ADDITIONS TO THE SURVEY OF THE ODONATE (DRAGONFLY) FAUNA OF WESTERN INDIA, WITH DESCRIPTIONS OF NINE NEW SPECIES.

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Introduction.

In these Records (Vol. XXVI, pp. 423-522; 1924), I published an account of the Odonate (Dragonfly) fauna of Western India, listing 80 genera and over 150 species. Since that date I have been able to renew my acquaintance with the magnificent stretch of mountains and plateaus which extends from the level of Bombay to Travancore, broken only by the Palghat Gap, a brief interval of some 40 miles at its widest part. A study of the fauna on the two sides of the Gap has served to show that narrow as it is, it is sufficient to divide the fauna into northern and southern groups. It will also be seen that the watershed of the Western Ghats again divides the fauna into eastern and western groups, especially in so far as the montane and submontane species are concerned. Experiments carried out with species of the *Indoneura* group served to show that montane species rapidly succumb when brought down to plain level, either due to the heightened atmospheric pressure or more probably due to the greatly increased temperatures. It was also noticed that individual species decreased in size and robustness according to altitude, the larger and more robust forms being taken at the higher altitudes, the smallest at sea-level. This again may be due to differences in the temperature of the water in which they breed or to a more restricted food-supply. As regards species taken in the plains, very little difference was noted in their distribution throughout the whole area, as they are able to work their way round the bases of the mountains or through gaps like that of Palghat. Montane species are more strictly confined, however, by the cold of the higher altitudes and the heat of the lower, that is they exist in a definite belt and are thus held up by breaks in the mountain chains. That some do manage to transgress across these barriers is probably due to cyclonic action, which tears them from their old habitats and bears them on the wings of the wind for vast distances. This is as true for the smaller as for the larger species.

Differences in size of individual species were more particularly noticed in the case of *Pseudophaea*, *Lamellogomphus*, and in species of the *Indoneura* group. The smallest of the latter group, *Indoneura risi*, is taken at or near sea-level in Malabar, whilst the larger species *Phylloneura westermanni* and *Esme mudiensis* are taken at 4,000 ft. or upwards. Of the former group, great differences in size were noticed in the case of *Indophaea dispar* and *Indophaea fraseri*, the former taken at low levels being equal in size to average of the latter, whilst specimens of *I. fraseri* taken at the higher altitudes were equal sometimes to the largest *I. dispar*. Specimens of *Lamellogomphus nilgiriensis*

taken in the Mudis Hills were markedly larger than those taken in the Nilgiris.

The following notes on known and new species were compiled during two years spent in Malabar and a subsequent period spent in Coimbatore district, which latter is conveniently situated at the mouth of the Palghat Gap and is thus within easy reach of both the northern and southern groups of mountains which go to make up the Western Ghats of India. During this time I was able to pay a flying visit to the Cochin forests and, due to the kindness of the then Diwan, was able to ascend the forest tram and cable line and thus penetrate the heart of these magnificent primeval jungles. I arrived at Kavalai on the same date as Dr. Gravely of the Zoological Survey did in 1914, and thus timed my arrival to coincide with the same day on which he discovered *Platysticta deccanensis* Laid., in that locality, and, although 14 years had elapsed, after only a few minutes search, I rediscovered that beautiful insect. This is the only locality in which the insect has been found and it affords an interesting example of for how long a period of time certain insects of this order will cling to one restricted habitat.

I was also able to spend a short holiday in the Annaimallai and Mudis Hills, where Mr. Davenport of the Toni Mudis estate kindly put me up. I collected over a great many streams in these hills, including a one-day visit to the Kallar Valley, but more particularly my activities were confined to two fine streams on the estate itself, one of which again afforded evidence of the restricted character of the habitats of Odonata. This stream starts life in a deep gully, the head of which is littered with rocks and fallen trees. On these were many specimens of *L. nilgiriensis* and a few *Acrogomphus fraseri*. A hundred yards down stream these were replaced by numbers of *G. nilgiricus* Laid., resting in the bed of the stream, whilst on the rocky sides of the ravine a few Protostictas were taken. Quite a short distance below this, the stream widened abruptly to flow between open hill-sides clad only with tea, and here the fauna changed abruptly to species of *Orthetrum*, *Trithemis* and a few *Anax immaculifrons*. The river flowed in this open manner for not more than a quarter of a mile when it suddenly plunged into dense virgin jungle, from which point there was again a dramatic change in the character of the fauna. Here every twig was occupied by a specimen of *Indophaea fraseri* or *I. cardinalis*, the latter in countless numbers. The banks of the stream here rose steeply and lurking amidst the maidenhair fern, which clothed them densely, were numerous specimens of *Vestalis* and *Esme*. Here also was found a spring on the hillside which was not more than a seepage, over which quite a number of *Heliogomphus promelas* and *Protosticta hearseyi* were taken. These two were entirely confined to a small space occupying less than a quarter of an acre, and I never once came across them in any other locality of the hills south of the Palghat Gap, save Travancore.

Still further downstream, the character of the river changed, here entering dense cane brakes (wate), which in places completely arched over the water. This part was peopled by *Gomphidia kodaguensis*, *Burmagomphus laidlawi* and a few *Neurobasis* only. Thus in a short

stretch of river, not exceeding half a mile, were four definite fannal areas corresponding to geographical changes in the character of the stream and affording most striking evidence of the restricted habitats of dragonflies.

More recently I paid a visit to Travancore, making my headquarters at Munnar, 4,500 ft., which being only eight miles from the divide, separating the eastern from the western slopes of the High Range Mountains, was conveniently situated to study the fauna on the two aspects. Most of the collecting here was done on the new Ghat road which runs into Cochin, and on the upper slopes of the Eastern Ghat as well as around Munnar itself. This expedition yielded 36 species only, but of course did not include the common plain species which would certainly be found along the coastal borders of Cochin and Travancore. *Chlorogomphus xanthoptera*, so far represented by a single female specimen in the British Museum, was rediscovered here and the male was discovered. No further Platystictas were discovered so that *P. deccanensis* still remains the sole representative of that genus in India. A remarkable new *Protosticta*, which is the largest of the genus so far discovered, was found near Munnar. Apart from these, the fauna largely resembled that of the Annaimallais and Mudis Hills, which are of course a continuation of the High Range.

In addition to the above I was able thoroughly to explore the Pollachi Ghat, a formidable road with over forty hairpin bends which leads into the heart of the Annaimallais, but which from its rather dry character and paucity of streams yielded few species of Odonata. Lastly, a few excursions were taken into the Bolovumpatti valley which lies some twenty miles southwest of Coimbatore. This is the extreme or tail end of the northern range of the Western Ghats and the mountains form three sides of an immense circle which gives one the impression of an enormous crater, the fourth side of which has broken down and belched forth to create the raised plateau of Coimbatore. In this secluded valley, shut off by hills from Malabar on the west, the Nilgiris to the north, the Palghat Gap to the south and by the arid Coimbatore plateau to the east, an area inimical to dragonfly life, a singularly beautiful species of *Megalogomphus* has become isolated. Nowhere else in the well explored surrounding hills and valleys has this insect been met with, and, by the way it dominates the streams here, it must have occupied the valley for a period of time which can hardly be guessed at.

Revised list of Species.

Now that the greater part of the area has been surveyed, and large additions made to the fauna, it will be convenient to recapitulate and, at the same time, give some indication of the individual distribution of the species. This latter in the following list is indicated by the following letters :—

A. Annaimallai and Mudis Hills.
B. Bolovumpattis, Coimbatore District.
C. Cochin.
CG. Coorg.
D. Deccan.
K. South Kanara.
M. Malabar.
N. Nilgiri Hills.
P. Palni Hills.
T. Travancore.

