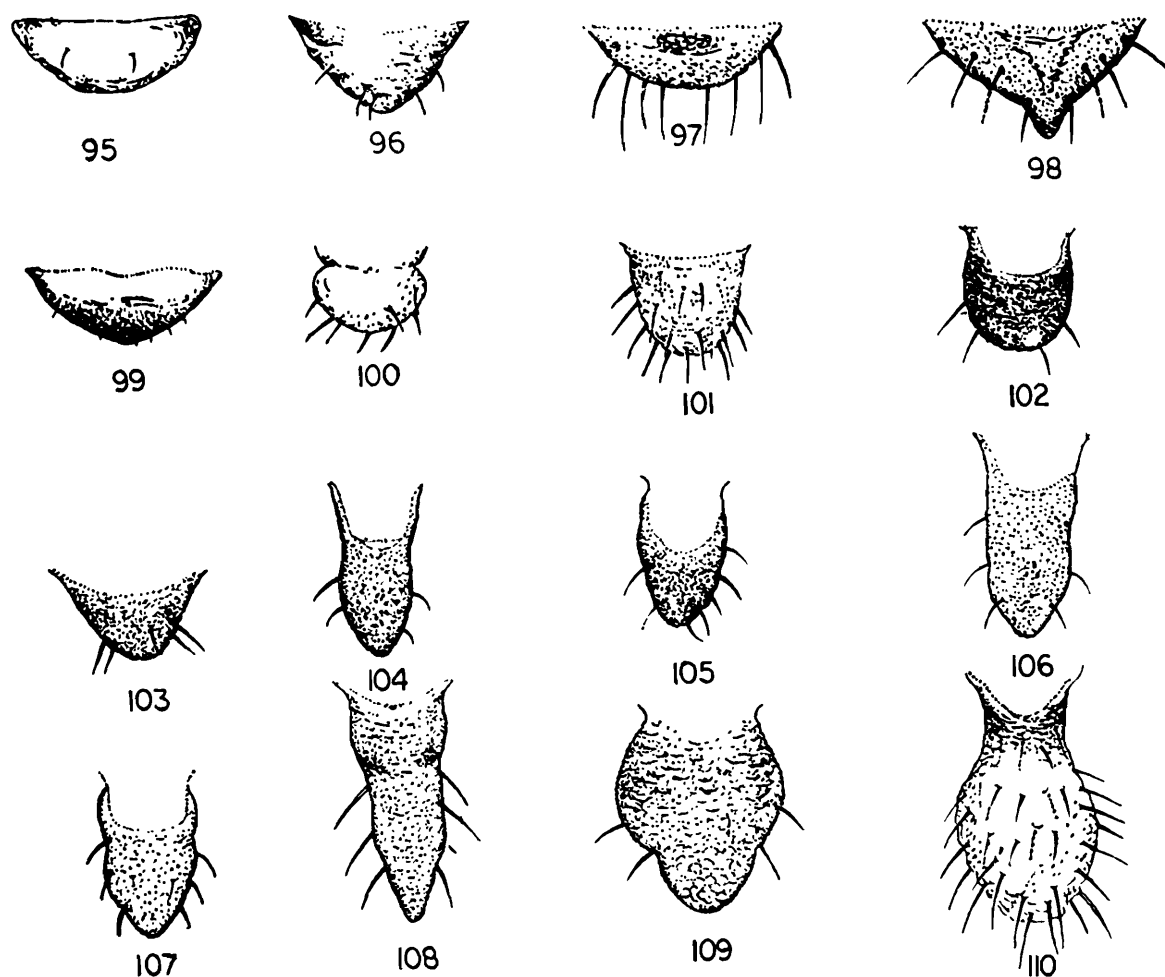
Figs 67-83. Types of Siphunculi

- Fig. 67. *Eriosoma lanigerum* (Hausmann) : Alata.
- Fig. 68. *Eriosoma (Schizoneura) phaenax* Mordvilko : Alata.
- Fig. 69. *Cinara comata* Doncaster : Apter.
- Fig. 70. *Serratocallis takahashii* Quednau and Chakrabarti : Apter.
- Fig. 71. *Callaphis juglandis* (Goetze) : Alata.
- Fig. 72. *Periphyllus aesculi* Hille Ris Lambers : Alata.
- Fig. 73. *Dysaphis microsiphon* (Nevsky) : Alata.
- Fig. 74. *Oedisiphum soureni* Basu : Apter.
- Fig. 75. *Rhopalosiphum maidis* (Fitch) : Apter.
- Fig. 76. *Brevicoryne brassicae* (Linnaeus) : Apter.
- Fig. 77. *Chaetosiphon indicum* Chakrabarti and Ghosh : Apter.
- Fig. 78. *Aphis verbasci* Schrank : Apter.
- Fig. 79. *Macrosiphoniella sanborni* (Gillette) : Apter.
- Fig. 80. *Trichosiphonaphis (Xenomyzus) polygoni* (van der Goot) : Alate male.
- Fig. 81. *Nasonovia strobilanthidis* Chakrabarti and Raychaudhuri : Apter.
- Fig. 82. *Indoidiopterus geranii* (Chowdhuri, Basu, Chakrabarti and Raychaudhuri) : Apter.
- Fig. 83. *Hyalomyzus razi* Hille Ris Lambers : Apter.



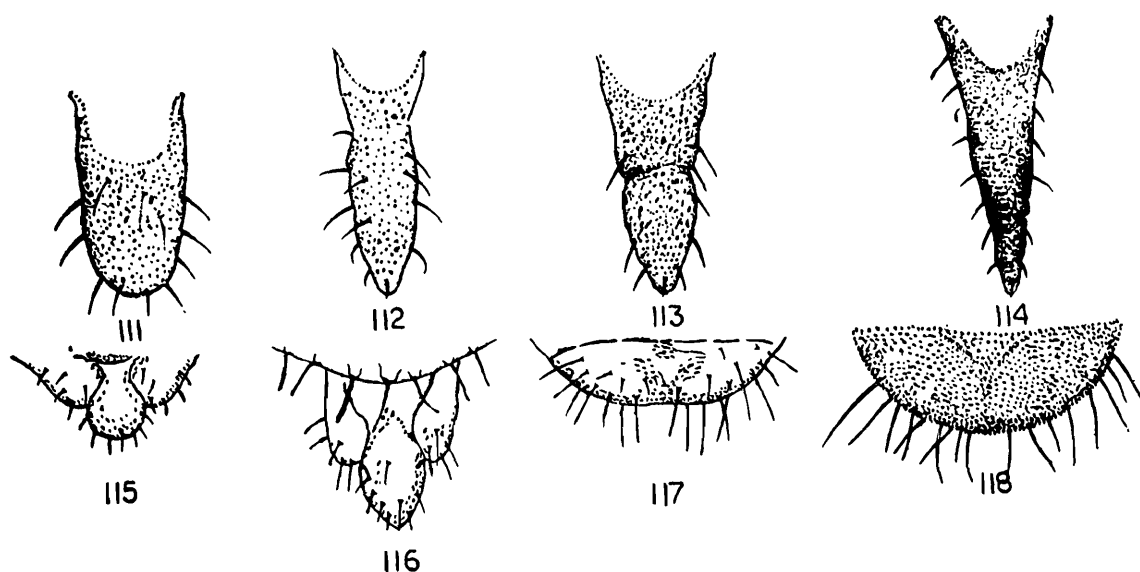
Figs. 84-94. Types of Siphunculi

- Fig. 84. *Mollitrichosiphum* (*Metatrichosiphon*) *nandii* Basu : Alata.
- Fig. 85. *Liosomaphis himalayaensis* Basu : Apter.
- Fig. 86. *Neomasonaphis rumicis* Chakrabarti and Raychaudhuri : Alate male.
- Fig. 87. *Acutosiphon obliquoris* Basu, Ghosh and Raychaudhuri : Apter.
- Fig. 88. *Acutosiphon obliquoris* Basu, Ghosh and Raychaudhuri : Alata.
- Fig. 89. *Vesiculaphis pieridis* Basu : Apter.
- Fig. 90. *Macrosiphum rosae* (Linnaeus) : Apter.
- Fig. 91. *Uroleucon* (*Uromelan*) *compositae* (Theobald) : Apter..
- Fig. 92. *Jacksonia campanullata* Chakrabarti and Raychaudhuri : Apter.
- Fig. 93. *Eutrichosiphum* (*Neoparatrichosiphum*) *raychaudhurii* Ghosh : Apter.
- Fig. 94. *Greenidea* (*Trichosiphum*) *heeri* Raychaudhuri, Ghosh, Banerjee and Ghosh : Apter.



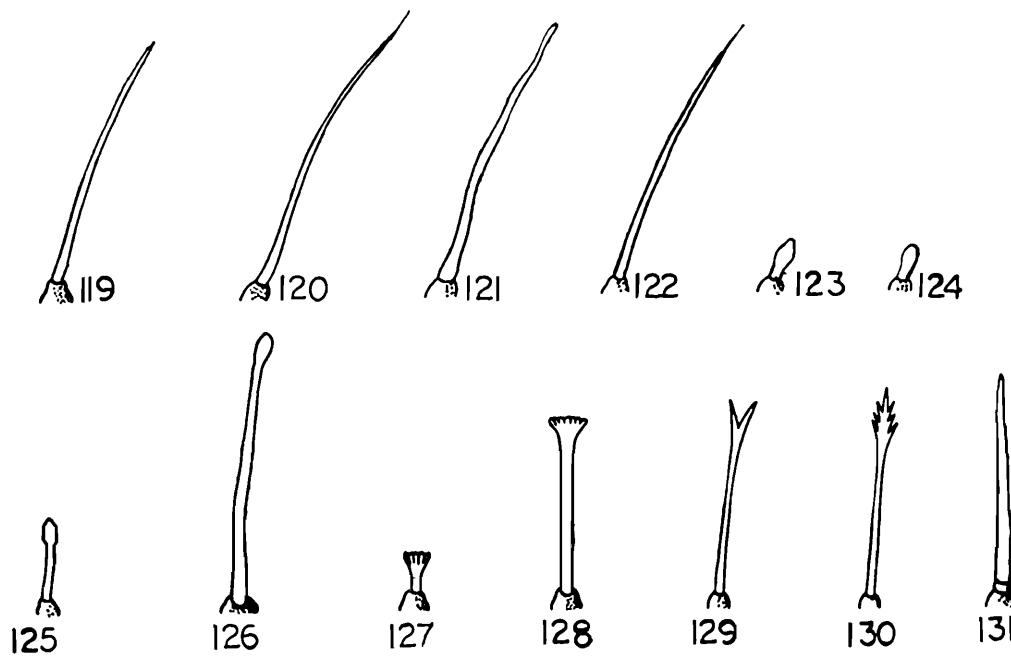
Figs. 95-110. Types of Cauda

- Fig. 95. *Eriosoma lanigerum* (Hausmann) Mordvilko : Alata.
- Fig. 96. *Tetraneura* (*Tetraneurella*) *nigriabdominalis* (Sasaki) : Alata.
- Fig. 97. *Eutrichosiphum arunachali* Basu, Ghosh and Raychaudhuri : Apter.
- Fig. 98. *Greenidea* (*Trichosiphum*) *heeri* Raychaudhuri, Ghosh, Banerjee and Ghosh : Apter.
- Fig. 99. *Cinara comata* Doncaster : Apter.
- Fig. 100. *Ceratovacuna lanigera* Zehntner : Apter.
- Fig. 101. *Serratocallis takahashii* Quednau and Chakrabarti : Apter.
- Fig. 102. *Oedisiphum soureni* Basu : Apter.
- Fig. 103. *Brachycaudus amygdallinus* (Schouteden) : Alata.
- Fig. 104. *Rhopalosiphum maidis* (Fitch) : Apter.
- Fig. 105. *Aphis verbasci* Schrank : Apter.
- Fig. 106. *Myzus persicae* (Sulzer) : Apter.
- Fig. 107. *Chaetosiphon indicum* Chakrabarti and Ghosh : Apter.
- Fig. 108. *Indoidiopterus geranii* (Chowdhuri, Basu, Chakrabarti and Raychaudhuri) : Apter.
- Fig. 109. *Vesiculaphis pieridis* Basu : Apter.
- Fig. 110. *Callaphis juglandis* (Goetze) : Alata.



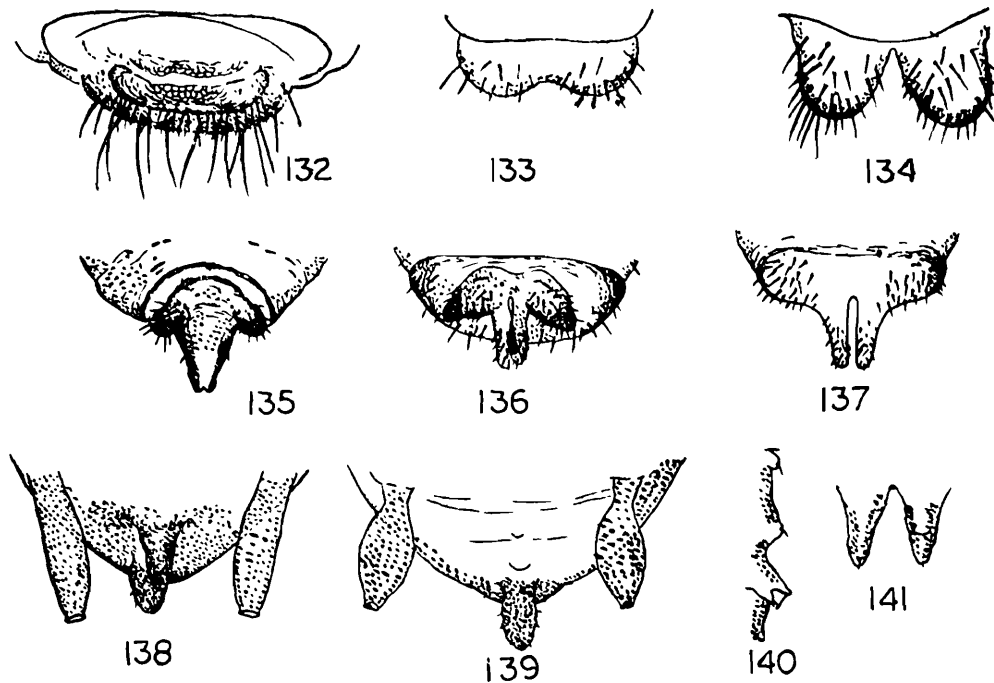
Figs. 111-118. Types of Cauda

- Fig. 111. *Macrosiphum pseudogeranii* Chakrabarti and Raychaudhuri : Aptera.
 Fig. 112. *Macrosiphum rosae* (Linnaeus) : Aptera.
 Fig. 113. *Nasonovia strobilanthidis* Chakrabarti and Raychaudhuri : Aptera.
 Fig. 114. *Uroleucon (Uromelan) compositae* (Theobald) : Aptera.
 Fig. 115. *Astegopteryx minuta* (van der Goot) : Aptera.
 Fig. 116. *Neobetulaphis pusilla* Basu : Aptera.
 Fig. 117. *Ceratoglyphina bambusae bengalensis* Ghosh : Aptera.
 Fig. 118. *Pterocomma* sp. : Aptera.



Figs. 119-131 Types of hairs

- Fig. 119. Bluntish apex.
 Fig. 120. Acuminate apex.
 Fig. 121. Spatulate apex.
 Fig. 122. Acute apex.
 Fig. 123-124 Spatulate to expanded apex.
 Figs. 125-126 Capitate apex.
 Figs. 127-128 Fan-shaped apex.
 Figs. 129-130 Furcated to multifaceted apex.
 Figs. 131. Fringed margin.



Figs. 132-134. Types of Subanal plates

Fig. 132. *Greenidea (Trichosiphum) heeri* Raychaudhuri, Ghosh, Banerjee and Ghosh : Apteræ

Fig. 133. *Cerataphis palmarum* (Ghesquiere) : Apteræ

Fig. 134. *Callaphis* sp. : Apteræ

Figs. 135-137 Types of male genitalia

Fig. 135. *Indumasonaphis inulae* (Ghosh, and Raychaudhuri).