1. *Tetrathemis platyptera* Selys. A, B, C, CG, K, M, N.
2. *Hylaeothemis fruhstorferi fruhstorferi* (Karsch). A, C, CG, M, N, T.
3. *Hylaeothemis fruhstorferi apicalis* Fras. CG.
4. *Amphithemis mariae* Laid. C, CG, M.
5. *Lathrecista asiatica asiatica* (Fabr.). CG, D, M, N.
6. *Cratilla calverti* Först. CG, K, M, N.
7. *Potamarcha obscura* (Karsch). A, C, CG, D, K, M, N.
8. *Orthetrum taeniolatum* (Schneid.). A, B, CG, D, K, M, N, P, T.
9. *Orthetrum chrysostigma luzonicum* (Brauer). A, CG, D, M, N, P, T.
10. *Orthetrum sabina* (Drury). A, B, C, CG, D, K, M, N, P.
11. *Orthetrum glaucum* (Brauer). A, CG, D, K, M, N, P, T.
12. *Orthetrum pruinosum neglectum* (Ramb.). A, B, C, CG, D, K, M, N, P, T.
13. *Orthetrum triangulare triangulare* (Selys). A, CG, D, K, M, N, P, T.
14. *Palpopleura sexmaculata* (Fabr.). A, C, CG, M, N, T.
15. *Brachydiplax sobrina* (Ramb.). CG, D, M, N.
16. *Acisoma panorpoides panorpoides* Ramb. C, CG, D, K, M, N.
17. *Diplacodes nebulosa* (Fabr.). CG, D, M, N.
18. *Diplacodes trivialis* (Ramb.). A, B, C, CG, D, K, M, N.
19. *Diplacodes lefebvrei* (Ramb.). CG.
20. *Indothemis coesia* (Ramb.). CG, D, N.
21. *Indothemis limbata sita* Kirby. CG.
22. *Crocothemis servilia* (Drury). CG, D, K, M, N.
23. *Bradinopyga geminata* (Ramb.). CG, D, M, N, B.
24. *Neurothemis tullia tullia* (Drury). CG, D, M, N.
25. *Neurothemis intermedia intermedia* (Ramb.). A, CG, D, K, M, N.
26. *Neurothemis fulvia* (Drury). A, C, CG, D, K, M, N, T.
27. *Brachythemis contaminata* (Fabr.). C, CG, D, K, M, N.
28. *Rhodothemis rufa* (Ramb.). CG, D, M, N.
29. *Sympetrum fonscolombei* (Fons.). A, K, N, P, T.
30. *Trithemis aurora* (Burm.). A, B, C, CG, D, K, M, N.
31. *Trithemis festiva* (Fabr.). A, B, C, CG, D, K, M, N, P, T.
32. *Trithemis kirbyi kirbyi* (Kirb.). D.
33. *Zygonyx torrida isis* Fras. CG.
34. *Zygonyx iris malabarica* Fras. A, CG, N, T.
35. *Zygonyx iris metallica*, sub sp. nov. M.
36. *Onychothemis testacea ceylanica* Ris. A, B, CG, K, M, N.
37. *Zyxomma petiolatum* (Ramb.). D, CG.
38. *Tholymis tillarga* (Fabr.). B, C, CG, D, K, M, N.
39. *Pantala flavescens* (Fabr.). B, C, CG, D, K, M, N, P.
40. *Rhyothemis variegata variegata* (Linn.). C, CG, D, M, N.
41. *Rhyothemis triangularis* Kirby. CG, M.
42. *Hydrobasileus croceus* (Brauer). CG, D.
43. *Tramea basilaris burmeisteri* (Burm.). B, CG, D, K, M, N.
44. *Tramea limbata* (Desj.). B, C, CG, D, K, M, N.
45. *Urothemis signata signata* (Burm.). C, CG, D, K, M.
46. *Aethriamanta brevipennis brevipennis* (Ramb.). CG, M.
47. *Hemicordulia asiatica* Selys. CG, A, N.
48. *Azuma cyanocephala* (Selys). D, CG, C, N.

49. *Azuma frontalis* Selys. M.
50. *Macromia cingulata* Ramb. D, CG, K, M.
51. *Macromia flavicincta* Selys. D.
52. *Macromia indica* Fras. N, CG.
53. *Macromia annaimallaiensis*, sp. nov. A, Mudis.
54. *Macromia irata* Fras. CG, M, K.
55. *Macromia binocellata* Fras. P.
56. *Macromia ida* Fras. CG.
57. *Macromia ellisoni* Fras. CG, N, K.
58. *Macromia bellicosa* Fras. CG.
59. *Macromia miniata* Fras. CG, M.
60. *Macromia* sp. Fras. CG.
61. *Macromidia donaldi* (Fras.). CG, K, M.
62. *Idionyx corona* Fras. M, and Mysore.
63. *Idionyx burliyarensis* Fras. A, CG, K, M, N, T.
64. *Idionyx nilgiriensis* (Fras.). N.
65. *Idionyx galeata* Fras. CG, K.
66. *Idionyx saffronata* Fras. A, CG, M, N, T.
67. *Idionyx nadganensis* Fras. N, CG.
68. *Idionyx travancorensis*, sp. nov. A, T.
69. *Idionyx minima*, sp. nov. T.
70. *Hemianax ephippiger* (Burm.). C, CG, D, K, M.
71. *Anax immaculifrons* Ramb. A, CG, D, K, M, N, P. T.
72. *Anax guttatus* (Burm.). CG, D, K, M, N.
73. *Anax parthenope parthenope* Selys. D.
74. *Anaciaeschna jaspidea* (Burm.). CG, N, T.
75. *Anaciaeschna martini* (Selys). CG, N, P.
76. *Gynacantha hyalina* Selys. A, CG, K, M, N, T.
77. *Gynacantha millardi* Fras. CG, D, K, N.
78. *Chlorogomphus xanthoptera* (Fras.). T.
79. *Chlorogomphus campioni* (Fras.). CG, K, M, N.
80. *Ictinus rapax* (Ramb.). B, C, CG, D, K, M, N.
81. *Gomphidia T-nigrum* Selys. D.
82. *Gomphidia kodaguensis* Fras. A, B, CG, M.
83. *Gomphidia fletcheri* Fras. CG.
84. *Macrogomphus annulatus* (Selys). D.
85. *Macrogomphus wynaadicus* Fras. N, CG, M.
86. *Davidioides martini* Fras. M.
87. *Heliogomphus promelas* (Selys). A, CG, M, N, T.
88. *Microgomphus torquatus torquatus* (Selys). D.
89. *Microgomphus torquatus souteri* Fras. CG, M, B.
90. *Cyclogomphus heterostylus* Selys. D.
91. *Cyclogomphus ypsilon* Selys. D.
92. *Cyclogomphus wilkinsi* Fras. CG.
93. *Burmagomphus pyramidalis* Laid. CG, M, D.
94. *Burmagomphus laidlawi* Fras. CG, K.
95. *Burmagomphus cauvericus* Fras. CG.
96. *Gomphus nilgiricus* Laid. A, CG, N, P.
97. *Lamellogomphus nilgiriensis* Fras. A, CG, M, N, T.
98. *Lamellogomphus acinaces* (Laid.). CG, K, M.

99. *Lamellogomphus malabaricus* Fras. M.
100. *Mesogomphus lineatus* (Selys.). B, CG, D, K, M, N.
101. *Onychogomphus striatus* Fras. N.
102. *Merogomphus longistigma* (Fras.). CG, M, N.
103. *Megalogomphus hannyngtoni* Fras. CG, M.
104. *Megalogomphus superbus*, sp. nov. B.
105. *Neurobasis chinensis* (Linn.). A, B, C, CG, D, K, M, N, P, T.
106. *Vestalis gracilis* (Ramb.). A, B, C, CG, D, K, M, N, T.
107. *Vestalis apicalis* Selys. A, B, CG, K, M, N, T.
108. *Indophaea dispar* (Ramb.). CG, M, N.
109. *Indophaea fraseri* (Laid.). A, CG, K, M, N.
110. *Indophaea cardinalis* (Fras.). A, P, T.
111. *Dysphaea ethela* Fras. CG, K, M.
112. *Rhinocypha bisignata* Selys. A, B, CG, C, K, M, N, T.
113. *Calocypha laidlawi* (Fras.). CG, K, M.
114. *Micromerus lineatus indica* Fras. B, CG, K, M, N, D.
115. *Lestes elata* Selys. C, CG, D, K, M, N.
116. *Lestes viridula* Ramb. CG, D.
117. *Lestes praemorsa praemorsa* Selys. CG, D, K, M, N.
118. *Lestes praemorsa dorothea* Fras. CG.
119. *Lestes patricia* Fras. CG.
120. *Lestes malabarica* Fras. M.
121. *Ceylonolestes davenporti* (Fras.). A, P, T.
122. *Ceylonolestes pulcherrima* (Fras.). CG.
123. *Onychargia atrocyana* Selys. CG.
124. *Ischnura aurora* (Brauer). B, C, CG, D, K, M, N.
125. *Ischnura senegalensis* (Ramb.). CG, D, M, N.
126. *Mortonagrion varralli* Fras. D, M.
127. *Agriocnemis pygmaea* (Ramb.). B, C, CG, D, K, M, N, T.
128. *Agriocnemis pieris* Laid. CG, K, M, N.
129. *Agriocnemis splendidissima* Laid. CG, K, C, M.
130. *Enallagma parvum* Selys. CG, D, N.
131. *Aciagrion pallidum* (Selys). D.
132. *Aciagrion hisopa* Selys. D, CG, N, T.
133. *Aciagrion occidentalis* Laid. B, CG, M, N.
134. *Ceriagrion coromandelianum* (Fabr.). B, C, CG, D, K, M, N.
135. *Ceriagrion rubiae* Laid. CG, K, M.
136. *Ceriagrion olivaceum* Laid. D.
136. *Ceriagrion aurantiacum* Fras. CG, N.
137. *Ceriagrion cerinorubellum* Selys. CG, K, M.
138. *Pseudagrion decorum* (Ramb.). C, CG, D, K, M. N.
139. *Pseudagrion microcephalum* (Ramb.). C, D, K, M.
140. *Pseudagrion rubriceps* Selys. B, CG, D, K, M, N.
141. *Pseudagrion hypermelas* Selys. D.
142. *Pseudagrion indicum* Fras. CG, M, N.
143. *Pseudagrion malabaricum* Fras. CG, M, N, P.
144. *Archibasis mimetes praeclarum* (Fras.). CG, M.
145. *Coenagrion dyeri* Fras. CG, D, M, N.
146. *Copera marginipes* (Ramb.). B, CG, D, M, N.
147. *Copera vittata deccanensis* Laid. CG, K, M, N.

148. *Protosticta gravelyi* Laid. K, C, CG, M, N.
149. *Protosticta sanguinostigma* Fras. CG, K, M, N.
150. *Protosticta hearseyi* Fras. A, N, T.
151. *Protosticta mortoni* Fras. CG, M.
152. *Protosticta davenporti* Fras. A, T.
153. *Protosticta antelopoides*, sp. nov. T.
154. *Platysticta deccanensis* Laid. C.
155. *Chloroneura quadrimaculata* (Ramb.). D, CG.
156. *Chloroneura apicalis* Fras. CG.
157. *Disparoneura tetrica* Laid. CG, K, M.
158. *Disparoneura souteri* Fras. CG, K, M.
159. *Disparoneura nigerrima* Laid. D.
160. *Caconeura verticalis annandalei* Fras. D, A, B, CG, K, M, N.
161. *Phylloneura westermanni* (Selys.). CG, M, N.
162. *Esme cyaneovittata* Fras. A, P, T.
163. *Esme mudiensis*, sp. nov. A, C, T.
164. *Esme longistyla*, sp. nov. K.
165. *Indoneura gomphoides* (Ramb.). N.
166. *Indoneura ramburi* Fras. CG, M, N.
167. *Indoneura risi*, sp. nov. M.
168. *Melanoneura bilineata* Fras. CG, M.
169. *Trithemis pallidinervis* (Kirby). B, CG, D, M, N.

In the above list, in addition to the introduction of several new species, some discrepancies will be noticed between it and the previous list published in Volume XXVI of these Records. The following notes will elucidate these :—

Indothemis limbata limbata Selys, given as from Coorg, has since been determined as *I. limbata sita* Kirby, formerly only known from Ceylon.

Zygonyx iris Selys, as found in the south of India, differs considerably from the type and has now been classed as a subspecies.

Zygonyx isis, sp. nov. is now determined as a subspecies of an African form under the name of *Z. torrida isis*.

Rhyothemis phyllis phyllis (Sulz) is not known from Western India; the forms I determined as belonging to this species are actually andromorph females of *R. variegata*.

Orogomphus xanthoptera and *O. campioni* have been transferred to the genus *Chlorogomphus* as the two genera are synonymous.

Ictinus rapax mordax and *Ictinus rapax praecox* are here suppressed as merely varieties of *I. rapax*.

Heliogomphus pruinans Fras. is synonymous with *H. promelas* (Selys).

Indogomphus longistigma Fras. has been removed to the genus *Merogomphus* Mart. Dr. Laidlaw has pointed out the similarity of its generic characters with the genotype of Martin's genus, an opinion with which I entirely agree.

Pseudophaea dispar and *P. fraseri* have since been removed by the author from *Pseudophaea* to a new genus *Indophaea*.

Rhinocypha laidlaw Fras. has also been given generic rank under the name of *Calocypha*.

Ceylanicolestes appears to be synonymous with Kennedy's *Ceylonolestes*. *C. gracilis birmanus* (Selys) has been given a new name (*C. davenporti*) as it does not appear to be conspecific with *L. birmanus* Selys as Dr. Ris thought.

Pseudagrion praeclarum, sp. nov. is now found to be a mere subspecies of an Australian form of *Archibasis* and is accordingly removed to that genus.

Protosticta stevensi Fras. A re-examination of the type of *P. gravelyi*, a teneral and poorly marked specimen in spirit, has convinced me that the two are conspecific, the latter having priority.

Protosticta cerinostigma Fras. This is probably not more than a variety of *P. sanguinostigma* and is therefore deleted from the list.

Caconeura canningi Fras. This is a Ceylon form and not found in Western India.

Although a few of the sexes of the species mentioned still remain to be discovered, the present list will probably be found to be almost exhaustive and it is highly improbable that many more species will come to light. The coastal areas of Cochin and Travancore and the whole of Tinnevelly yet remain to be surveyed but they are not likely to furnish us with more new material. As the number at present listed from Western India stands, it represents well over a third of the whole fauna of the Indian Empire.

Systematic.

Amphithemis mariae Laid.

A small colony of this interesting insect was found in a marsh at the foot of the Vayitri Ghat, S. Malabar. This makes the fourth colony so far discovered of this comparatively rare insect.

Orthetrum taeniolatum (Schneid.).

A common species in the Bolovumpatti valley, Coimbatore district, and not uncommon on the foothills of the Annaimallai Hills, east of the watershed during the dry season.

Zygonyx iris metallica, sub sp. nov.

Male. Abdomen 40 mm. Hindwing 44 mm.

Head.—Labium blackish brown, lateral lobes citron yellow; labrum, postclypeus and occiput dark brown, anteclypeus brownish yellow, the sides of face and lower border of frons in front narrowly citron yellow; frons and vesicle metallic purple; eyes dark brown above, yellowish below.

Prothorax blackish brown, the anterior lobe yellow along its free border and an obscure transverse spot of yellow on the middle lobe.

Thorax blue metallic on sides, dark bronzed blue on dorsum, marked with citron yellow as follows:—a lower vestigial antehumeral spot, the posterior half of metepimeron and a vestigial medial lateral stripe made up of two or three obscure spots.

Wings hyaline, apices clouded with warm brown; pterostigma black, covering 4 cells; discoidal cells traversed once or, in the hindwing, sometimes twice; anal loop with distal angle acute; nodal index, $\frac{11-15}{12-12} \mid \frac{16-10}{18-12}$; other features similar to *Z. iris iris*.

Abdomen velvety black marked with citron yellow as follows:—segment 1 unmarked; segment 2 with a large quadrate spot on each side; segment 3 with a broad stripe on each side tapering apicad, and the middorsal carina and jugal suture very finely yellow; segment 4 with a latero-basal triangular spot and the middorsal carina very finely for its whole length; segments 5 and 6 similar to 4 but the basolateral spots smaller and the middorsal carina yellow for only the basal half or third; segment 7 with a middorsal basal recognition mark longitudinally oval in shape, its basal end either separated from base of segment or just meeting it at a point; remaining segments unmarked.

Anal appendages black; superiors as long as segment 9, broad at base, then narrowing and again expanding near apex which ends in a needle-like point. Seen in profile, a row of fine teeth on the under surface near base and a robust broad subapical point below. Inferiors nearly as long as superiors, broad at base then tapering in the apical half and curling up to an acute point.

Distribution.—Appears to be confined to South Malabar, and is the sole representative of its genus on some of the ghats, especially on the Vayitri Ghat during April to June. It differs from *Z. iris malabarica* by its consistently small size, by the restricted yellow markings on the thorax, by the shape of the recognition mark which resembles that of the genotype, and by the acute angulation of the distal angle of the anal loop, bent to only a right angle in *Z. iris malabarica*. The nodal index is also higher in spite of its smaller size. From the genotype it differs by the much more restricted yellow markings, these being even broader in *Z. iris iris* than in *Z. iris malabarica*. Type will be deposited in the British Museum. Female unknown.

Onychothemis testacea ceylanica Ris.

A common species in the Bolovumpatti valley and moderately common in the Mudis and Annaimallai Hills from 1,500 to 3,000 ft. May.

Rhyothemis triangularis Kirby.

A few specimens of this beautiful insect were noticed over a small tank near Manjeri, South Malabar, but it is a rare and local insect outside of Coorg where it is well established.

Hemicordulia asiatica Selys.

It was interesting to discover this insect in the Mudis breeding in rivers, where it was quite common, several being seen at the same time. All other records have been from lakes, *viz.*, from the Khasia, Nilgiri and Palni Hills. In one particular river in the Mudis, there were many deep pools and it was apparently in these that the insect had established

itself. There are no large tanks or lakes in the hills south of the Palghat Gap save that at Kodaikanal, so that a riverine habitat has been forced upon the insect.

Azuma frontalis Selys.

A few males of this species, new to the fauna of Western India, were seen and taken in South Malabar during October and November. I succeeded in securing two males in my own compound at Calicut, but with difficulty as they always flew high and swiftly. Two others were taken in a forest clearing at the bottom of the Vayitri Ghat where they were hawking insects. No females were ever seen.

Macromia annaimallaiensis, sp. nov.

Male. Abdomen 58 mm. Hindwing 48 mm.

Head.—Labium reddish brown; labrum, clypeus and frons dark brown, the latter and vesicle with a slight purplish metallic reflex; occiput dark glossy brown; eyes dark bottle green during life, fading to brown in death.

Prothorax dark brown. Thorax dark warm mahoghany brown, the upper part of dorsum and middle portion of sides with a thin metallic blue reflex. The antealar sinus and a very narrow medio-lateral oblique stripe citron yellow, the latter crossing tergum between wings. Legs of great length, black; tibial keels extending for half the distal end of anterior tibiae, and the whole length of posterior pair.

Wings hyaline with the beginnings of a dark reddish brown fascia in the costal and median spaces; membrane white; nodal index.—$\frac{9-15}{12-10} \mid \frac{15-9}{10-11}$; 8 cells in the anal loop; 3 cross nervures in the hypertrigones of forewings, 2 in those of the hind. Pterostigma black, covering one and a half to two cells.

Abdomen black marked with citron yellow as follows.—segment 2 with a broad annule encircling its basal half but narrowly separated from the base of segment on dorsum; segment 3 with a narrow annule bordering the basal side of jugal suture and continued laterally as far as base of segment; segments 4 and 5 with small paired spots on dorsum basad the jugal sutures; segment 6 unmarked, whilst 7 has a broad basal annule covering one-third of segment and continued squarely for a slight distance on middorsum; remaining segments unmarked; all segments from 3 to 8 with paired yellow spots beneath. Segment 10 with a robust but obtuse dorsal spine.

Anal appendages blackish brown, of equal length, superiors with the apex acute and turned up and out, and with a small outer spine near its middle; inferiors turned slightly up at apex.

External hamules very long and narrow, the ends curled strongly.

Female. Abdomen 56 mm. Hindwing 51 mm.