Fig. 136. *Periphyllus viridis* (Matsumura)

Fig. 137. *Mollitrachosiphum (Metatrachosiphon) nandii* Basu

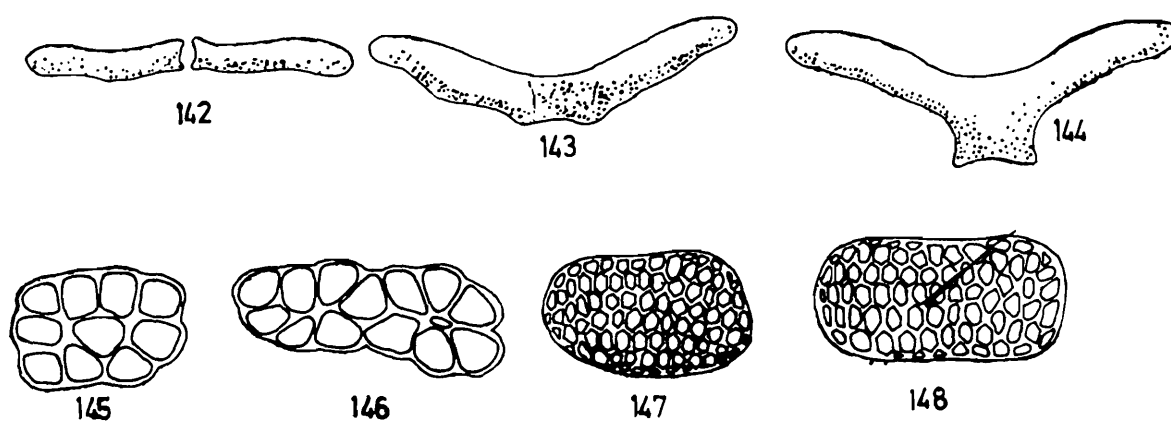
Figs. 138-141 Types of body process

Fig. 138. *Cavariella aegopodii* (Scopoli) : Apteræ

Fig. 139. *Tricaudatus polygoni* (Narzikulov) : Apteræ

Fig. 140. *Myzocallis (Hoplocallis) microtricha* Quednau and Chakrabarti : Alata

Fig. 141. *Tinocallis distincta* Ghosh, Ghosh and Raychaudhuri : Alata



Figs. 142-144 Types of mid-thoracic furca

Fig. 142. *Liosomaphis himalayensis* Basu

Fig. 143. *Lipaphis erysimi* (Kaltenbach)

Fig. 144. *Macrosiphoniella sanborni* (Gillette)

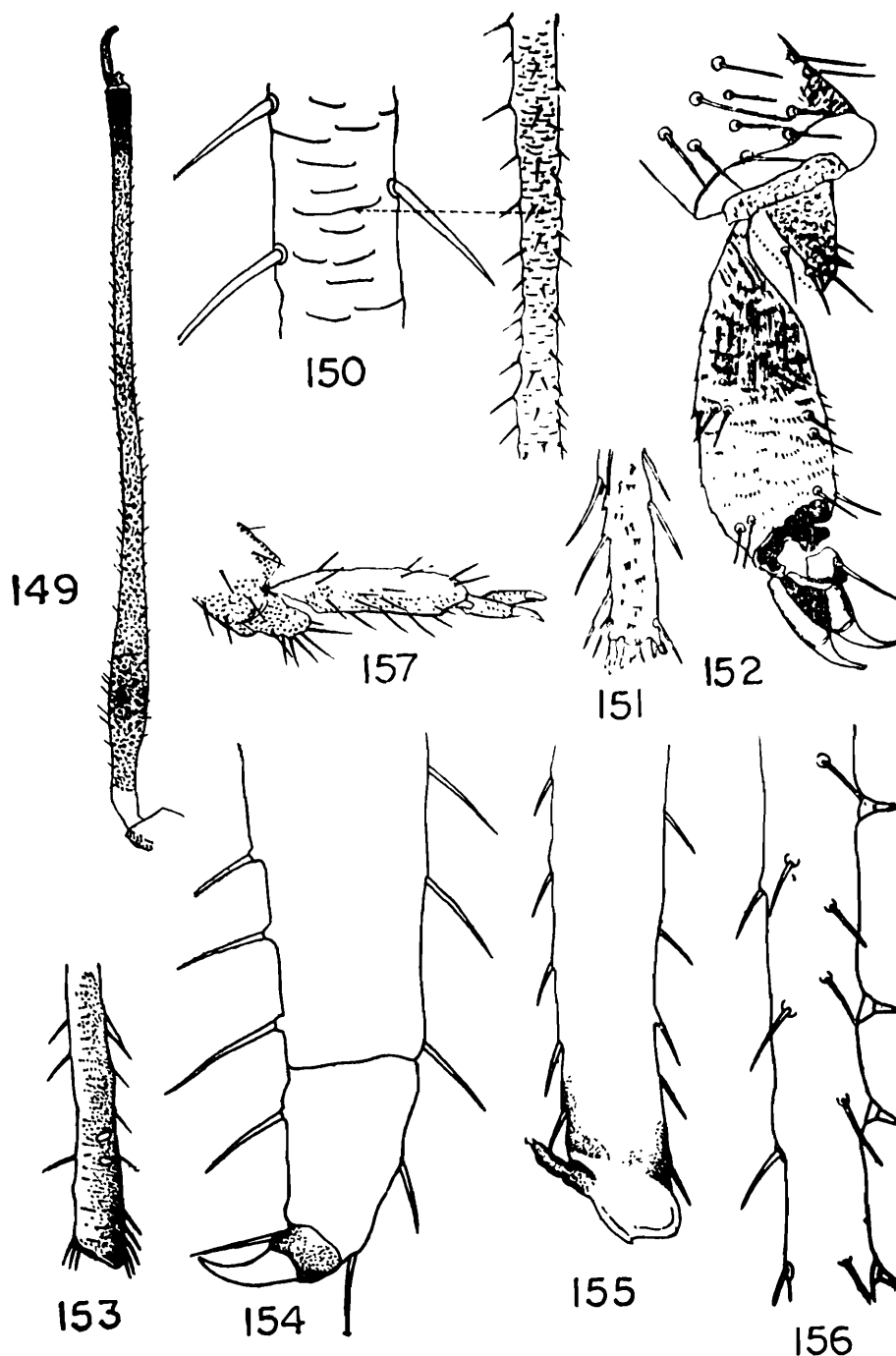
Figs. 145-148 Arrangement of wax-plates

Fig. 145. *Eriosoma lanigerum* (Hausmann) : Aptera (on dorsum of head)

Fig. 146. *Eriosoma lanigerum* (Hausmann) : Aptera (on dorsum of abdomen)

Fig. 147. *Kaburagia ailanthi* Chowdhuri, Basu, Chakrabarti and Rychaudhuri :
Alata

Fig. 148. *Pemphigus* sp. : Alata



Figs. 149-157 Hind tibia

- Fig. 149. *Macrosiphum* (*Sitobion*) *rosaeiformis* Das : Hind tibia of apterous ovipara
- Fig. 150. *Greenideoida* (*Paragreenideoida*) *bhalukpongensis* Ghosh, Banerjee and Raychaudhuri : portion of hind tibia
- Fig. 151. *Greenidea* *artocarpæ* (Westwood) : Alata : Apical portion of hind tibia
- Fig. 152. *Pseudoacyrthosiphon* *holsti* (Takahashi) : Apteræ : Hind tarsus with portion of hind tibia
- Fig. 153. *Kurisakia* *indica* Basu : Portion of hind tibia with Pseudosensoria
- Fig. 154. *Tetraneura* *nigriabdominalis* (Sasaki) : Apteræ : Hind tarsus with portion of tibia
- Fig. 155. *Shinjia* *pteridifoliae* (Shinji) : Apteræ : Hind tarsus with portion of tibia
- Fig. 156. *Toxoptera* *citricidus* (Kirkaldy) : Apteræ : Portion of hind tibia
- Fig. 157. *Chaetogeomys* *graminiphaga* Pal and Raychaudhuri : Apteræ : Hind tarsus with portion of hind tibia

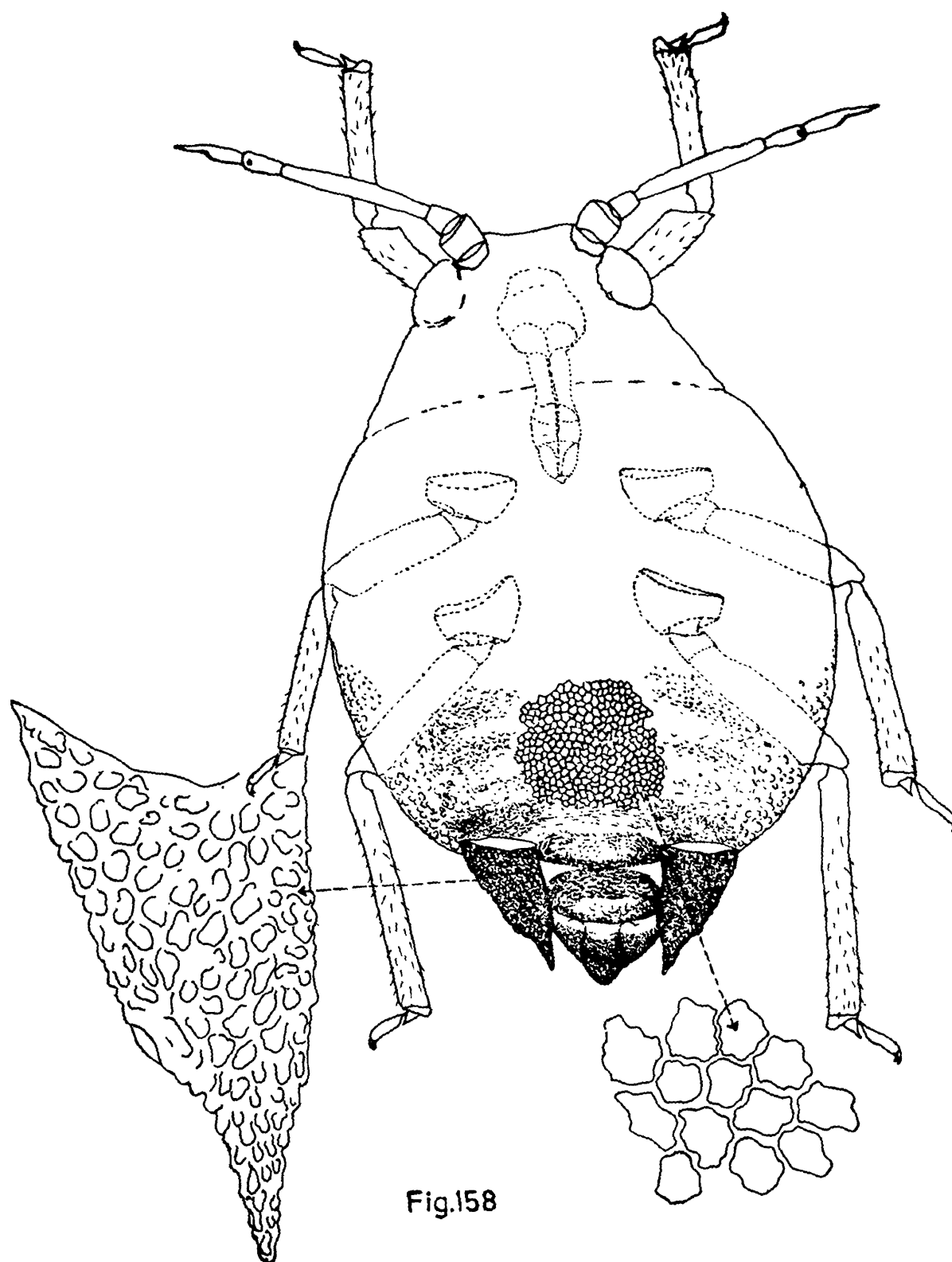


Fig.158

Fig. 158. *Acutosiphon obliquoris* Basu et al. : Aptera

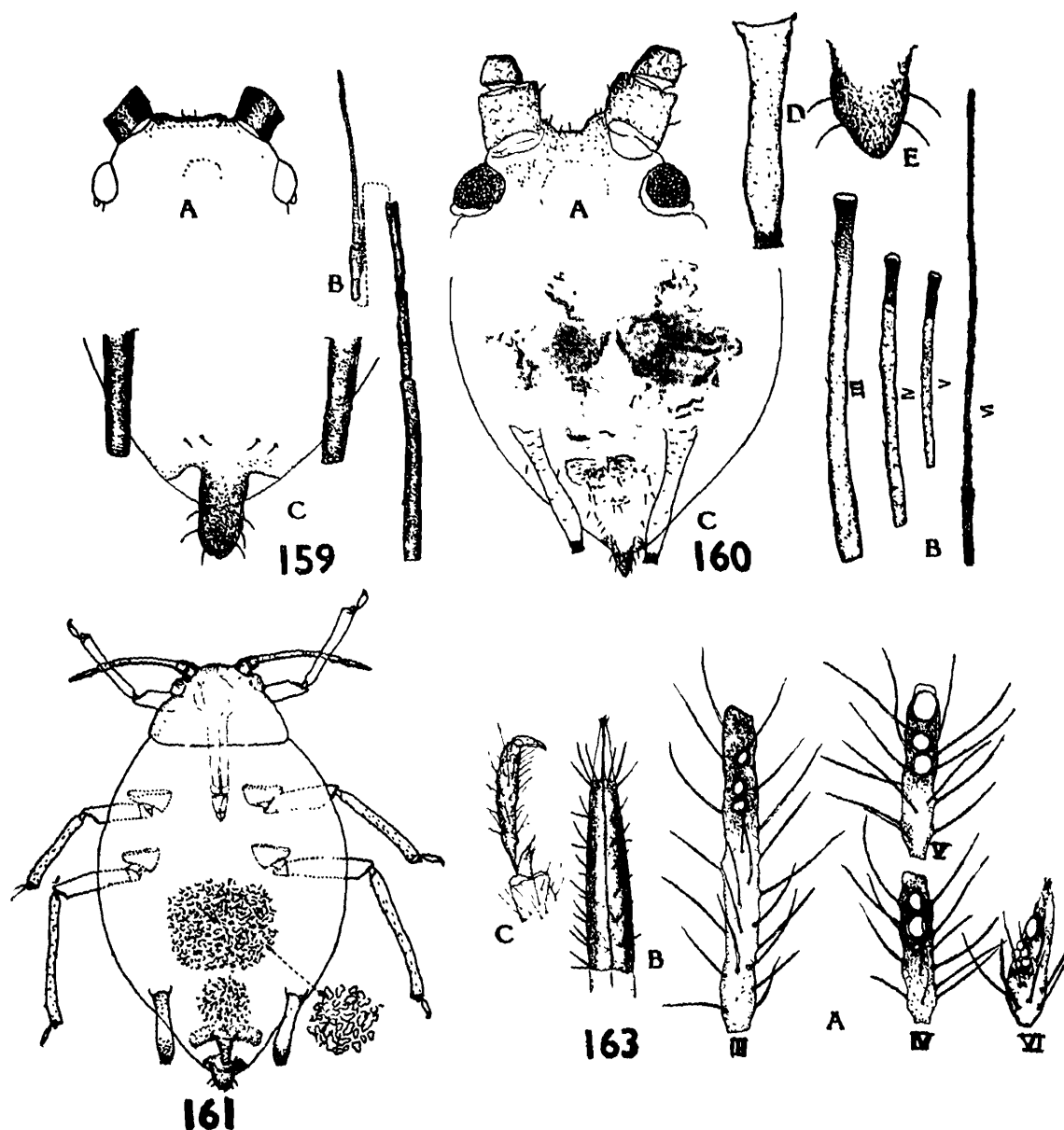


Fig. 159. *Acyrthosiphon* (*Metopolophium*) *graminum* Raychaudhuri, Ghosh and Das : Apteræ : A. Head, B. Antenna, C. Posterior part of abdomen

Fig. 160. *Aulacorthum* (*Neomyzus*) *strobilantheae* sp. nov. : Apteræ : A. Head, B. Antennal segments III-VI, C. Abdomen (Posterior part), D. Siphunculus and E. Cauda.