Exactly similar to the male save for sexual differences, the abdomen shorter and stouter, the wings longer and warmly enfumed for the outer half of forewing and whole of hind; hypertrigones traversed three times in forewings, only once in the hind; 4 to 5 nervures in median space of forewings, 2 in the hind; anal loop with 13 cells; the dark

reddish brown rays in costal and median spaces much more extensive, extending nearly as far as the 1st antenodal nervure in forewings, and a little beyond that nervure in the hind; nodal index.— $\frac{8-16}{10-8}|\frac{14-9}{9-11}$; membrane white.

Abdomen with a pair of small dorsal spots on segment 6 in addition to those on the preceding segments, otherwise similar to the male. Anal appendages black, very short. Vulvar scales short, barely half the length of segment 8, triangular processes cleft to the base.

Distribution.—This new species, equal in size to the largest members of the genus, is easily distinguished by its combination of the characters of *M. ellisoni* and *M. indica*. The wings and genitalia compare very closely with those of the latter species, especially the brown rays in the costal and median spaces at the roots of the wings, and also the long attenuated hamules, whilst the body colouring, especially the abdominal markings, are exactly similar to those of *M. ellisoni*. Only a single pair of this fine insect was taken by the author in the Mudis Hills, during May, the female luckily being secured by a small coolie who was following behind with a spare net.

Macromia irata Fras.

This species was found to be very common in the Malabar Wynaad, especially near Vayitri, where nearly a score of specimens were secured in one hour towards the end of May. It is also not uncommon in parts of Kanara.

It is interesting to note here that not a single species of *Macromia* was found in Travancore, and the genus appears to become increasingly scarce south of the Palghat Gap, although extremely rich in species to the north of that barrier.

Genus Idionyx.

The recent discovery by the author of two new species of this genus now brings the total known species up to twenty. The males of *I. nadganiensis* and *I. nilgiriensis* yet remain to be discovered. Concerning the latter it is interesting to note that one of the new species from Travancore also has the end of the abdomen depressed and dilated, but it has no yellow markings on the abdomen as in *I. nilgiriensis*, an unique feature in the genus. Two species only have been found in Malabar and in the Annaimallai-Mudis group of Hills, but a great abundance of specimens belonging to four species was found in Travancore, the whole of which were entirely confined to the western side of the divide.

Idionyx minima, sp. nov.

(Fig. 1 *a*.)

Male. Abdomen 27 mm. Hindwing 30 mm.

Head.—Labium, labrum, clypeus and genae black; frons above and in front metallic prussian blue; vesicle metallic blue; occiput black; eyes emerald green during life.

Prothorax blackish brown; thorax metallic green changing below to metallic blue. No humeral stripe. A narrow citron yellow stripe traversing each side obliquely at the level of the spiracle and a similar coloured stripe on the lower border of metepimeron. Beneath brownish black encircled with yellow.

Wings hyaline, the bases very palely saffronated as far out as 2 cells distad the trigones; pterostigna black, covering from 1 to 1½ cells, twice as long as broad, unbraced; nodal index.—$\frac{7\text{-}12}{7\text{-}8}\,|\,\frac{13\text{-}6}{9\text{-}6}$; anal loop with 7 cells; membrane cinereous.

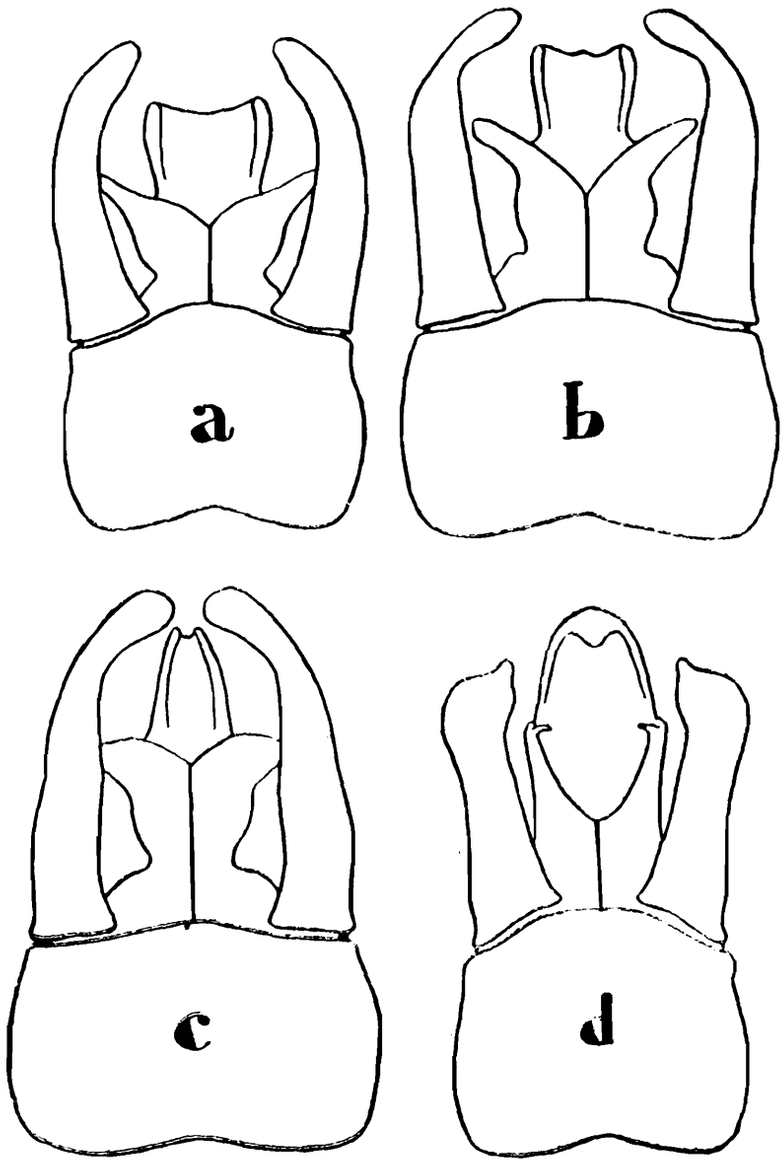

FIG. 1.—Dorsal view of anal appendages of the four species of the Genus *Idionyx* from Travancore.—

a. I. minima, sp. nov. *b. I. saffronata* Fras.
c. I. travancorensis, sp. nov. *d. I. burliyarensis* Fras.

(Camera lucida studies drawn to the same scale.)

Abdomen black, unmarked, the end segments expanding as far as segment 10 which is keeled on dorsum. Anal appendages black; superiors rather longer than segment 10, broad at base, gradually tapering as far as apex, rather less than the distal half curved in at an obtuse angle and also curved downward and ending in a short point, a row of minute teeth on the under surface of the basal two-thirds. Inferior

shorter than superiors, shaped like a bird's claw as seen in profile and trifid in character as seen from above, the middle segment blunt at end, hollowed out scoop-like and very shallowly concave; the lateral branches curving up and out and acute at apex. This appendage very similar to that of *I. galeata* but, as seen in profile, is far less strongly curved; it is still more like that of *I. saffronata* but has the apex more strongly curled up and the end less deeply concave, and broader.

Female. Abdomen 29-31 mm. Hindwing 30 mm.

Markings exactly similar to those of the male. Differs only in sexual characters and in the colouring of the wings, which are a deep golden amber tint at the base as far out as one or two cells distad the trigones; nodal index similar to the male. Legs in both sexes black, tibiae yellow on extensor surface. Vesicle simple, rounded and very slightly notched above.

Habitat.—Travancore. Several specimens of both sexes taken near Munnar, chiefly in or about the neighbourhood of streams in tea estates. Besides being the smallest species known of the genus, the jet black labium and labrum will at once distinguish it from all other species. The characters of the male relate it somewhat closely to *I. saffronata*, with which it was on several occasions taken in company. Type and co-type will be deposited in the British Museum collection.

Idionyx travancorensis, Sp. nov.

(Fig. 1 *c*.)

Male. Abdomen 32 mm. Hindwing 32 mm.

Head.—Labium blackish brown, paler laterally; labrum citron yellow broadly bordered with black; clypeus and genae black; frons in front and above metallic greenish blue; vesicle metallic violaceous blue; occiput black; eyes emerald green during life.

Prothorax blackish brown; thorax metallic green. No humeral stripe. A narrow oblique citron yellow stripe on each side at the level of the spiracle and another similar coloured stripe bordering the lower part of metepimeron. Beneath black, bordered with yellow and with a streak of paler yellow at its middle. Legs black, tibiae yellow on extensor surface.

Wings hyaline, very palely and uniformly tinted. Pterostigma black, covering 1½ cells, slightly more than twice as long as broad; membrane cinerous; anal loop with 7 to 8 cells; nodal index.—$\frac{7\text{-}12}{8\text{-}8} \mid \frac{12\text{-}7}{8\text{-}9}$; hypertrigones traversed once in forewings, entire in the hind.

Abdomen black, unmarked, save for the lower border of segment 2 and a narrow apical stripe on the same segment, yellow. Segment 10 keeled and with two rounded bosses on the dorsum.

Anal appendages black, superiors shaped similarly to those of *I. saffronata* and *I. minima* but the apex with its inner side turned abruptly down and looking like a spine in profile; the minute spines beneath arranged into two groups of 3 and 2 respectively. Inferior appendage differing markedly from the two preceding species as seen dorsally, the apex tapering to a blunt and rather deeply notched point, less than half the breadth of those of the two species mentioned. Viewed

laterally, however, this appendage is strikingly like that of *I. saffronata* and runs straight back, without the curve upwards at apex seen in *I. minima.*

Female. Abdomen 32-35 mm. Hindwing 34-35 mm.

Marked exactly similar to the male but differs by the colouration of the wings and shape of abdomen. Vesicle conical shaped, a blunt cone differing from the tapered structure found in *I. burliyarensis* and with its tip distinctly flattened. Abdomen expanding at segment 7 and tapering again from segment 9, so that the end is distinctly depressed and fusiform in shape, somewhat like that seen in *I. nilgiriensis.*

Wings a burnt brown throughout, this colour more or less limited to the venation so that the wing surface is prettily stippled; the bases saffronated as far out as the trigones, very deeply so in some specimens; other details of wings as for the male.

Habitat.—Travancore and the Annaimallai-Mudis Hills, during May and June at altitudes of 3,000-4,000 ft. A number of both sexes were taken flying low over the roads in the neighbourhood of mountain streams, usually in company with *I. saffronata.* The male is easily distinguished from all others by the shape of its inferior appendage, and the female by the distinctive character of the vesicle. Type and co-type will be deposited in the British Museum collection.

(I take this opportunity of noting here that fig. 3 of plate xxvi in Vol. XXVI of these Records refers to the anal appendages of *I. saffronata* and not to those of *I. nilgiriensis,* the male of which still remains unknown.)

Idionyx saffronata Fras.

(Fig. 1 *b.*)

Comparatively rare in the Mudis Hills but common in Travancore during May. Its occurrence here is noteworthy as being the first species of the genus so far taken south of the Palghat Gap, although six species have been found to the north, in the Western Ghats.

Macromidia donaldi (Fras.).

(= *Indomacromia donaldi* Fras.)

A comparatively common species on some of the rivers arising near the foot of the Ghats in South Malabar. Favourite streams are mere brooks closed in by jungle or overarching cane or scrub. To find the insect, one was compelled to get into the bed of the stream and work slowly up the leafy tunnels, to the roof of which the insect clung. When disturbed they flew in swift loops and circles and, owing to the prevailing gloom, were most difficult to follow and still more so to catch owing to the confined space. When settled, they could be caught however with the fingers, if approached cautiously. Quite occasionally specimens would be seen coming into and leaving the tunnels through windows in the jungly sides, this rather late in the afternoon, so that I suspect they are more or less crepuscular in habits and resort to the strange resting places mentioned only during the day.

Chlorogomphus campioni (Fras.).

(= *Orogomphus campioni* Fras.)

An exuviae of this species was found clinging to a rock in midstream on the Gudalur Ghat, Nilgiris, in May and the fact is of interest in that, during two years stay in those hills, I never once came across the species. A number of specimens were seen flying along the road during May and the end of April, at the top of the Vayitri Ghat, South Malabar, but only a single male was captured. Mr. C. A. Souter saw the species in great numbers on the slopes of Kudremukh, South Kanara, so that the distribution of this insect is not as restricted as at first thought.

Chlorogomphus xanthoptera (Fras.).

(Fig. 2 *a* and *b*.)

Male. Abdomen 55 mm. Hindwing 48 mm.

Head.—Labium pale brownish yellow; labrum blackish brown; anteclypeus pale greenish brown, yellow along its upper border; postclypeus greenish yellow, narrowly bordered below and traversed at its middle and again slightly lateral to the middle with dark brown; rest of head and face dark brown, but the frons above for about its anterior third greenish yellow; eyes bottle green during life; occiput and vesicle black, the former with a dense fringe of long coarse dark brown hairs.

Prothorax black, the anterior lobe bordered finely with yellowish green, and a spot of the same colour on the lower part of each side of the middle lobe.

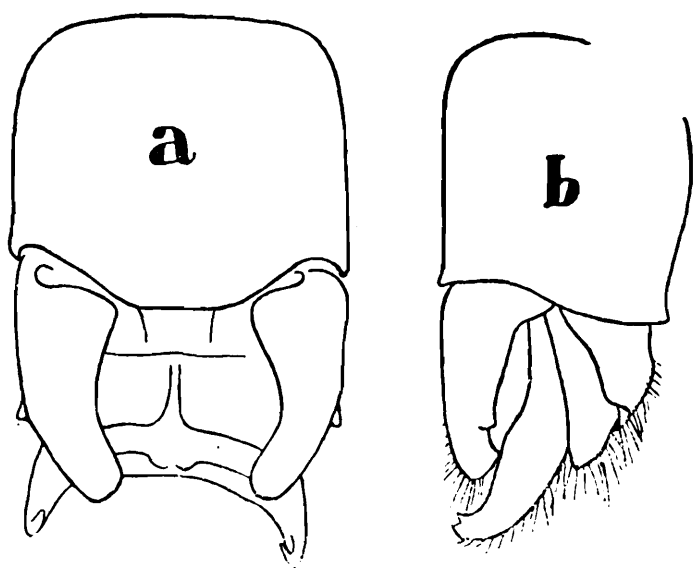

FIG. 2.—Anal appendages of *Chlorogomphus xanthoptera* Fras.
a. Dorsal view. *b*. Right lateral view.

Thorax black marked with grass green as follows.—Narrow antehumeral stripes and broader, sinuous humeral ones broadly connected above by a cross-bar of the same colour, the humeral stripes lying slightly anterior to the humeral suture; a posthumeral upper spot and two moderately broad oblique stripes on each side, one on the posterior half of mesepimeron, the other covering the posterior half of the metepimeron; beneath black overlapped on each side by grass green. Legs

black, the anterior pair of femora bright yellow for the proximal two-thirds on the outer side.

Wings hyaline, palely enfumed, the apices of all finely bordered with burnt brown; pterostigma black, covering about 3 to 4 cells, unbraced, rather short; triangles of forewings formed of 2 or 3 cells, that of the hind similar but the 3 cells sometimes formed by 2 traversing nervures, and sometimes by 3 nervures converging at the centre of triangle; basal antenodal nervures present in all wings; 2 median nervures in all wings; 7 to 8 cubital nervures in forewings, 7 in the hind; 15 to 16 cells in the anal loop; greatest breadth of hindwings 17 mm; hypertriangles traversed 2 to 4 times in the wings; membrane cinereous; nodal index $\frac{16\ 22}{16-17} \mid \frac{20-12}{15-13}$.

Abdomen black marked with greenish yellow as follows.—Segments 1 to 3 with a confluent stripe on the lower part of sides extending as far as the level of the jugal suture on the latter segment; segment 2 with its dorsum coated with dense coarse black hairs, it and segment 3 with paired narrow antejugal and apical spots very narrowly separated on the middorsum; segments 4 to 7 with a pair of similar apical spots only.

Anal appendages black. Superiors seen from above very broad at base, squared at apex, keeled outwardly and curling gently in towards each other; seen in profile the apices curled slightly downwards and with a robust apical ventral spine. The lateral keel ending in a minute outer spine. Inferior rather longer than superiors, quadrate, its outer ends or angles produced as upward curling spines which end in two minute teeth and which are deeply hollowed out on the inner side. The superiors barely as long as segment 10.

Female. Abdomen 59-60 mm. Hindwing 60 mm.

Body markings very similar to the male, differing in the following respects.—front of frons dark olivaceous, the green on crest of frons often obscure and always more restricted than in the male; segment 4 has an additional pair of antejugal dorsal spots and these on both segments 3 and 4 extend down on to sides and then curve slightly forward towards base of segments; segment 1 with an apical dorsal median lunule.

Wings uniformly deep amber tinted, the apices only slightly darker; greatest breadth of hindwings 21 mm. Triangles of forewing 3-celled, those of the hind with 4 to 5 cells; 20 to 24 cells in anal loop. End of abdomen depressed, dilated and curled upward.

Distribution.—The type, a female in the British Museum, was the only specimen known hitherto of this fine insect, which has the greatest spread of wing of any Indian dragonfly. The author rediscovered the insect near Munnar, Travancore, June 4-7, capturing 3 females of several seen and 8 males of a great number seen, the latter sex being unknown until then. Apart from their greater size there is but little to distinguish the males from those of *C. campioni*, but the uniform colouring of the wings of the females, a colouring increasing instead of decreasing with age, easily differentiates them, as well as their much greater size and greater breadth of wing. A paratype male will be deposited in the British Museum.

The specimens noted above were seen flying along the road or kud side within the first few miles of the eastern side of the divide above Munnar. The first specimens were taken about four or five miles down, but on visiting this same spot on the following day not a single specimen was seen. Retracing my steps up the ghat I came on them in numbers about a mile up. Two days later a third visit was paid to these two places and again both were found deserted but on trying a belt of forest still higher up, the colony was found again. The weather had been steadily improving at this time and the belt of monsoon cloud at the top of the ridge had been steadily retiring westwards so that it would seem that this species hugs the border of the wet monsoon zone, advancing or retiring, rising or descending, but always keeping clear of the rain.

A single pair were seen *in cop.* slowly soaring over the tops of the forest trees and gradually descending the valley towards the river bed.

Gomphidia kodaguensis Fras.

Specimens have been taken in the Malabar Wynaad and also in the Bolovumpatti valley during May. A few specimens were also seen and taken in the Mudis Hills in 1929, this being the first of the genus found to the south of the Palghat Gap. In none of these new localities was it present in anything like the numbers found in Coorg. The female still eludes discovery and its habits are shrouded in mystery.

Macrogomphus wynaadicus Fras.

Three males of this rare species were seen at Tamaracherri, South Malabar. They do not differ in any respects from the female.