Fig. 161. *Cavariella aegopodii* (Scopoli) : Apteræ

Fig. 163. *Cinara chaetorostrata* Ghosh and Raychaudhuri : Alata : A. a.s. III-VI, B. U.r.s., C. Hind tarsi with portion of tibia

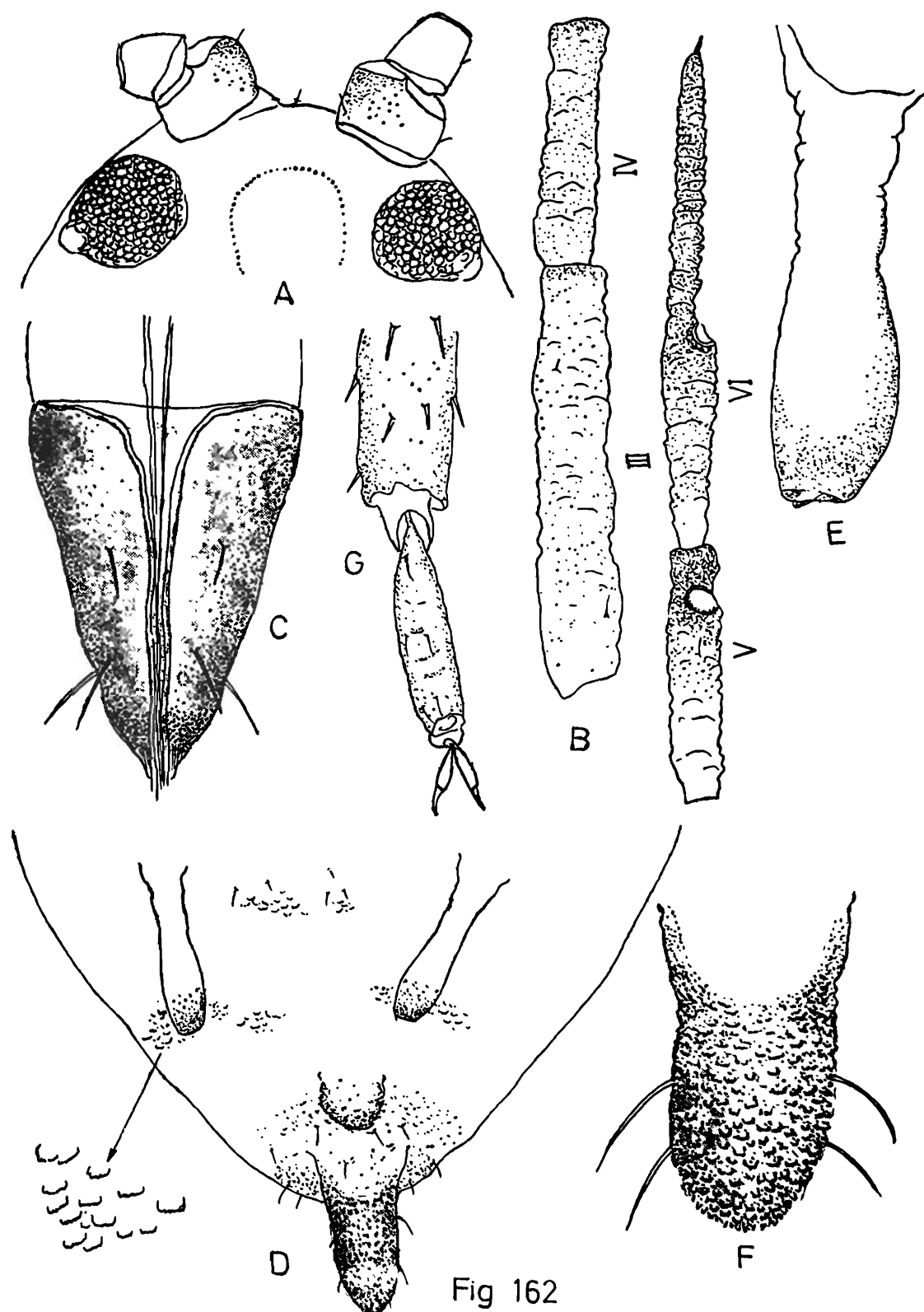


Fig 162

Fig. 162. *Cavariella himachali* sp. nov. : Aptera : A. Head, B. Antennal segments III-VI, C. U.r.s., D. Posterior part of abdomen, E. Siphunculus, F. Cauda, G. Hind tarsi with portion of tibia.

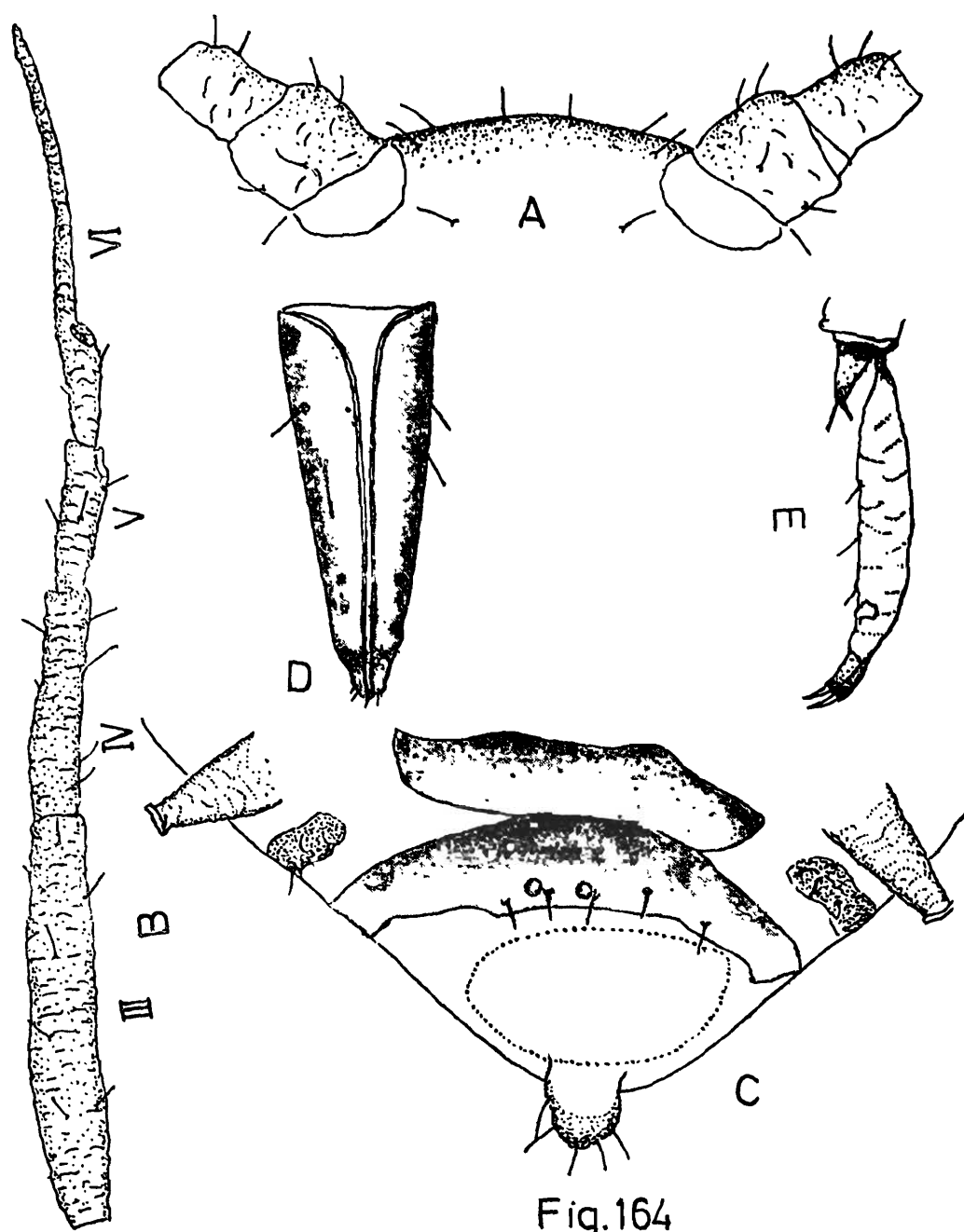


Fig.164

Fig. 164. *Dysaphis alinus* Ghosh et al. : Aptera : A. Head, B. Antennal segments III-VI, C. Posterior part of abdomen, D. U.r.s., E. Hind tarsi.

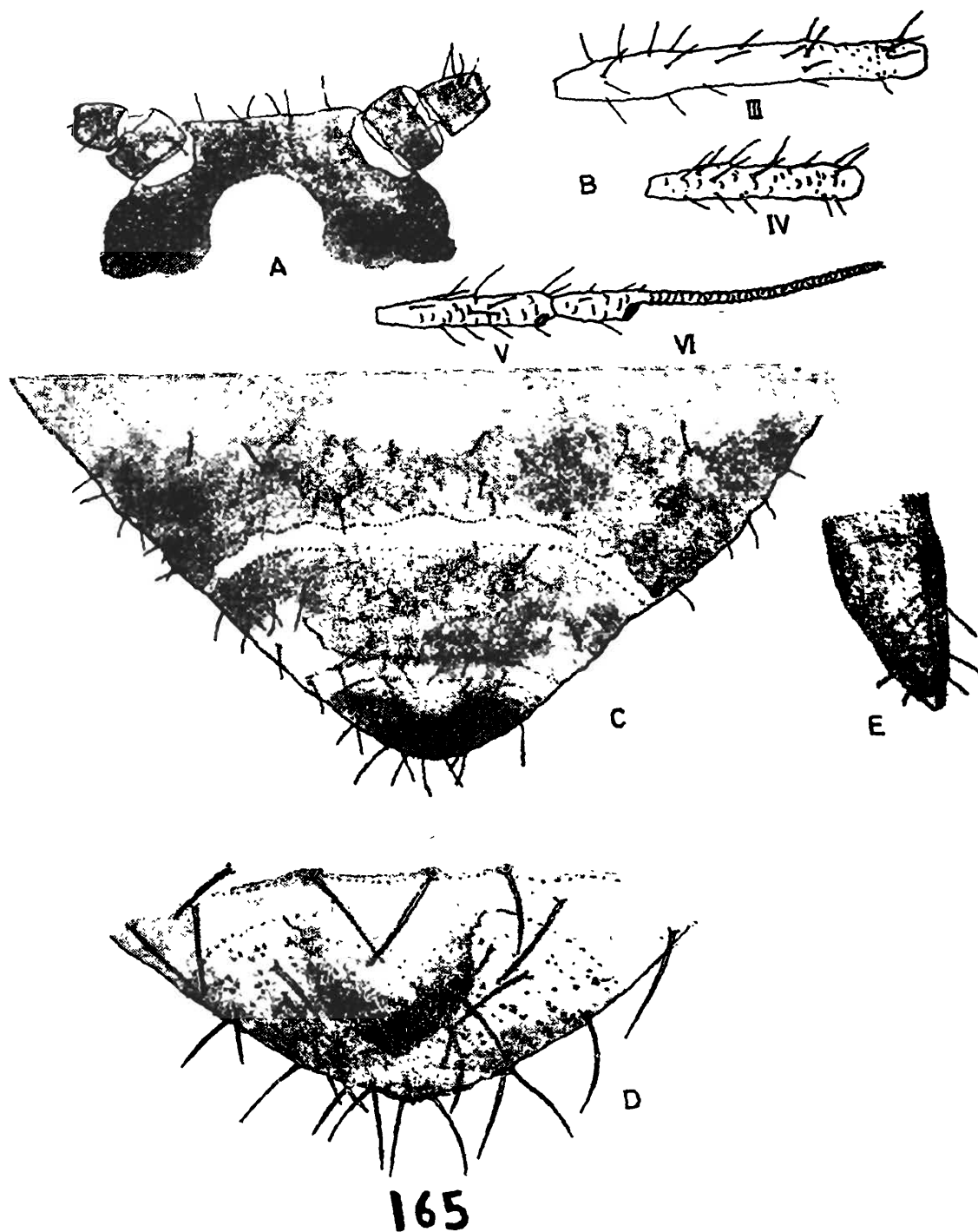


Fig. 165. *Dysaphis stroyani* sp. nov. : Aptera : A. Head, B. Antennal segments III-VI, C. Posterior part of abdomen, D. Terminal part of abdomen magnified, E. U.r.s.

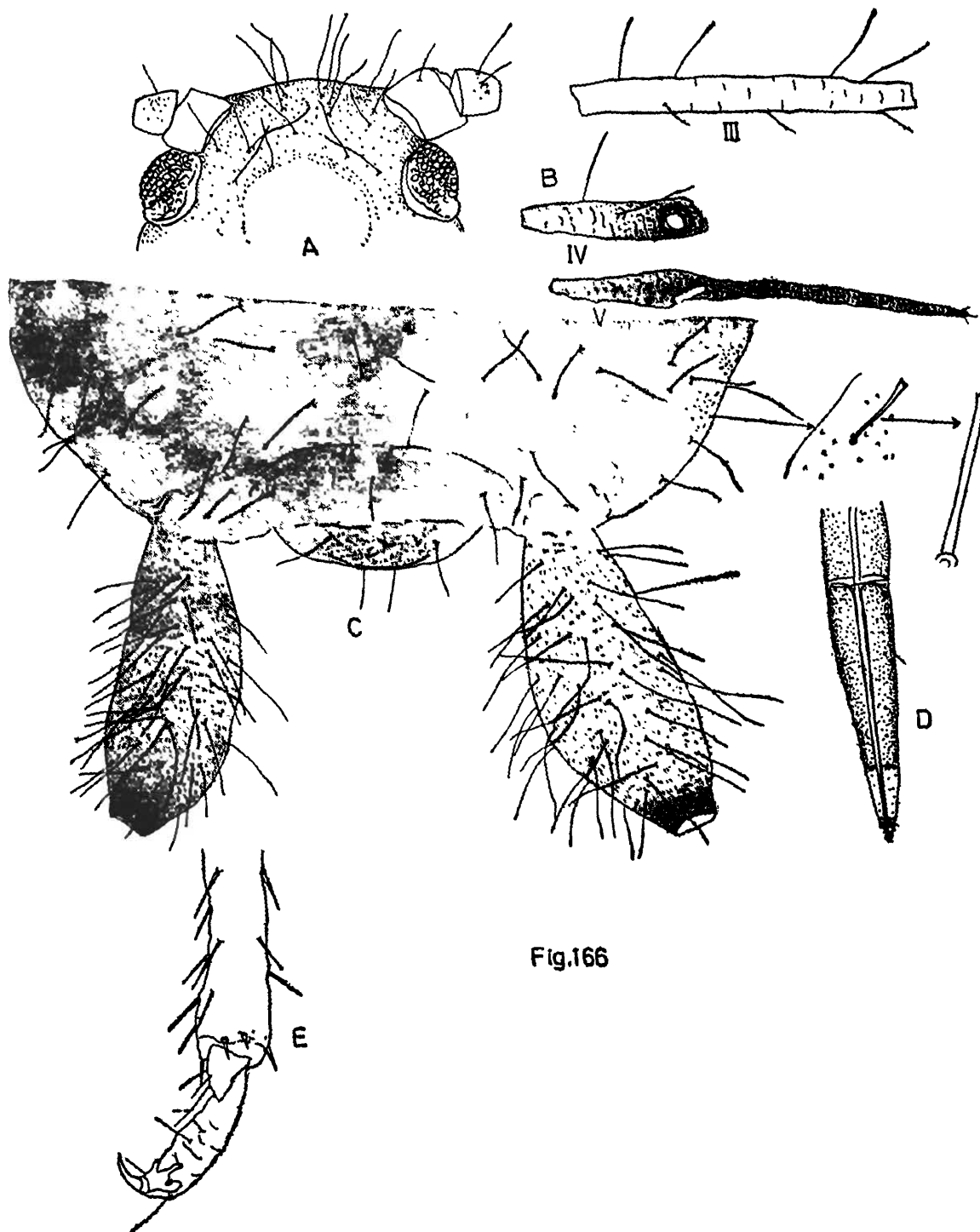


Fig.166

Fig. 166. *Eutrichosiphum (Eutrichosiphum) simlaensis* sp. nov.: Aptera : A. Head, B. Antennal segments III-V, C. Posterior part of abdomen, D. U.r.s., E. Hind tarsi with portion of tibia