Burmagomphus cauvericus Fras.

A species closely related to *B. laidlawi* and moderately common in Coorg along the banks of the Cauvery river. Not included in the previous list of the Western India Odonate fauna. Type in the British Museum.

Gomphus nilgiricus Laid.

A number of males were taken during May in a ravine in the Mudis Hills. Apparently widely distributed both north and south of the Palghat Gap, but uncommon anywhere.

Lamellogomphus nilgiriensis Fras.

Taken by the author in the Mudis Hills in the same ravine as the previous species. These forms were remarkable for their large size, the average being half an inch longer than Nilgiri or Coorg specimens; the anal appendages are more robust and form a more complete circle together, so that racial characters are strongly marked.

Acrogomphus fraseri Laid.

The range of this species has now been extended to the Annaimallai Hills and the High Range, Travancore. Four males were taken in

each of these two new localities, and contrary to the habits of the first specimens taken, these were found hovering in the beds of streams and very occasionally perching on rocks. In such places they greatly resembled *L. nilgiriensis*, with which they were usually in company, but the hovering nature of their flight is quite foreign to the latter. All the Coorg specimens were taken resting high in trees.

Merogomphus longistigma (Fras.).

(=*Indogomphus longistigma* Fras.)

Dr. F. Laidlaw, in his list of the Oriental Gomphinae, has pointed out that this genus is undoubtedly congeneric with *Merogomphus* Mart., an opinion with which I agree after comparing *I. longistigma* with the genotype. *I. longistigma* has been found sparingly in the Malabar Wynaad especially around Vayitri, but specimens taken a few miles from the foot of the Vayitri Ghat, and at an elevation of only 300 ft. or so above sea-level are conspicuously smaller than the type and also differ in the markings, so that they must be regarded as a race even if not a definite species. The following differences are to be noted :—

Merogomphus longistigma tamaracherriensis race or sp.

Male. Abdomen 40 mm. Hindwing 30 mm.

The occiput entirely black (greenish yellow in *M. longistigma longistigma*) ; middorsal spot on segment 3 isolated, and entirely absent on segments 4 to 6 ; segment 8 variable, the basal half yellow in some, the extreme base of segment finely black, and the apical border of the yellow markedly crenate, whilst in others it is reduced to a middorsal basal tiny diamond-shaped spot ; segments 9 and 10 usually unmarked, but occasionally a fine middorsal streak on 9 and a tiny middorsal apical point of yellow on 10.

Distribution.—Tamaracherri, South Malabar, inhabiting marsh lands or bogs at the foot of hills. Differing from *M. longistigma longistigma* by the colour of the occiput and abdominal markings, as well as by its smaller size. Type in the author's collection.

Megalogomphus superbus, sp. nov.

(Fig. 3, i and ii.)

Male. Abdomen 53-56 mm. Hindwing 42-43 mm.

Head.—Labium citron yellow ; labrum, bases of mandibles, clypeus and frons bright grass green, paler on labrum and clypeus, which are more of a delicate young foliage green, the labrum and frons above very narrowly black at base, the bases of mandibles narrowly black on their free border, the lower part of frons and the adjacent upper part of postclypeus narrowly black, and, on the latter, two prolongations running obliquely on to anteclypeus ; eyes bottle green above, paling to greenish yellow below ; vertex black ; occiput citron yellow, behind black, except at centre, where is a small spot of citron yellow confluent with that on upper surface.

Prothorax black, middle lobe with a small medial geminate spot on hinder border and a short stripe of the same colour to the outer side of the medial spot; posterior lobe small, tumid, posterior border rounded and covered with long black hairs.

Thorax velvety black marked with tender foliage green as follows:—thick inverted figures of "7" formed by confluence of oblique antehumeral stripes and an interrupted mesothoracic collar; narrow humeral stripes, the upper end swollen and often slightly separated from the lower part of stripe; a broad stripe on mesepimeron notched posteriorly; the whole of metepimeron; a large triangular upper spot between these two last stripes and a lower yellowish spot; the hinder part of antealar sinus and a stripe crossing tergum between the origins of wings.

Wings hyaline; pterostigma black, braced strongly, covering 6 cells; all triangles entire; anal loop of 2 cells; nodal index $\frac{11-20}{12-13}\left|\frac{18-11}{13-12}\right.$. (Anal loop occasionally one large cell.)

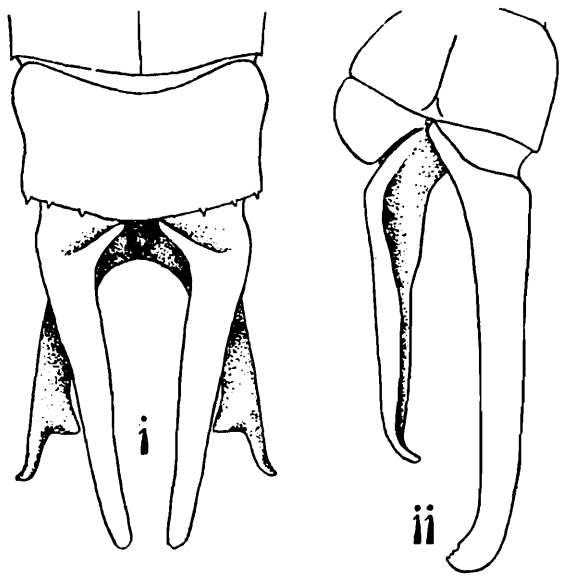

FIG. 3.—i. Anal appendages of *Megalogomphus superbus*, sp. nov., dorsal view. ii. The same seen from the left side.

Abdomen varicoloured as follows:—segment 1 black, the lower part of sides and the middle of apical border dorsally pale grass green; segment 2 black with a trilobed middorsal stripe bordered with yellow apicad and with ferruginous elsewhere, laterally the oreillet yellow bordered with grass green, the ventral border citron yellow and sending an upward prolongation to partially encircle the oreillet; segment 3 with a trilobed middorsal narrow stripe, green basad the jugal suture, yellow thereafter, a triangular basal lateral spot, the portion between it and the dorsal stripe black, the apical third of segment black, the medial third, except on middorsum, bright reddish brown; segments 4 to 6 similar to 3, except that the latero-basal spot is very minute and the dorsal stripe becomes more or less obliterated after the jugal suture, so that the middle third of all segments is entirely reddish brown; segment 7 with basal two-thirds citron yellow, apical third black, this extending slightly into the yellow laterally and still less so along the middorsal carina; segment 8 dark reddish brown changing to black on dorsum and with a diffuse latero-basal spot of citron yellow edged with ferruginous; segment 9 similar but with the lateral spot much

larger and brighter yellow; segment 10 reddish brown, the base narrowly citron yellow subdorsally.

Anal appendages reddish brown, paler basad, superiors as long as segments 9 and 10 taken together, tapering to a point which is turned down at an obtuse angle at apex; inferior four-fifths as long as superiors, cleft as far as base into two slightly divaricate branches which are themselves split into two at apices, an inner robust spine triangular in outline, and an outer slim spine ending acutely, its apex curled strongly upwards and outwards.

Legs short, robust, black; coxae, trochanters and proximal halves of the two hind pair of femora, a spot on the coxae and one on base of anterior femora bright citron yellow.

Female. Abdomen 52 mm. Hindwing 46 mm.

Very similar to the male but much more robust and with a thick cylindrical abdomen. A tiny black point in centre of labrum; a small round citron yellow spot on vertex just behind the ocellar space; posterior lobe of prothorax shaped similarly to the male but with two small dorsal ochreous spots; thorax with the antehumeral stripes well separated from the mesothoracic collar, the humeral narrow stripe always complete, the mesepimeron with a fine medial prolongation from the green, the medial upper spot prolonged downwards and nearly confluent with the prolongation from mesepimeral stripe; yellow on femora more extensive.

Wings broader and longer, nodal index. $\frac{11-18}{11-13} \mid \frac{18-11}{13-11}$; pterostigma covering from 7 to 9 cells.

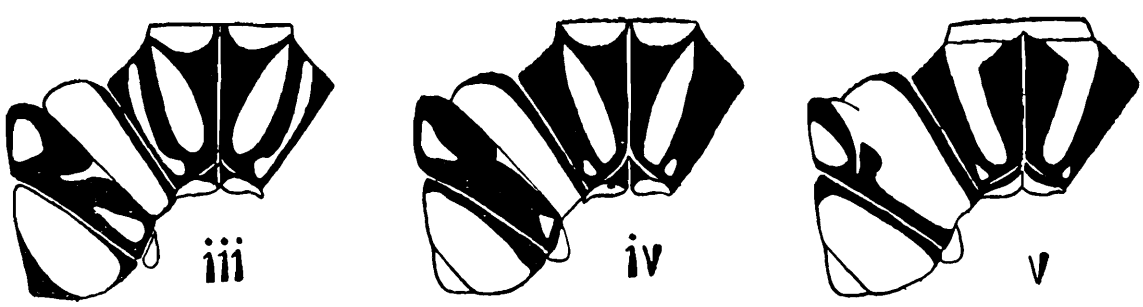

Fig. 4.—Diagram of the thoracic markings of :—
iii. *Megalogomphus superbus*, sp. nov. iv. *M. hannyngtoni* Fras.
v. *M. smithii* Selys.

Abdomen similar but the lateral spots on segment 2 fused to form a broad even stripe; segment 3 with the basal-lateral spot prolonged into a stripe extending two-thirds the length of segment and with little evidence of the medial reddish brown; remaining segments similar to the male but the basal spots on 4 to 6 larger and conspicuous. Vulvar scale short, triangular, with a deep, narrow cleft at its medial border; anal appendages long, reddish brown, yellow outwardly.