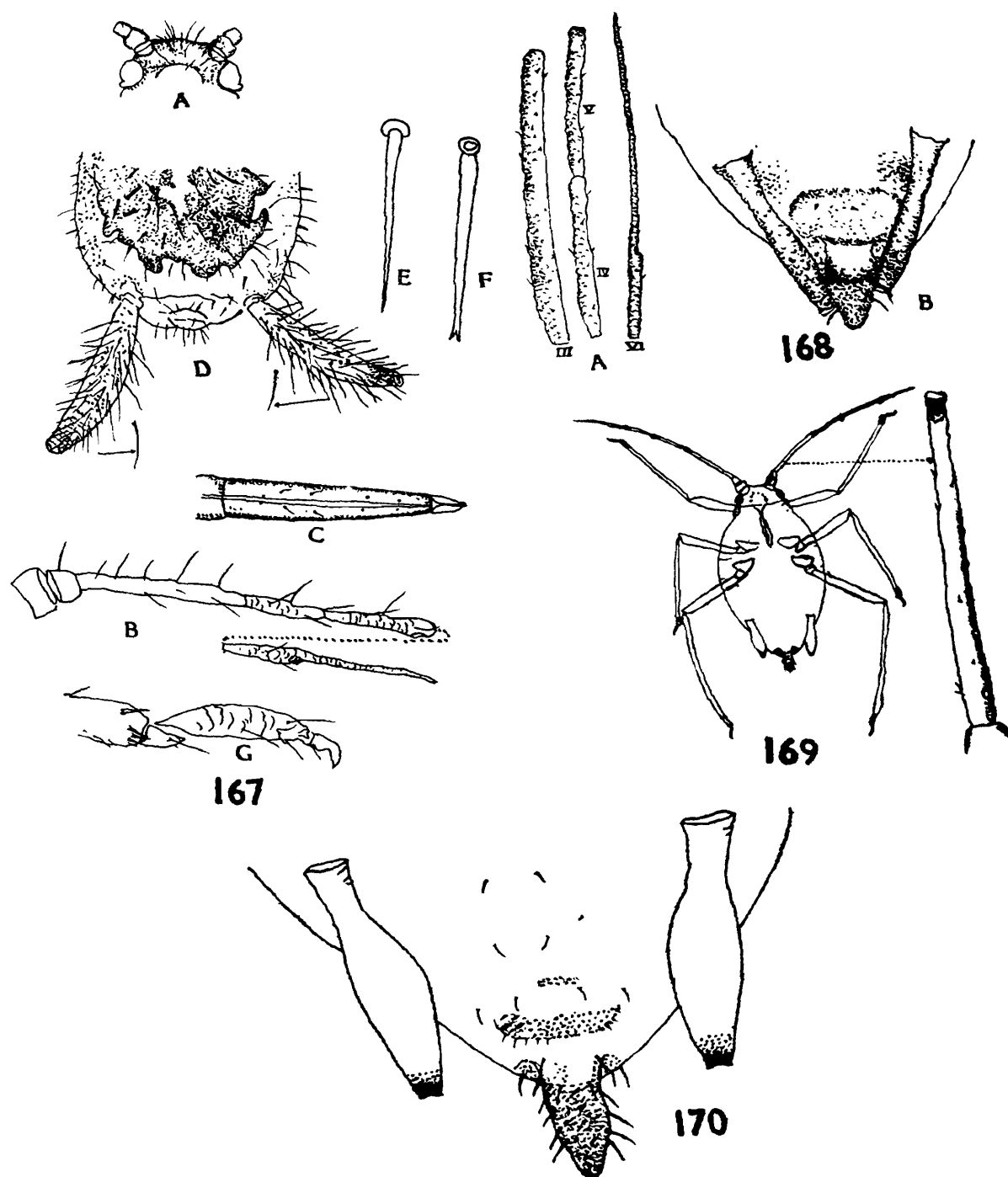


Fig. 167. *Eutrichosiphum (Paratrichosiphum) neoalnicola* Raychaudhuri, Ghosh and Das : A. Head, B. Antenna, C. U.r.s., D. Posterior part of abdomen, E & F. Dorsal hairs, G. Hind tarsi with portion of tibia

Fig. 168. *Hyalomyzus fragaricola* sp. nov. : Apterā : A. Antennal segments III-VI, B. Posterior part of abdomen

Fig. 169. *Hyperomyzus carduellinus* (Theobald) : Apterā : General view with antennal segment III magnified.

Fig. 170. *Liosomaphis himalayensis* Basu : Apterā : Posterior part of abdomen

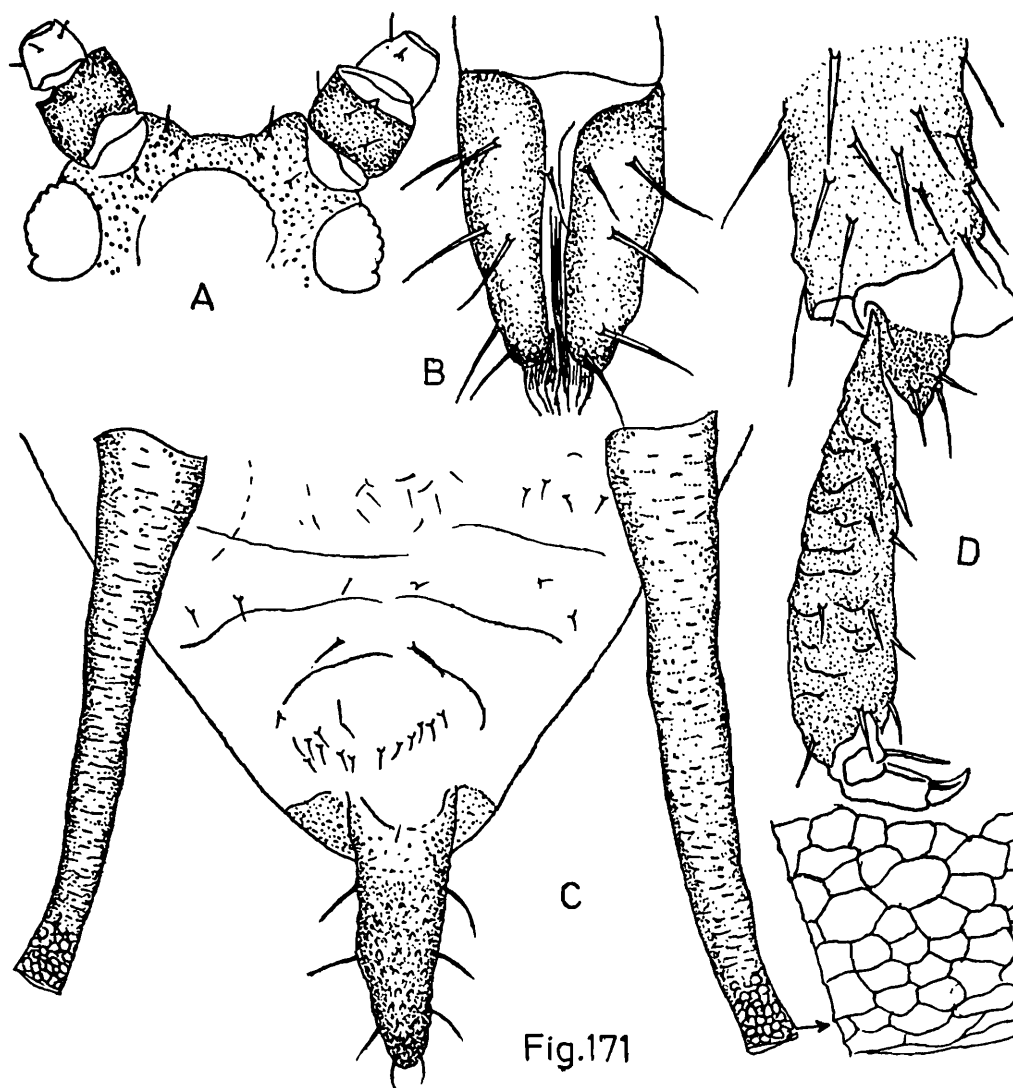
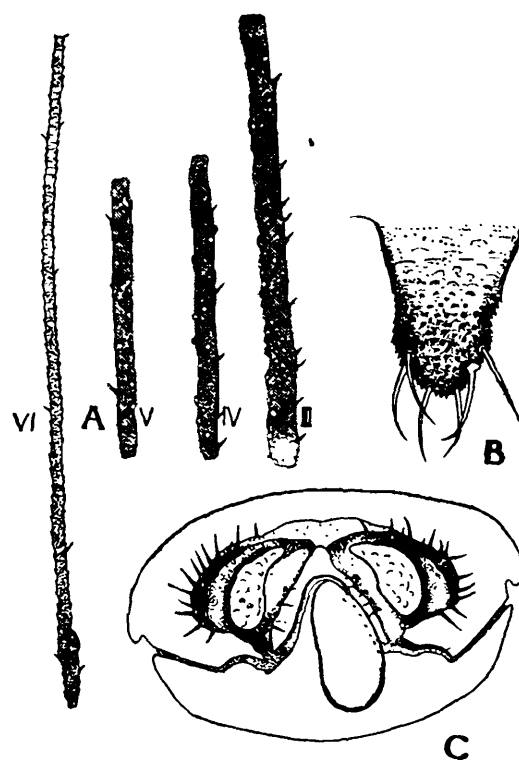
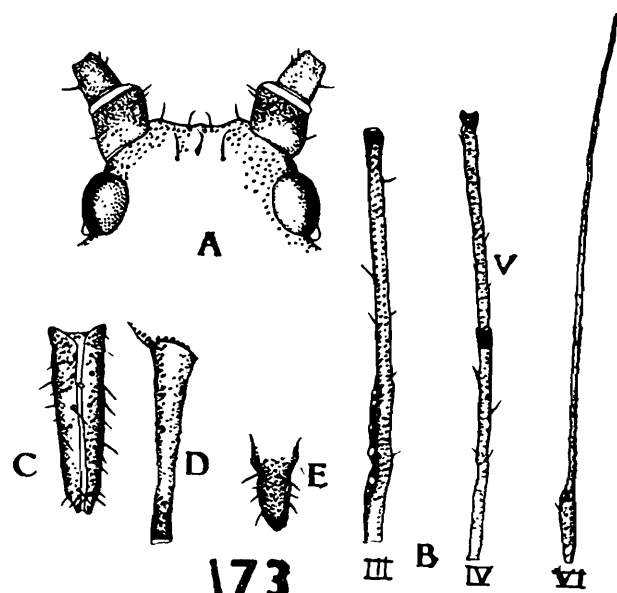


Fig.171

Fig. 171. *Macrosiphum (Sitobion) bambusicola* sp. nov. : Aptera : A. Head, B. U.r.s., C, Posterior part of abdomen, D. Hind tarsi with a portion of tibia



172



173

Fig. 172. *Macrosiphum (Sitobion) miscanthi* (Takahashi) : Alate male :
A. Antennal segments III-VI, B. Cauda, C. Male genitalia

Fig. 173. *Nasonovia (Neokakimia) rostrata* David and Hameed : Apterous : A. Head,
B. A. s. III-VI, C. U.r.s., D. Siphunculus, E. Cauda

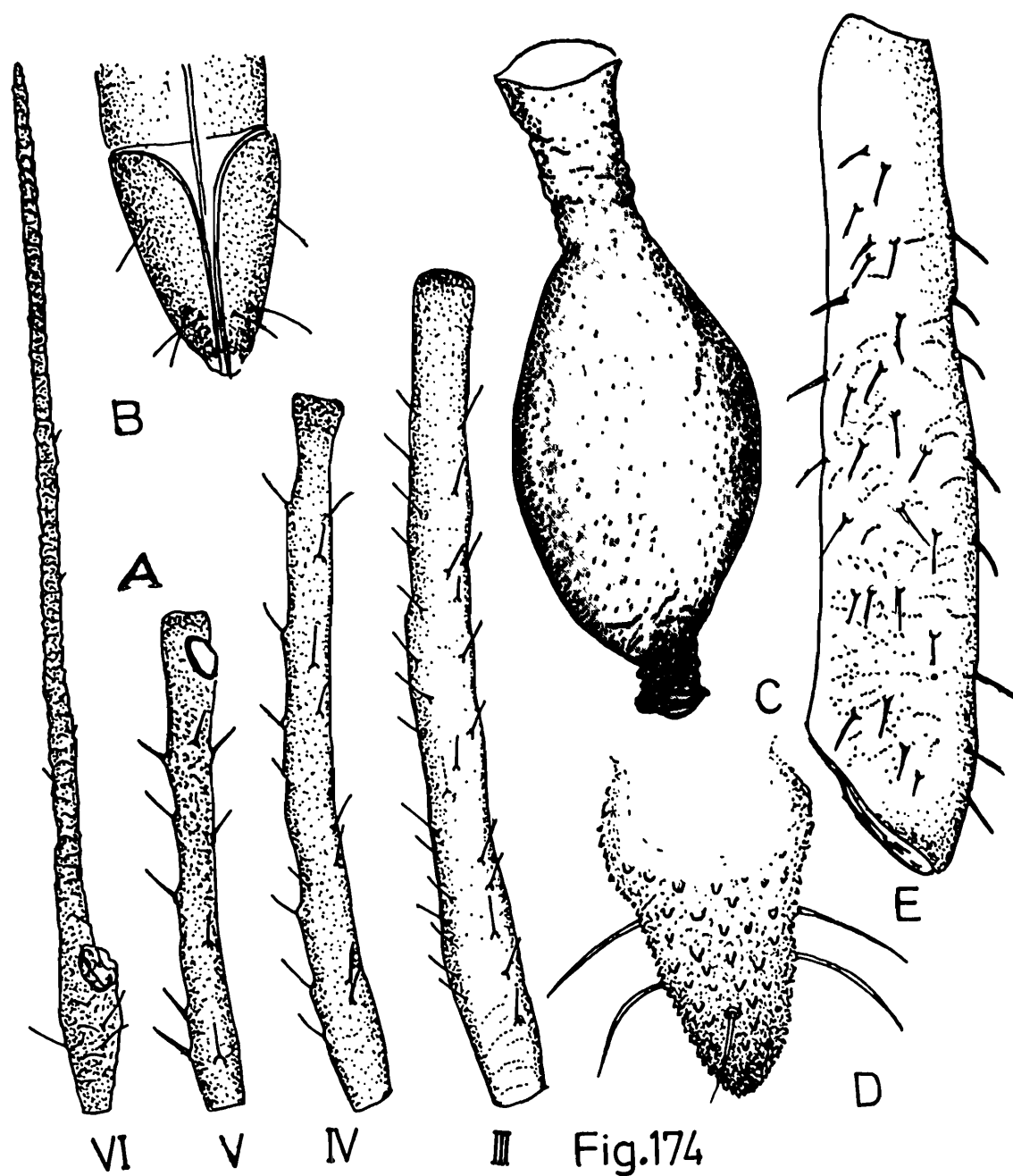


Fig. 174. *Rhopalosiphoninus indicus* sp. nov. : Aptera : A. Antennal segments III-VI, B. U.r.s., C. Siphunculus, D. Cauda, E. Femora of foreleg