Distribution.—Confined so far as at present known to a single river rising in the Bolovumpatti Hills, South Coimbatore district, where it is very common. Its habits are similar to those of *M. hannyngtoni* from Coorg and Malabar. It differs from this species by the red medial markings of segments 3 to 6, by the occiput being yellow instead of black, the face less black and the presence of a humeral stripe, etc.

From *M. ceylonicus*, a larger sized insect, the same abdominal characters will serve to differentiate the two, as well as the presence of a humeral stripe and the fusion of the antehumeral stripe with the mesothoracic collar. Lastly the narrow middorsal abdominal spots are entirely different to the broad dorsal markings found on all segments from 2 to 8 of *M. smithii* Selys. By its size and markings, the species falls about midway between the first two with which it is contrasted here. Type to be deposited in the British Museum. Paratypes in the author's collection taken at Bolovumpatti, S. E. Coimbatore district, 12th April, 1931. It is quite the most beautiful species of the family Gomphidae yet discovered.

Indophaea cardinalis (Fras.).

(=*Pseudophaea cardinalis* Fras.)

This insect is met with at the most northerly point of the southern portion of the Western Ghats but has not managed to cross the narrow belt of 40 miles or less formed by the Palghat Gap. It becomes increasingly common as the Annaimallais are traversed and positively swarms in the Mudis Hills, where also occasional specimens of *I. fraseri* are met with, but never any *I. dispar*. We may say that *I. cardinalis* is as common to the south of the Palghat Gap as *I. fraseri* is to the north, and that *I. dispar*, besides being a comparatively rare insect, is entirely confined to the north. *I. cardinalis* was found sparingly in Travancore, but *I. fraseri* was entirely absent.

Calophaea laidlawi (Fras.).

(=*Rhinocypha laidlawi* Fras.)

A single male of this species was taken at Tamaracherri, South Malabar, this being the only other locality known in addition to South Kanara, where the type was taken. No other specimens were seen so that this may have been a stray.

Micromerus lineatus indica Fras.

Micromerus as represented in southern India differs from *M. lineatus lineatus* so widely in its markings, that the author has raised the form to subspecific rank as described in the *Bombay Nat. Hist. Journ.* (*vide* appendix on Bibliography).

Lestes malabarica Fras.

A common species in South Malabar and Cochin which almost entirely replaces other species of the genus. An annual migration of this insect takes place during the early part of May or late April, the flight being in a northerly direction. Many adventitious tanks come into existence about that time with the advent of heavy rain, and it would seem that these insects pass northwards to populate them. This species was not included in the preliminary list given of the fauna.

Ceylonolestes davenporti (Fras.).

The range of this species has now been extended to Munnar, Travancore and the Mudis Hills. In the former place, about a dozen males were taken on bushes beside a piece of swampy ground. Like other species of the genus, it rests with its wings tightly closed and body trailing, and usually roosts high up in bushes or trees.

A few specimens were taken resting in scrub alongside a stream in the Mudis Hills, in May, but it was not as common as it appears to be in the Palni Hills further to the south. Whilst resting it closely resembles *Ischnura senegalensis* on account of the rich blues of the thorax and abdomen. The original description of the type is very poor (of *Lestes gracilis birmanus*), but such as it is it resembles the Palni specimens. Considering the restricted habitats of species of this genus, however, it is difficult to reconcile two such widely removed localities as Burma and Madura district as common to one species, thus on geographical grounds alone one is justified in considering the two forms as distinct species.

Mortonagrion varralli Fras.

A single male of this interesting species from Bombay was taken on the banks of a small mountain stream about halfway up the Vayitri Ghat, Malabar, in March. None other was ever found in this or in Malabar so that I am inclined to consider this particular specimen as a windborne one. Apart from this adventitious habitat, Bombay still remains the only locality in which the species has been found.

It is interesting to note that Dr. Ris has recently transferred two species of *Agriocnemis, viz.,—amoena* and *selenion*, to, and described another new species, *M. simile* belonging to this hitherto monotypic genus.

Agriocnemis splendidissima Laid.

A very common insect in South Malabar, swarming in the short herbage of the beds of rivers during the dry season.

Aciagrion hisopa Selys.

Occurs in colonies throughout the whole area, from sea-level to over 7,000 ft. I found it swarming on the Lovedale Lake, Ootacamund, Nilgiris, and it was common on a swamp at Munnar, Travancore, during May and June. It breeds in marshes and weedy ponds and is not uncommon on paddy lands along the coastal areas.

Ceriagrion cerinorubellum (Brauer).

A small colony of this species was found on a small mountain brook about halfway up the Vayitri Ghat, Malabar. I mention this occurrence as the habitat was quite abnormal, the insect breeding in weedy ponds and marshes. This insect is extremely local and crops up in very widely distributed areas, the habitat mentioned above being the only one in which it was found throughout Malabar.

Genus **Pseudagrion.**

No representatives were found of this genus in Travancore. *P. microcephalum* and *P. decorum* were found to be extremely common along the coast of Malabar, whilst *P. indicum* frequents all the Malabar rivers. *P. malabaricum* has established itself on a small lake at Pokote, near Vayitri, Malabar.

Archibasis mimetes praeclarum (Fras.).

Occasional specimens of this insect were taken during the pre-monsoon months on several streams in S. Malabar, but it was quite common on a small stream near Tamaracherri which made its way through dense jungle in the foot-hills 20 miles from Calicut. (This was the same stream on which *Macromidia donaldi* was so common.)

In the original survey this insect was described from a teneral specimen taken at Makut, Coorg, and was then thought to be a *Pseudagrion*. The finding of adults in Malabar has permitted the correct placing of the species and has also demonstrated its remarkably close relationship to *A. mimetes* Till., from Australia. The description of the adult follows :—

Male. Abdomen 36-39 mm. Hindwing 24-27 mm.

Head.—Labium white; labrum, bases of mandibles, genae, anteclypeus, frons and vertex as far posterior as the middle ocellus, including basal joints of antennae turquoise blue; postclypeus black with two small basal blue spots; a broad black band crossing head from eye to eye on top of vertex, behind which are large turquoise or dark blue triangular postocular spots narrowly connected across the occiput by a blue stripe; beneath head black, broadly white against the eyes; eyes blue above, pale greenish blue or yellow below.

Prothorax black, the anterior lobe, two large spots on dorsum of middle lobe and the lower part of the sides broadly blue.

Thorax broadly black on dorsum to well beyond humeral suture, marked with moderately broad dark azure blue antehumeral stripes strongly indented by the humeral black in the upper third; laterally blue with a small round black spot in middle of mesepimeron and another small spot on the upper part of postero-lateral suture; beneath white or carneous, thinly pruinosed.

Legs creamy white with black spines; femora broadly black on extensor surface; tibiae on the flexor surface.

Wings hyaline; pterostigma subquadrate, blackish brown framed palely in yellow, covering less than 1 cell; 15 to 16 postnodal nervures in forewings, 14 in the hind; petiolation ceasing before level of *Ac* in the forewings, at *Ac* in the hind.

Abdomen black on dorsum, blue to greenish yellow on the sides; segment 1 with a broad black basal dorsal spot not extending to apical border of segment; segment 2 with a broad black goblet-shaped dorsal marking with a very short apical stem connected to a narrow apical black ring, a large oval middorsal blue spot extending along the basal half of segment, laterally blue; segments 3 to 6 with broad black dorsal

stripes expanding subapically and then contracting again to join narrow apical rings; segment 7 somewhat similar but the apical dilatation continuing to the apical border; segments 8 and 9 with an apical ring of black spines only, whilst 10 is entirely blue.

Anal appendages black; superiors as long as segment 10, with a tiny apical notch as seen in profile, narrow at base, expanding rather broadly on the inner side of the apical half, this expansion hollowed out; inferiors two-thirds the length of superiors, broad at base, then tapered rapidly to a fine point as seen in profile, rounded and with a small tooth on the inner side as seen from above.

Female. Abdomen 38 mm. Hindwing 27 mm.

Differs in a few respects from the male, a more robust insect; labium greenish yellow, with a small medio-basal black point; genae, bases of mandibles and anteclypeus bluish green; postclypeus, frons, vertex and occiput black, the latter with a large greenish blue postocular spot on each side; eyes olivaceous green, pale below.

Prothorax marked similarly to the male; posterior lobe with two short forwardly directed spines which lie closely apposed to dorsum of middle lobe. Thorax with the humeral black irregular and often interrupted above and margined with golden ochreous. Laterally and beneath as for male.

Wings evenly enfumed in adults; pterostigma violaceous brown; 16 postnodal nervures in forewings, 14-15 in the hind.

Abdomen differing in the following respects:—segment 2 with a narrow thistle-head shaped mark on dorsum; segments 8 to 10 azure blue, 8 with a large cordate dorsal spot, its point prolonged narrowly along middorsal carina as far as base of segment, its base constricted and joining a narrow apical annule, segment 9 with 2 large triangular black spots, the base of spots resting on base of segment; segment 10 wholely blue.

Anal appendages small, conical, pointed, blue. Vulvar scales robust, not extending beyond end of abdomen, bluish.

Type and allotype in the author's collection, paratypes in the British Museum collection. The anal appendages are identical to those of *A. mimetes mimetes* Till., the nodal index is higher than in that insect and the proportions are larger, otherwise there is little to separate them.