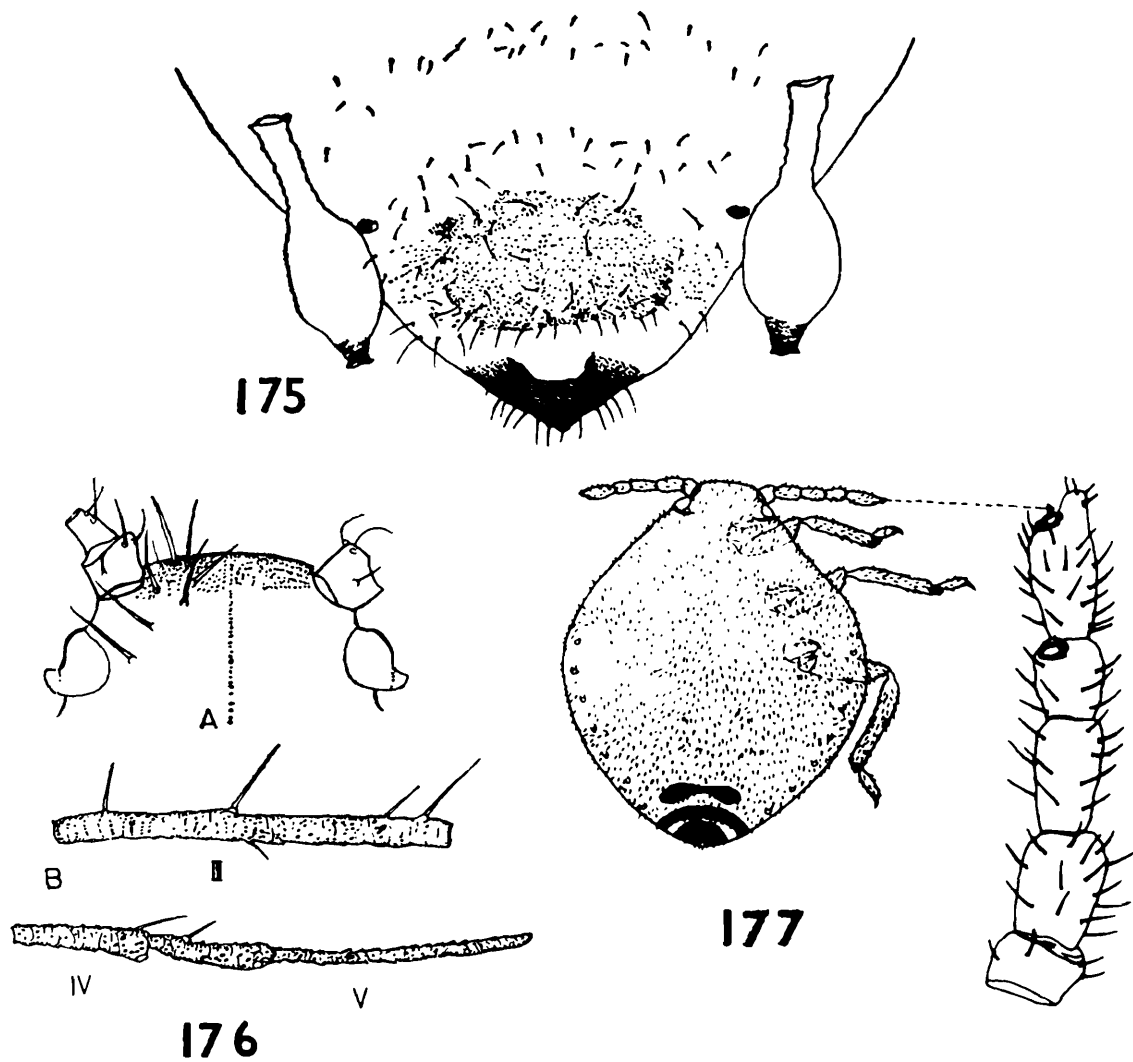


Fig. 175. *Rhopalosiphoninus latysiphon* (Davidson) : Aptera : Posterior part of abdomen

Fig. 176. *Sipha (Rungsia) maydis* (Passerini) : Aptera : A. Head, B. Antennal segments III-V

Fig. 177. *Smynthuroides betae* Westwood : Aptera : General view : The antenna magnified

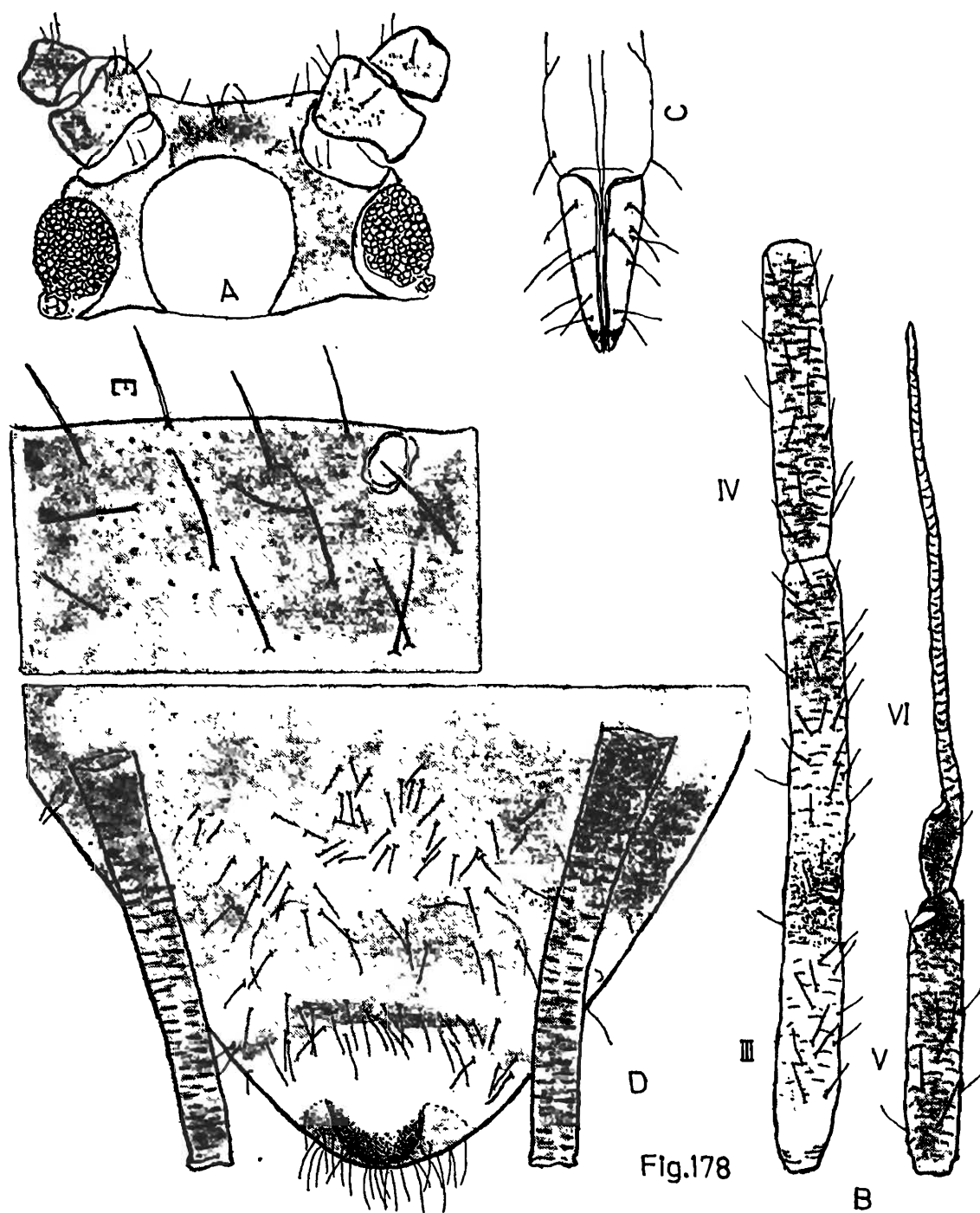


Fig. 178. *Spinaphis multisetosa* gen. et sp. nov. : Apteræ : A. Head, B. Antennal segments III-VI, C. Ultimate rostral segment, D. Posterior part of abdomen, E. Portion of posterior abdominal tergite

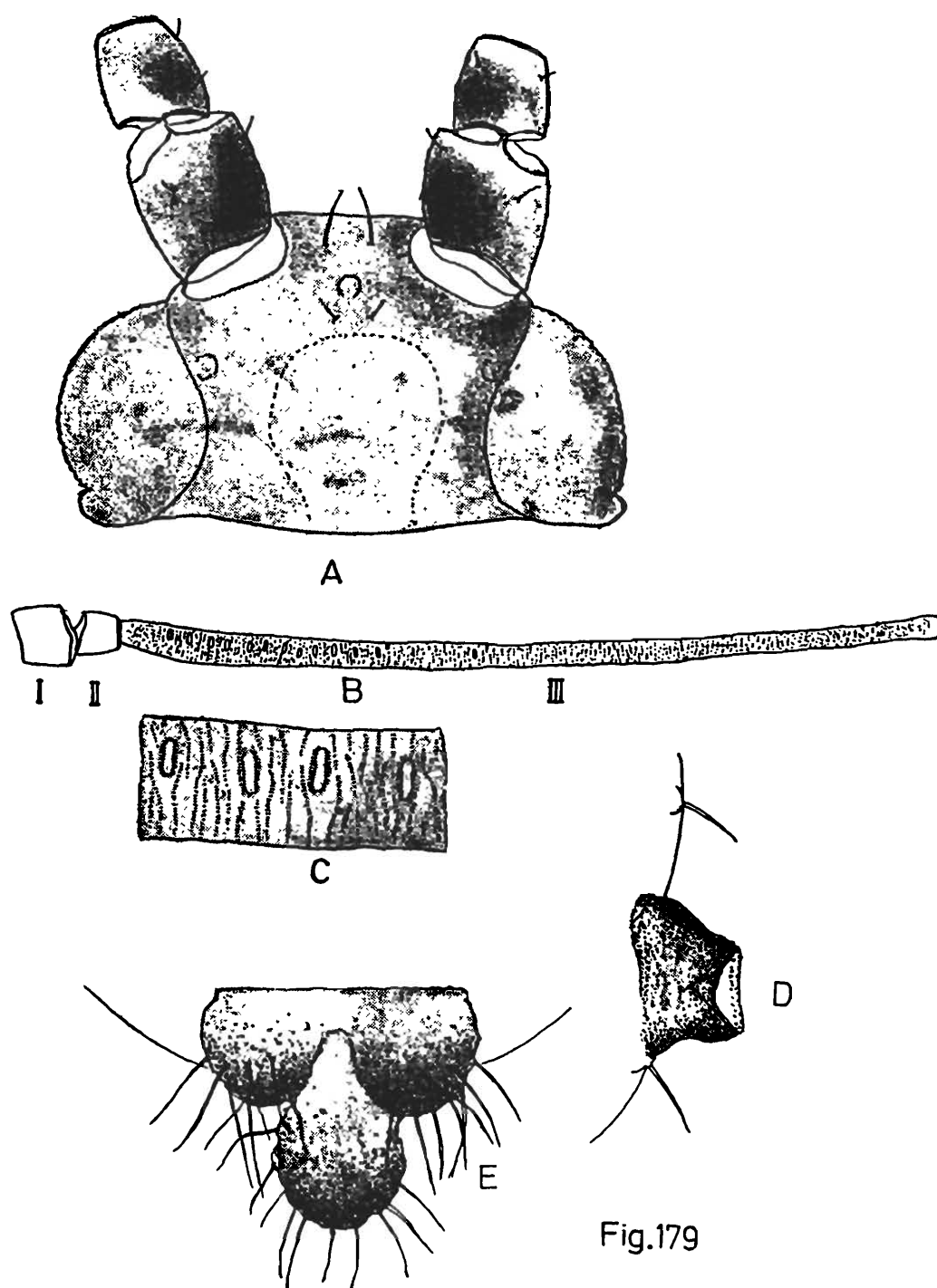
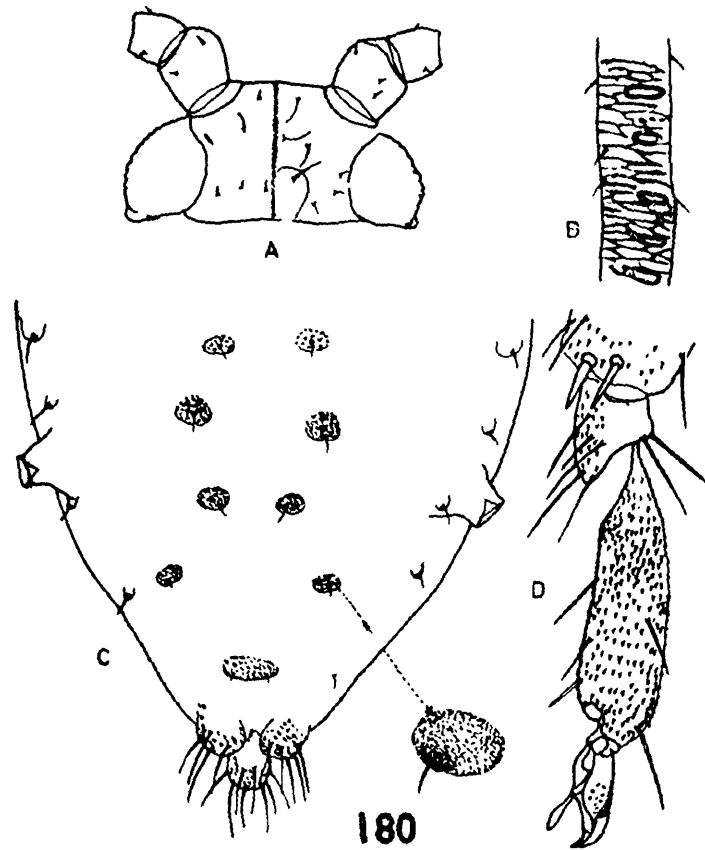
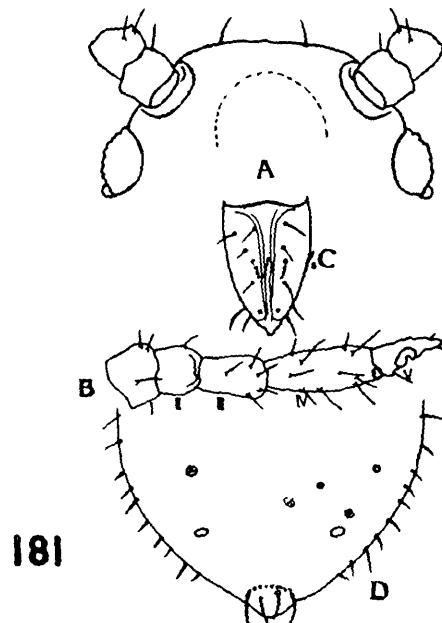


Fig.179

Fig. 179. *Takecallis affinis* sp. nov. : Alata : A. Head, B. Antennal segments I-III, C. Part of a. s. III showing secondary rhinaria, D. Siphunculus, E. Cauda with Subanal plate



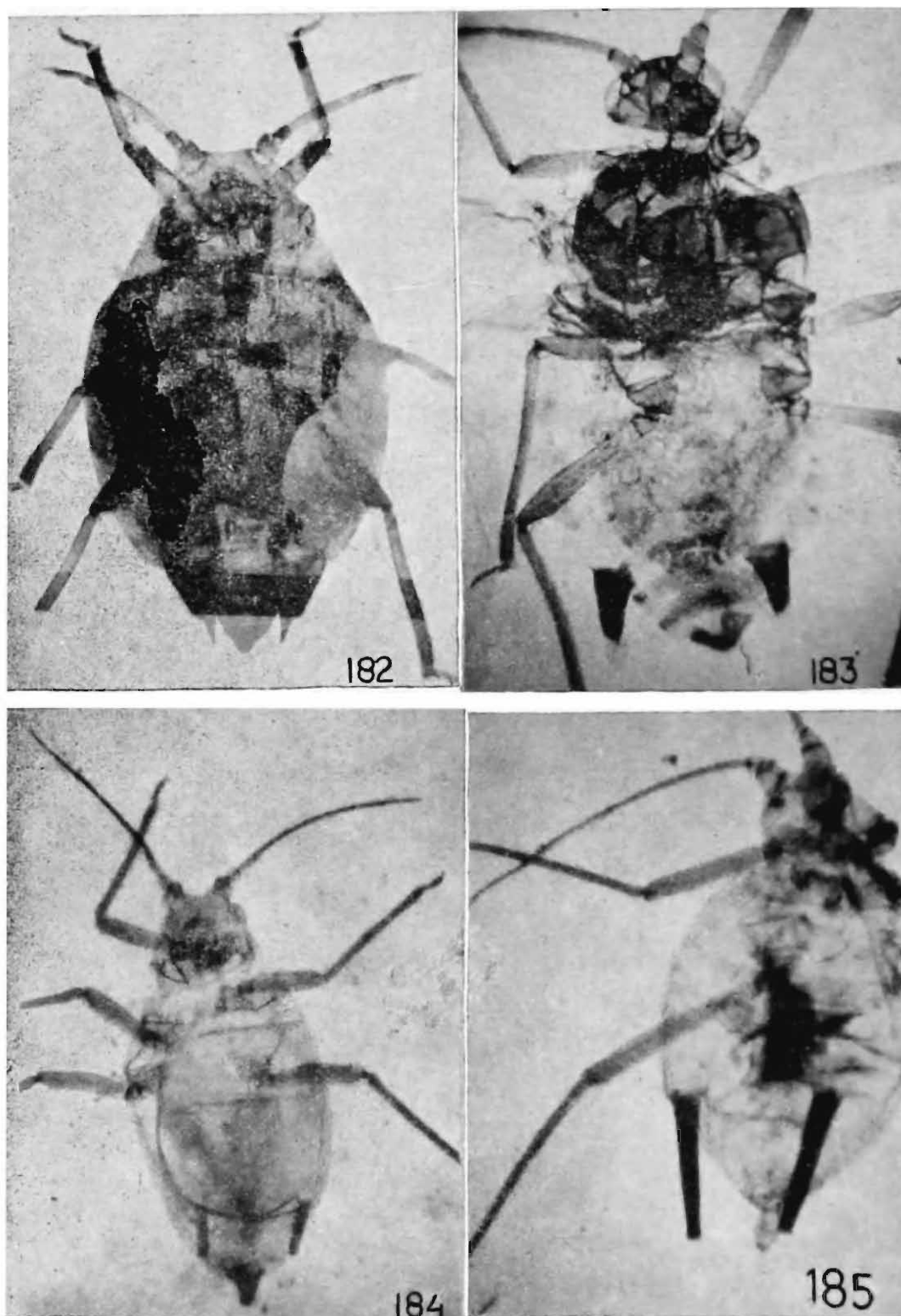
180



181

Fig. 180. *Takecallis arundinariae* (Essig) : Alata : A. Head, B. Part of a.s. III magnified, C. Posterior part of abdomen, D. Hind tarsi with portion of tibia

Fig. 181. *Tetraneura indica* sp. nov. : Aptera : A. Head, B. Antenna, C. U.r.s., D. Posterior part of abdomen



Microphotographs :—

- Fig. 182. *Acutosiphon obliquoris* Basu, Ghosh and Raychaudhuri : Apteræ
Fig. 183. *A. obliquoris* Basu *et al.* : Alata
Fig. 184. *Acyrtosiphon (Metopolophium) graminum* sp. nov. : Apteræ
Fig. 185. *A. (M.) ranunculum* sp. nov. : Apteræ

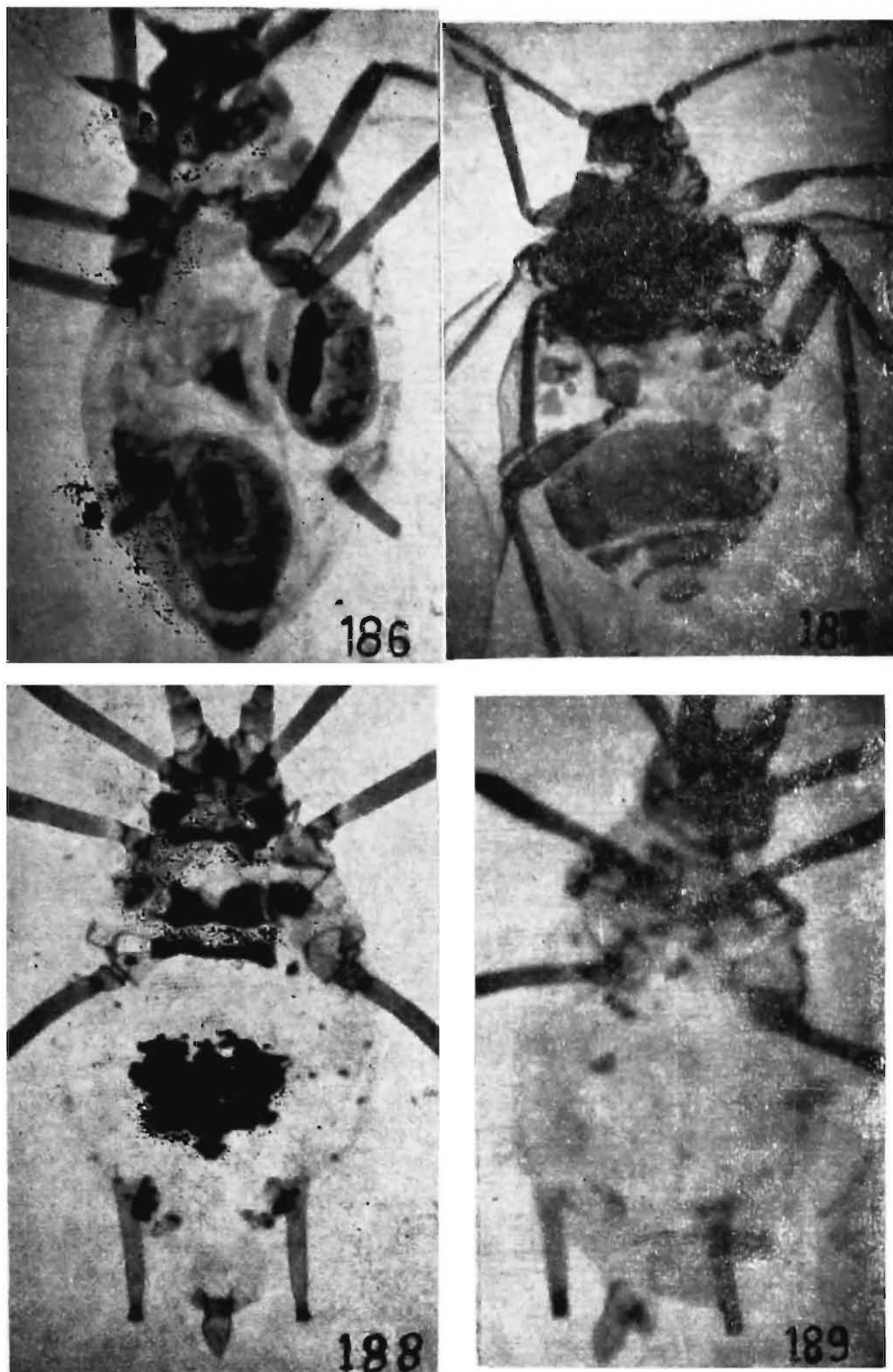


Fig. 186. *Amphicercidus tuberculatus* David, Narayanan and Rajasingh : Apterous ovipara

Fig. 187, *Anoecia corni* Fabricius : Alata

Fig. 188. *Aulacorthum sclerodorsi* Kumar and Burkhardt : Aptera

Fig. 189. *Aulacorthum spinacaudatus* Kumar and Burkhardt : Aptera

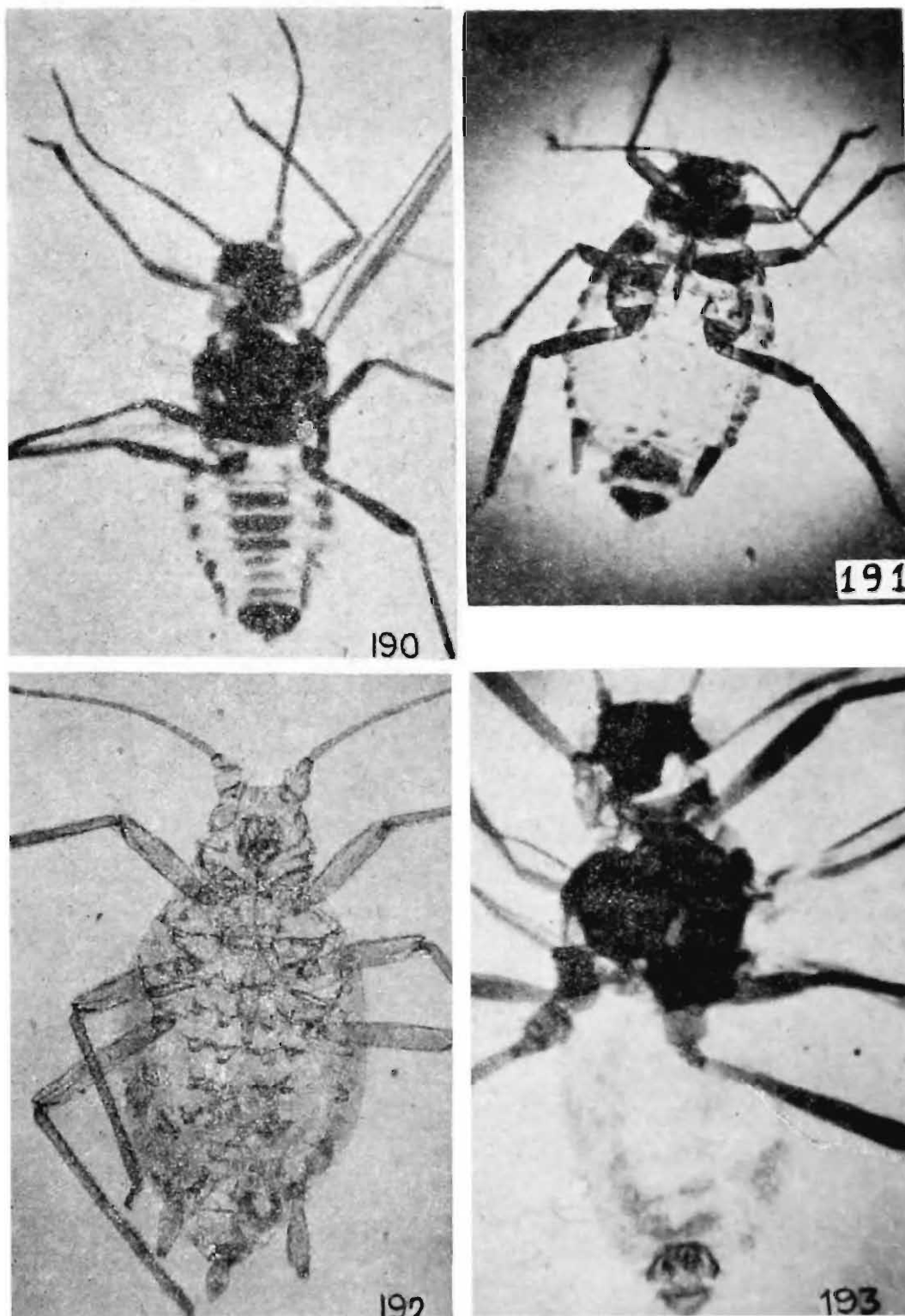


Fig. 190. *Cavariella aegopodii* (Scopoli) : Alate male

Fig. 191. *C. nigra* Basu : Apterous ovipara

Fig. 192. *Chaetomyzus rhododendri* Ghosh and Raychaudhuri : Aptera

Fig. 193. *Cinara confinis tenuipes* Chakrabarti and Ghosh : Alate male

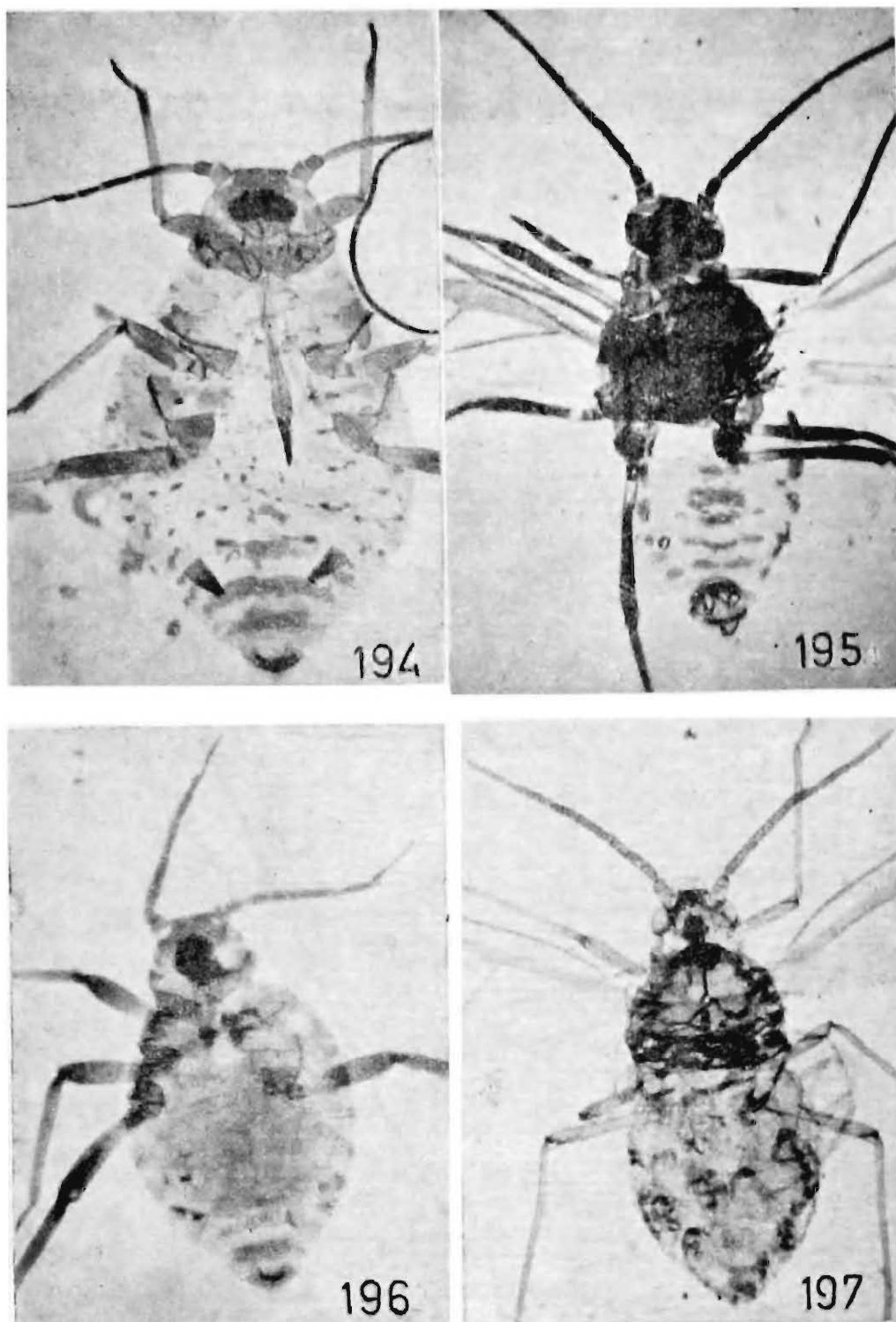


Fig. 194. *Dysaphis atinus* Ghosh, Basu and Raychaudhuri : Apter

Fig. 195. *D. ghanii* Stroyan : Alate male

Fig. 196. *D. stroyani* sp. nov. : Apter

Fig. 197. *Eriosoma lanigerum* (Hausmann) : Alata

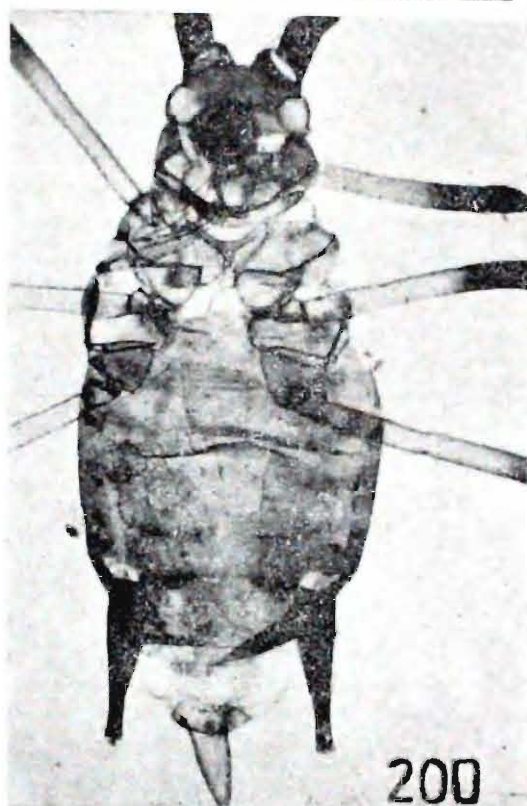
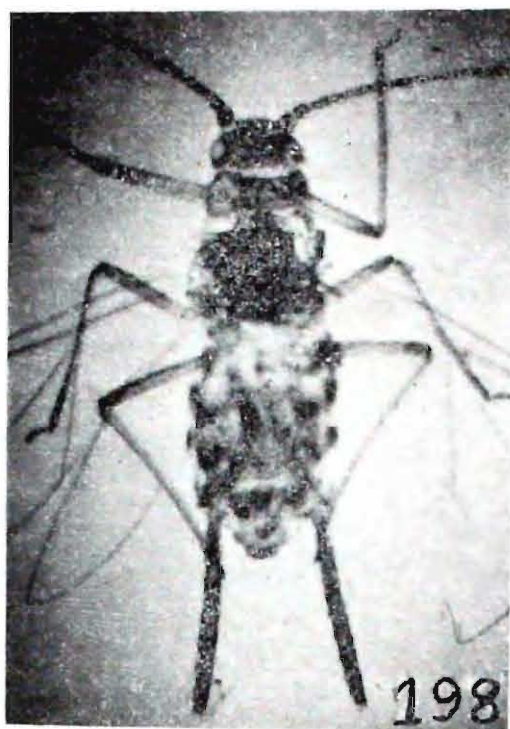


Fig. 198. *Eutrichosiphum* (*Neoparatrichosiphum*) *khasyanum* Ghosh and Raychaudhuri : Alata

Fig. 199. *Hyalomysus fragaricola* sp. nov. : Aptera

Fig. 200. *Impatientinum impatiensae dalhousiensis* Verma : Aptera

Fig. 201. *Indoctnara hottesis* Ghosh, Basu and Raychaudhuri : posterior part of abdomen

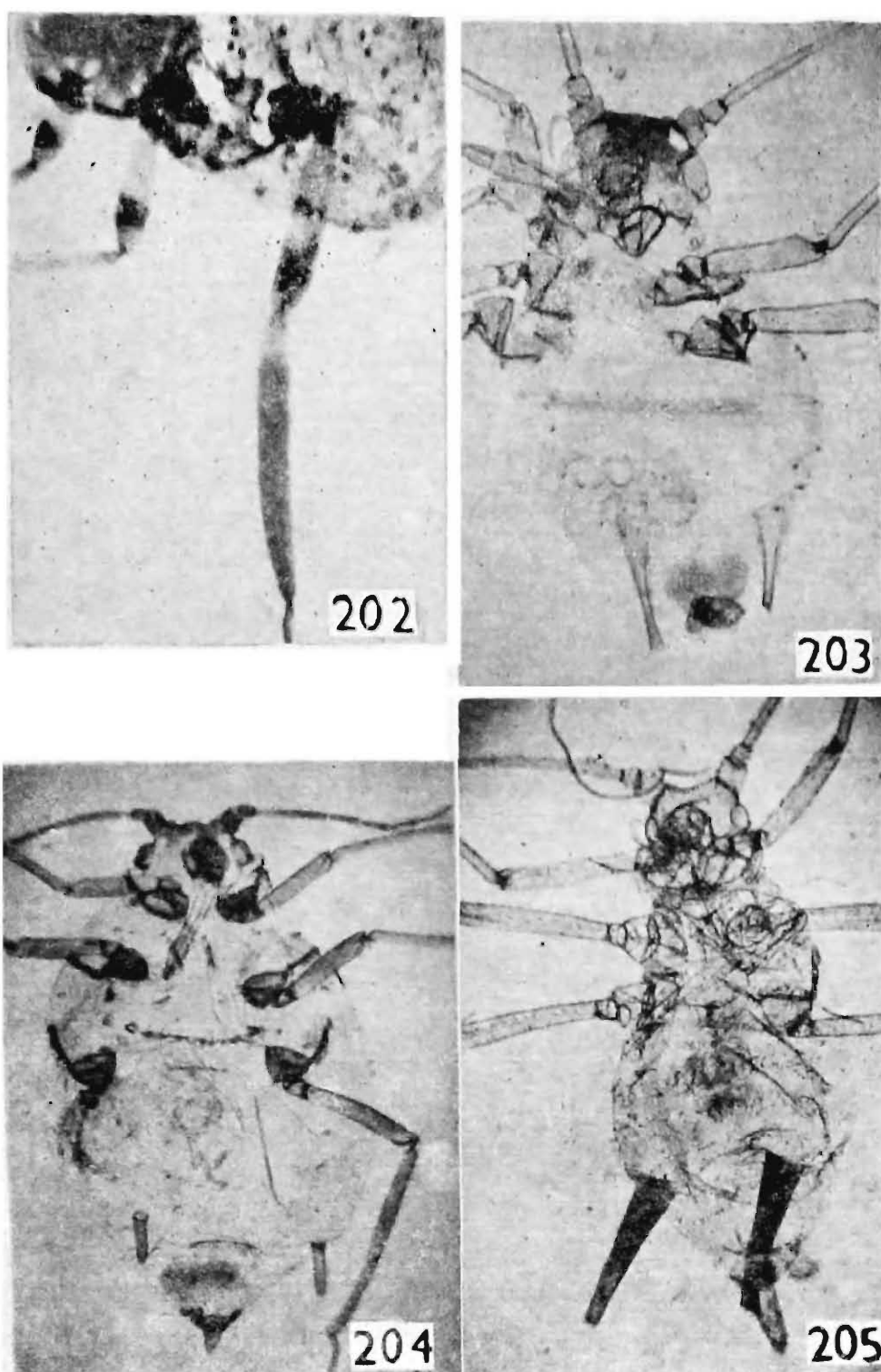


Fig. 202. *Indocinara hottesis* Ghosh *et al.* : Apterous ovipara : Hind tibia showing pseudosensoria

Fig. 203. *Jacksonia campanullata* Ohakrabarti : Aptera

Fig. 204. *Lipaphis erysimi* (Kalt.) : Apterous ovipara

Fig. 205. *Macrosiphum pachysiphon* Hille Ris Lambers : Aptera

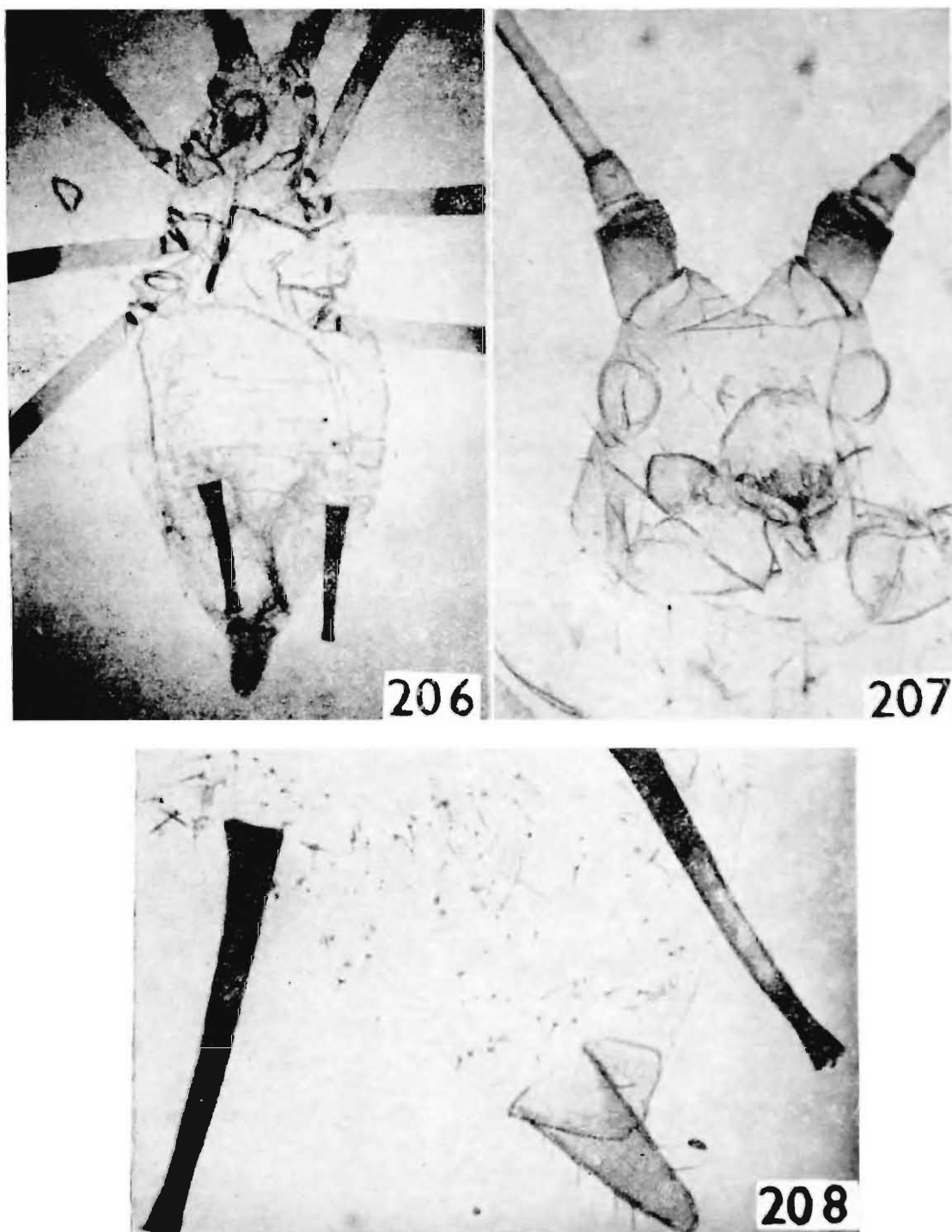


Fig. 206. *Macrosiphum pseudogeranii* Chakrabarti and Raychaudhuri : Aptera

Fig. 207. *M. pseudogeranii* Chakrabarti and Raychaudhuri : Head of aptera

Fig. 208. *M. pseudogeranii* Chakrabarti and Raychaudhuri : Aptera, posterior part of abdomen

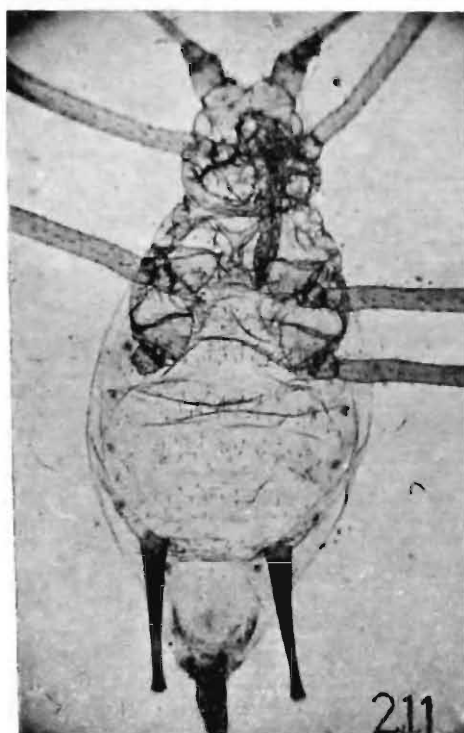


Fig. 209. *Macrosiphum (Sitobion) bambusicola* sp. nov. : Aptera, posterior part of abdomen

Fig. 210. *M. (S.) himalayensis* sp. nov. : Aptera, posterior part of abdomen

Fig. 211. *M. (S.) rosaeiformis* Das : Aptera

Fig. 212. *M. (S.) rosaeiformis* Das : Apterous ovipara

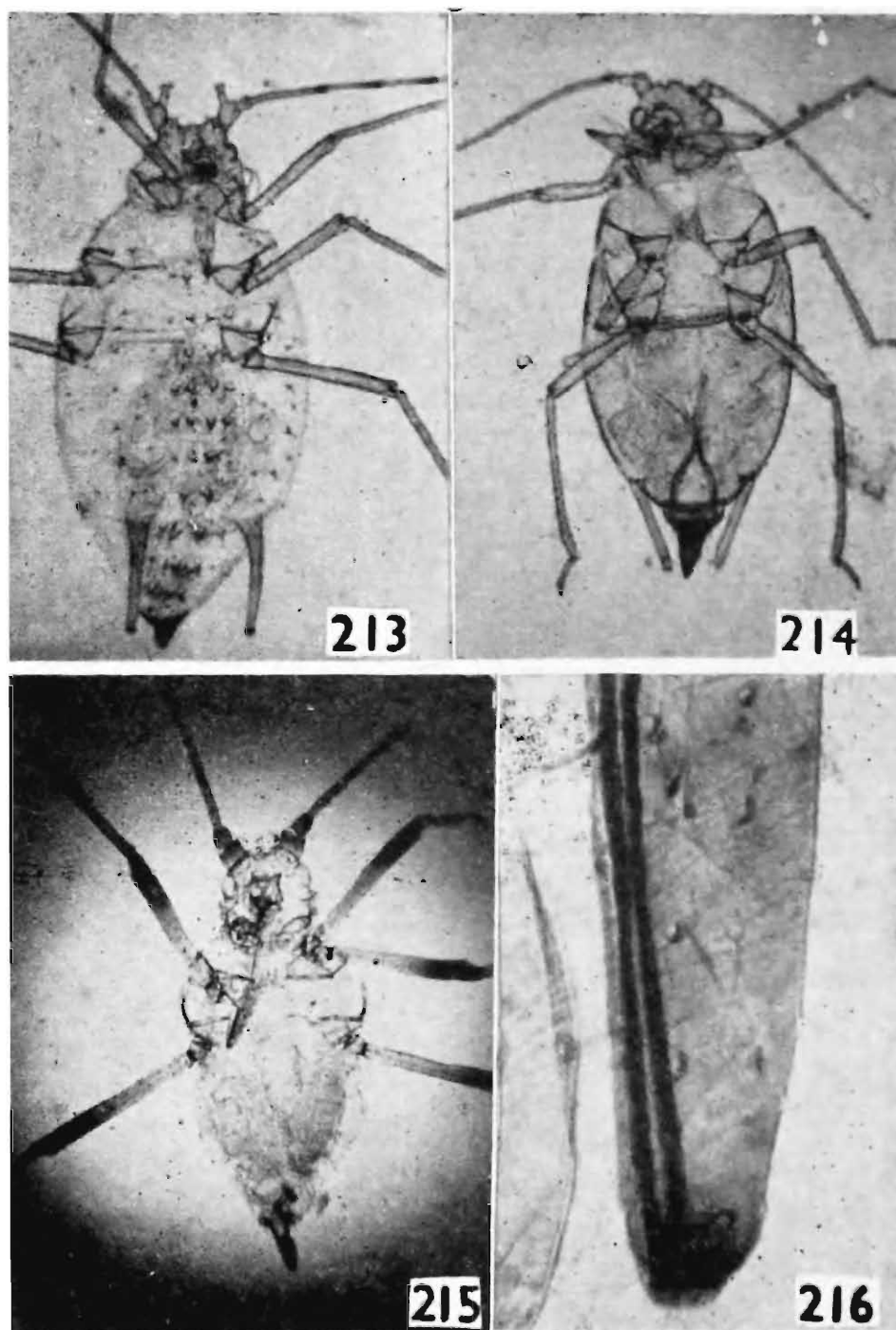


Fig. 213. *Matsumuraja capitophoroides* Hille Ris Lambers : Apter

Fig. 214. *Myzaphis rosarum* (Kaltenbach) : Apter

Fig. 215. *Nasonovia* (*Neokakimia*) *rostrata* David and Hameed : Apter

Fig. 216. *N. (N.) rostrata* David and Hameed : Apter, U.r.s. showing secondary hairs.

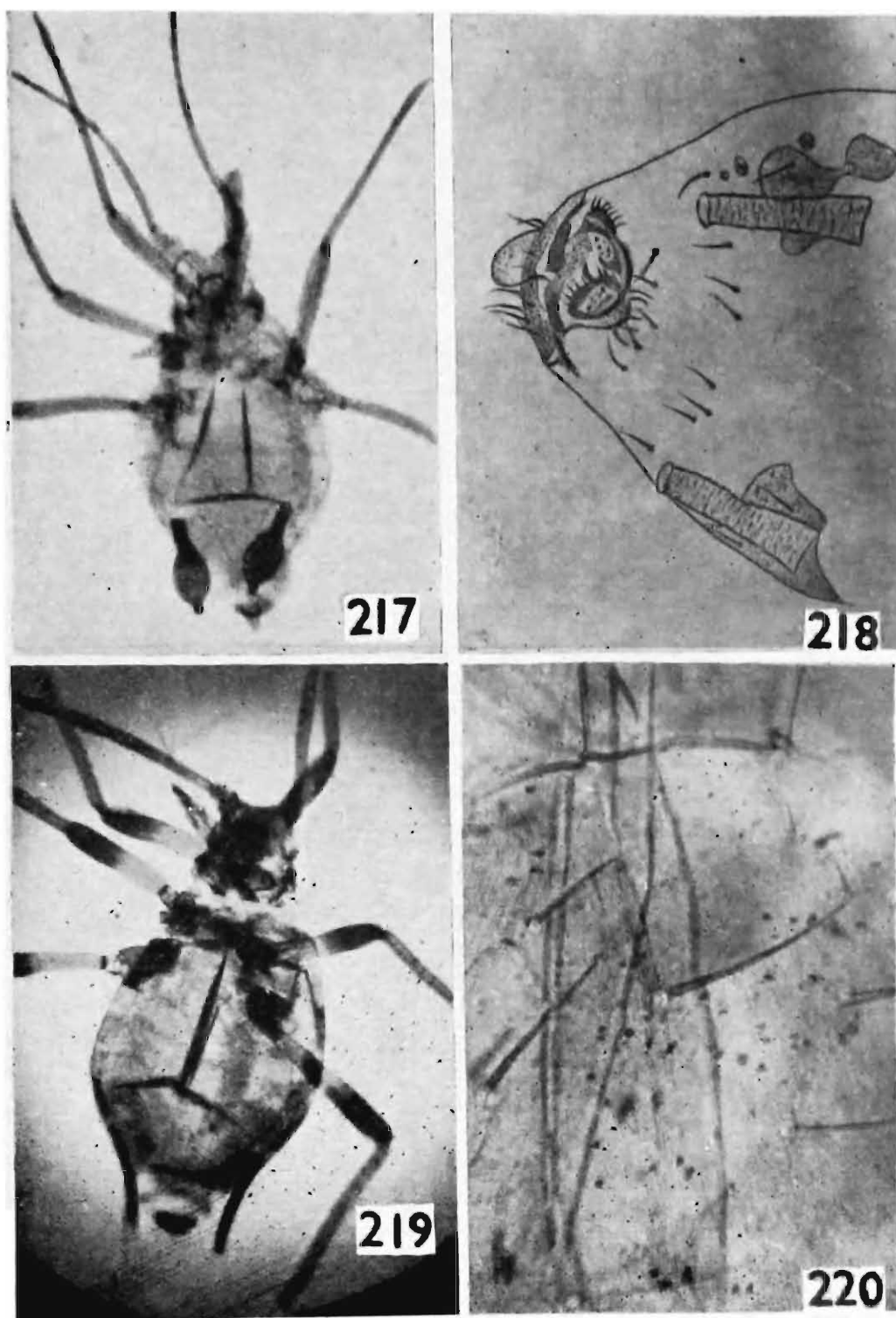


Fig. 217. *Rhopalosiphoninus indicus* sp. nov. : Apteræ

Fig. 218. *Rhopalosiphum ruflabdominalis* (Sasaki) : Male genitalia

Fig. 219. *Spinaphis multisetosa* gen. et sp. nov. : Apteræ

Fig. 220. *S. multisetosa* : Apteræ, portion of abdominal dorsum showing spinules

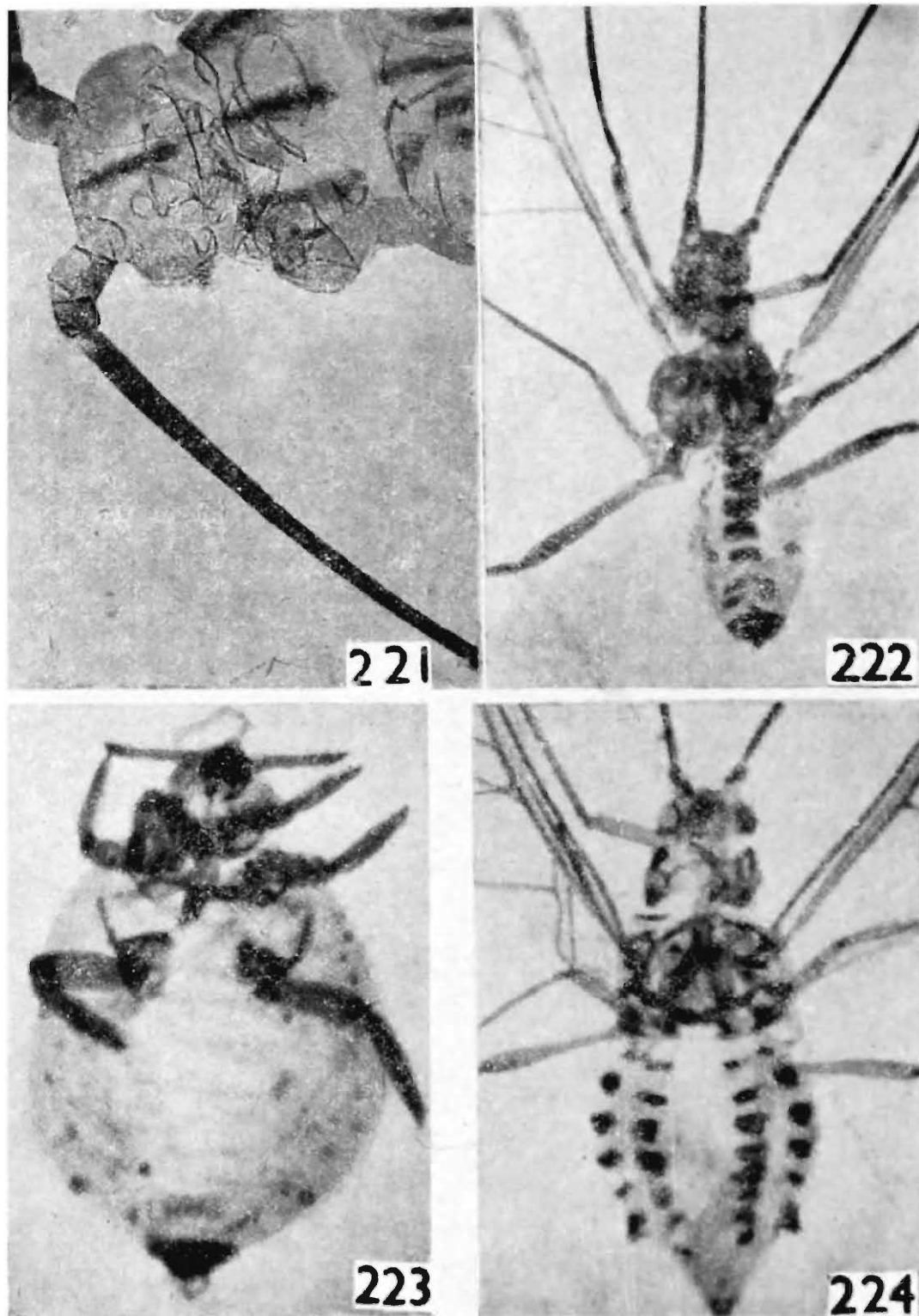


Fig. 221. *Takecallis arundinariae* (Essig) : Alata, head

Fig. 222. *Takecallis affinis* sp. nov. : Alate male

Fig. 223. *Tetraneura indica* sp. nov. : Aptera

Fig. 224. *Tinocalloides montanus* Basu : Alata

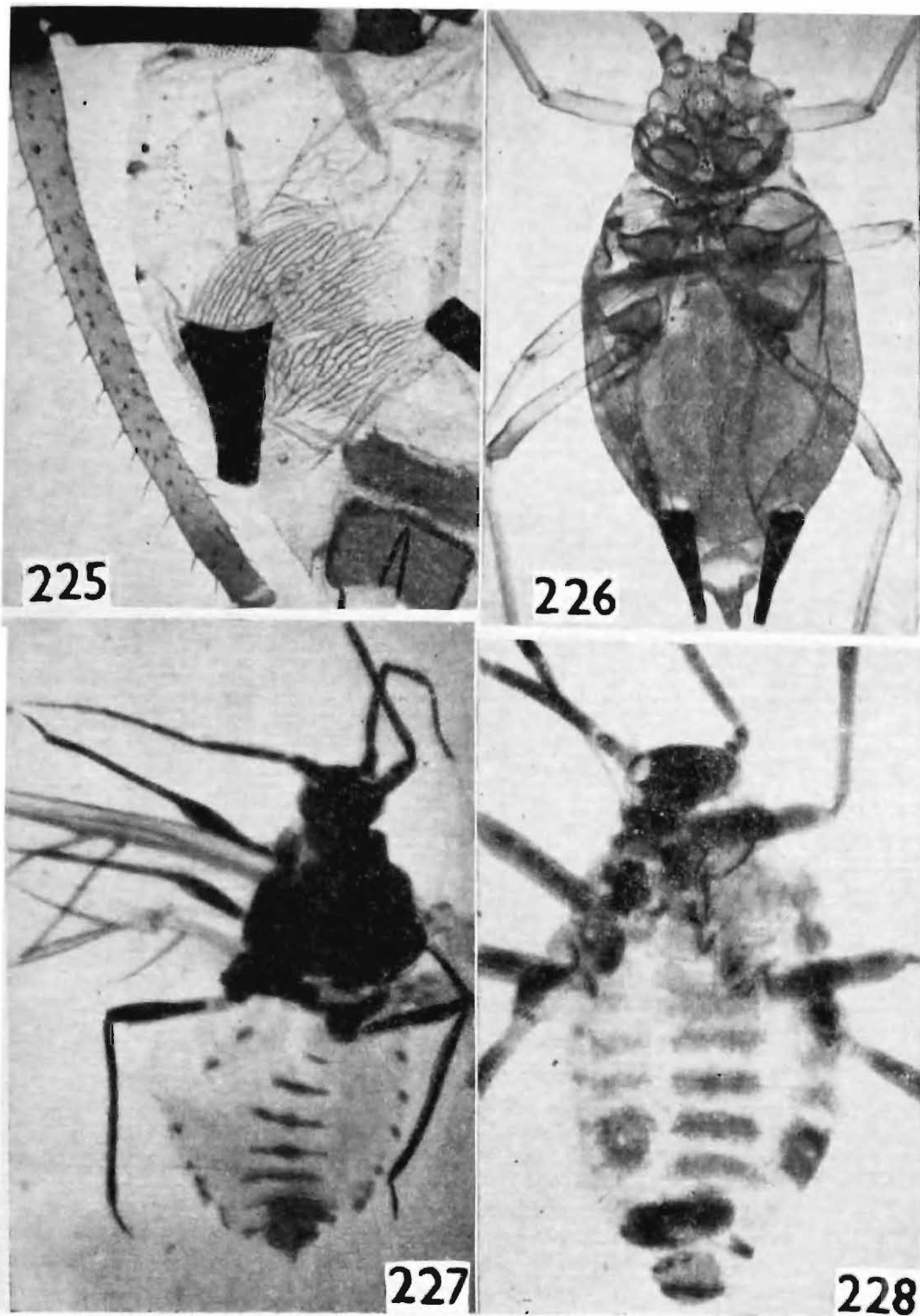


Fig. 225. *Toxoptera aurantii* (B.d.F.) : Apter, posterior part of abdomen.

Fig. 226. *Vesiculaphis verbasci* Chowdhuri, Basu, Chakraborti and Raychaudhuri :
Apter

Fig. 227. *Xenosiphonaphis folisacculatus* Kumar and Burkhardt : Alate

Fig. 228. *Protrama longitarsus sclerodensus* Kumar : Apter

ERRATA / ADDENDA

Page	Line	Read	Instead of
8	B12	aegopodii	aegopodi
13	T12	Passerini	Prasserini
15	B10	Eriosoma Leach	Eriosoma
17	T12	8 (7)	(7)
18	B18	dorsal	dosal
18	B11	placed	placad
19	T12	<i>Aiceona retipennis</i> David <i>et al.</i>	<i>Aiceona retipennis</i> David <i>et al.</i> 1972
19	B7	reaching	reeaching
22	B15	sclerites	sclerities
28	T9	oviparous	apterous
33	B1	inflorescence	inflorescence
34	B3	constricted	contricted
38	B1	males	maies
41	B9	a.s.IV.	a.s.III.
45	T9	88	85
49	T2	Acyrtosiphon	Atyrthosiphon
49	T6	(11,000 ft.)	(11,000)
52	B2	David, Narayanan and Rajasingh	David, Narayanan, Rajasingh
55	B1	present	preset
56	T24	as	rs
57	B9	portion of a.s. III	portion in apterae
58	T14	Kuwana	Kurana
67	T16	States	state
73	T11	Narayanan	warayanan
73	T14	—do—	—do—

T=from top B=from bottom

Page	Line	Read	Instead of
73	B8	Hairs	Haris
92	T6	campanullata	companullata
103	T6	1930	1360
105	T20	<i>Sitobion</i>	<i>Sitabion</i>
105	B11	<i>himalayensis</i>	<i>himalayaensis</i>
105	B7	ultimate rostral	ultimaterostrat
106	T6	(Takahashi)	Takahashi
109	B5	strobilanthi	stroblianthi
111	B5	<i>Myzaphis</i>	<i>Mysaphis</i>
111	B2	many	may
114	T11	scattered	acattered
115	B10	<i>parviflora</i>	<i>porviflora</i>
120	T2	incrassate	incrasate
135	T21	rhinaria	rhanaria
142	B15	knobbed	kbobbed
161	B1	(Chakrabarti and Ghosh)	Chakrabarti and Ghosh
171	T7	Narzikulov	Narzikow
171	B10	c 7,500 ft.	c 7,5000
178	B1	<i>populaeus</i>	<i>populncus</i>
179	T20	<i>populaeus</i>	<i>populneus</i>
185	T1	Pinaceae	Abiaceae
185	T7	Hippocastanaceae	Sapindaceae
185	T10	pieridis	peridis
185	T11	Simaroubaceae	Simarubaceae
185	T13	Simaroubaceae	Limarubaceae
185	T15	Simaroubaceae	Simarubaceae
185	B12	<i>rosea</i>	<i>rosaea</i>
186	T19	<i>nilagirica</i>	<i>vulgaris</i>
186	B6	Aspleniaceae	Filicinae
187	T5	<i>Impatiens</i>	<i>Balsum</i>
188	T1	<i>bitermata</i>	<i>wallichii</i>
188	T14	<i>Buddleja</i>	<i>Buddelia</i>

Page	Line	Read	Instead of
188	T16	<i>Buddleja</i>	<i>Buddelia</i>
188	T20	Buxaceae	Euphorbiaceae
188	B11	<i>Calamagrostis</i>	<i>Calamogrostris</i>
188	B2	Cannbidaceae	Moraceae
189	T6	<i>baccharoides</i>	<i>baccariodes</i>
189	T7	Metopolophium	Acyrtosiphon
189	T8	Pinaceae	Abiaceae
189	T16	Solanaceae	Rosaceae
190	T13	(Linnaeus)	Linnaeus
191	T11	Scrophulariaceae	Scrophulareaceae
191	B2	Dipsacaceae	Dipsaceae
192	T5	Onagraceae	Scrophulariaceae
192	T18	<i>tataricum</i>	<i>tartaricum</i>
192	B6	<i>Galinsoga</i>	<i>Galinsuga</i>
192	B2	<i>vernum</i>	<i>verbum</i>
193	T4	Geraniaceae	Gramineae
193	T6	Macrosiphum	Macrosiphus
194	T5	<i>amera</i>	<i>emera</i>
194	T11	<i>bicornuta</i>	<i>bicornata</i>
194	B13	<i>cuspidata</i>	<i>caspidata</i>
195	T5	<i>hastata</i>	<i>haustata</i>
196	T5	<i>wallichii</i>	<i>wallichi</i>
196	T11	<i>vulgare</i>	<i>vulgaris</i>
197	T1	<i>smithiana</i>	<i>sminthiana</i>
197	B17	<i>coetsa</i>	<i>coetza</i>
198	B4	<i>utilis</i>	<i>utilisa</i>
198	B2	<i>Prenanthes</i> <i>brunoniana</i>	<i>Prenanthes</i> <i>bruniana</i>
		(Compositae)	(Polypodiaceae)
199	T10	Brachycaudus <i>helichrysi</i> (Kaltenbach)	<i>Brachycaudus</i> <i>helichrysi</i> (Kaltenbach)
200	T1	<i>dealbata</i>	<i>dialbata</i>

Page	Line	Read	Instead of
211	T16	<i>Amphicercidus</i>	<i>A mphicercidus</i>
213	B16	aphids	aphides
227	T15	and	anp
229	T4	aegopodii	aegopodi
246	T1	(Hausmann)	(Hausmann) Mordvilko

Capitophorus himachali Chakrabarti and Maity [1980. Chakrabarti, S. and Maity, S. P. *Annl. zool.*, **35** (9) : 93-103 (93)] which was unfortunately omitted in the Text, is included in the area of study.

Page 106 : species No. 95. *Material examined* : 2 apterae, on Grass, Simla, 29. xii. 1972, coll. S. Chakrabarti.

Page 116 : species No. 108. *Material examined* : 3 apterae, on Grass, Simla, 12.v.1969, coll. K. Narayanan.

Page 182 : T8. 1969. *Chaitophorus hippophaes javanicus* Hille Ris Lambers is already included in the Text (*vide* p. 66).

Page 182 : T20. 1976. *Chaitophorus niger* Mordvilko is also included as *Chaitophorus salijaponicus niger* Mordvilko (*vide* p. 138).

The nomenclature of host plants dealt with in this contribution was kindly checked up by Dr. U. C. Bhattacharyya, Scientist-D, Botanical Survey of India, Howrah, to whom the author is highly grateful.