Genus **Protosticta** Selys.

P. mortoni and *P. gravelyi* are not uncommon throughout the Malabar Wynaad, whilst *P. hearseyi* was found in nearly every stream on the Western face of the ghats in Travancore to the almost entire exclusion of all other species. A large colony occupying a small area was found during May, in the Mudis Hills, breeding in a seepage in dense jungle on a hillside. Usually only small streams were occupied in Travancore. In this latter state, *P. davenporti* occurs very sparingly and its female was discovered here after a prolonged hunt. A single pair of a remarkable new species was also discovered on a stream just below Munnar, on the Cochin Ghat leading from Travancore.

Protosticta davenporti Fras.

Female. Abdomen 35-37 mm. Hindwing 23-24 mm.

Very similar to the male, basal half of labrum and anteclypeus turquoise blue, rest of head glossy black. The middle three-fifths of posterior lobe and posterior half of dorsum of middle lobe of prothorax black, remainder creamy white; thorax steely blue-black on dorsum, pale blue laterally marked with a thick oblique black stripe and a short linear streak of the same colour on hinder angle of metepimeron. Beneath creamy white marked with a black spur-shaped bifid streak. Legs as for male. Wings with 14 postnodal nervures to all wings, otherwise as for the male.

Abdomen marked similarly to the male except for segments 7 to 10, the former segment with a broad basal pale blue ring occupying rather less than a quarter of the segment and indented strongly at two points by the black so that the hinder border of the ring is serrate; segment 8 with a large basal lateral pale blue spot; segments 9 and 10 unmarked. Vulvar scale black, very robust.

Habitat.—Two females taken in a dark jungly retreat beside a small montane stream about 8 miles below Munnar, Western Ghat, Travancore, June 3. Four males were taken on a stream on the same ghat a few miles lower down the road. These were perched on wet rocks and ferns beside the ghat road in an unusually exposed situation.

Protosticta antelopoides, sp. nov.

(Fig. 5 *a*, *b*, and *c*.)

Male. Abdomen 53 mm. Hindwing 30 mm.

Head.—Labium pale yellow; labrum and anteclypeus turquoise blue, the former narrowly bordered with black; rest of head steely black; eyes bottle green.

Prothorax pale at sides, greyish black on dorsum; posterior lobe furnished with a short robust spine at each outer end, and a pair of very long divaricate horns internal to these, which extend nearly halfway up the thoracic dorsum, on which they lie.

Thorax steely blue-black on dorsum and anterior part of sides beyond which the latter are palest blue marked with the usual oblique black stripe on hinder border of mesepimeron; beneath unmarked. Legs dirty white with a broad pale blue ring followed by a narrow black ring towards the distal ends of femora; tibiae dark on flexor surface.

Wings hyaline; pterostigma black with a fine yellow lining to the enclosing nervures, of the usual Protostictine shape; 15 to 16 postnodal nervures to all wings.

Abdomen black, pale yellow beneath and on lower parts of sides, this colour extending on to dorsum at the base of segments 3 to 6 to form narrow basal rings; remaining segments unmarked.

Anal appendages.—Superiors more than twice the length of segment 10, black, broad at base and strongly convex outwards, subcylindrical in the basal two-fifths, then dilated to form the usual "finger and thumb"

process, but the two digits here fused so that only the final joints, as it were, are left free. On the inner side of the convexity a small ventral spine, and at the end of the convexity a robust dorsal spine; the inner

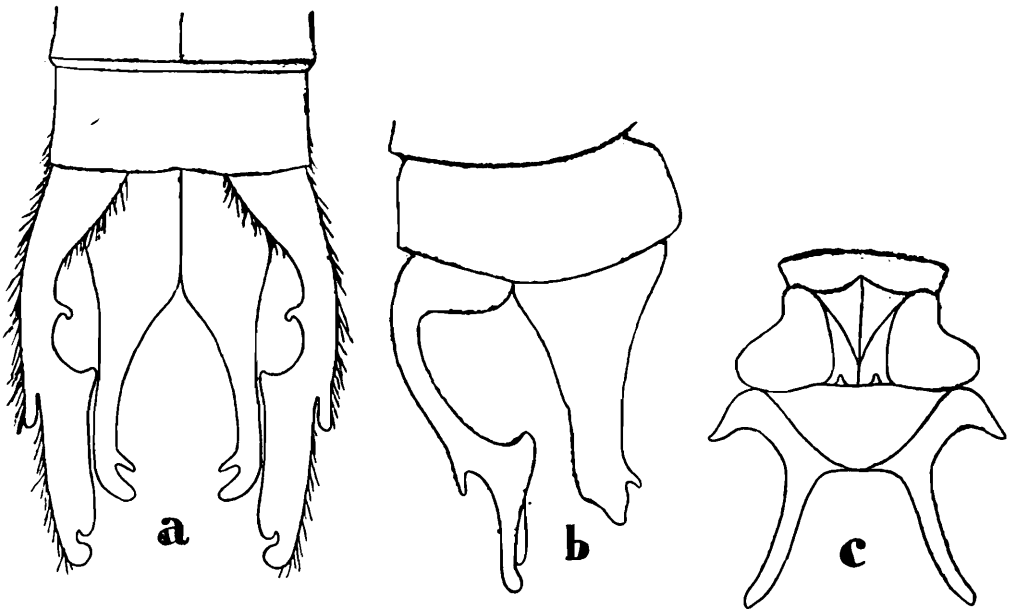

FIG. 5.—Anal appendages of *Protosticta antelopoides*, sp. nov.—
a. Dorsal view. *b*. Right lateral view. *c*. Prothorax of the same species, dorsal view showing the unique horns on the posterior lobe.

basal part of the dilated terminal portion strongly angulated so as to form a third spine. Inferior appendages white for the basal half, black for the apical, very robust as compared to the superior appendages and of equal length, very broad at base and closely apposed for the white half, thinner and cylindrical at the apical black half, the apex curled in and split into two chelate short processes.

Female. Abdomen 40 mm. Hindwing 29 mm.

Exactly similar to the male in markings and wings, differing only in sexual characters and in the posterior lobe of prothorax which lacks the long medial horns, but has the lateral spines.

Habitat.—A single pair taken at the top of the Munnar, Western Ghat, Travancore, May 30, 1931. The male is remarkable for several features unknown in other species of the genus—the armament of the prothorax which is quite unique, the total absence of any identification mark on the end segments of the abdomen, the unmarked under surface of the thorax and lastly the large size of the insect, far greater than any other known species of the genus. As for the female its large size and the absent identification mark on the abdomen will easily serve to distinguish it from other females. Type and paratype in the author's collection.

Disparoneura souteri Fras.

A single male of this beautiful species was taken on a medium sized stream near Tamaracherri, S. Malabar, during June. This is the only other locality, save Coorg, in which this insect has been observed.

Group **Indoneura** Laid.

(Fig. 6, i-vi.)

Formerly only represented by *Indoneura gomphoides* and *Phylloneura westermanni*, this group, by discoveries in recent years and of late, has steadily grown to one of considerable importance and of great interest, and now numbers nine species belonging to four genera. The genera *Indoneura*, *Phylloneura* and *Melanoneura* are more or less strictly confined to north of the Palghat Gap, although a few specimens of *I. ramburi* have been taken in the Mudis; genus *Esme*, on the other hand, is confined to south of the Gap, with the exception of a rare species taken in the Kanara-Coorg enclave. *Esme cyaneovittata* Fras. is the sole representative in the Palni Hills, whilst *Esme mudiensis* occurs with *I. ramburi* in the Annaimallai-Mudis Hills, the two species of *Esme* mingling in Travancore, where they are a feature of nearly every small montane stream. Three new species are here described.

Indoneura risi, sp. nov.

Male. Abdomen 37-38 mm. Hindwing 23-24 mm.

Head.—Labium white; labrum, ante- and post-clypeus steely metallic blue-black; bases of mandibles brownish; genae azure blue marked with a large median glossy black spot; rest of head black but the frons traversed by a broad azure blue band confluent with the blue of genae; *head beneath occiput pale azure blue;* eyes deep marine blue capped with black.

Prothorax black, the anterior lobe entirely azure blue, the middle lobe broadly blue laterally, this colour extending as a broad band for the whole length of lobe; dorsum and posterior lobe unmarked.

Thorax velvety black on dorsum as far lateral as the middle of mesepimeron and marked with a pair of azure blue antehumeral narrow, slightly curved stripes, the inner border of which is slightly concave, the outer biconvex. Laterally pale blue marked with a fusiform black stripe which occupies the middle two-fourths of the posterior border of mesepimeron; beneath thorax pale greenish blue, unmarked.

Legs pale brown or dirty white, the femora mottled with black on the extensor surface, more broadly so at the distal ends; tibiae with the extensor surface pale bluish; tarsi black; coxae and trochanters pale blue.

Wings hyaline, palely enfumed in adults, petiolated to a little proximad of *ac;* pterostigma black, *almost quadrate*, not diamond-shaped, braced; the nervure *ac* lying nearest the distal antenodal nervure or about halfway between the two antenodals in the hindwing; *ab* feebly arched and short; 19-21 postnodal nervures in forewings, 19 in the hind.

Abdomen black marked with blue as follows:—segment 1 almost entirely blue, marked on the dorsum with a moderately broad black band, extending the whole length of segment; segment 2 broadly blue at the sides, especially apicad; segments 3 to 7 with narrow blue basal annules, narrowest on the first and last of these segments; segments 8 to 10 entirely blue except for a very narrow apical black border and

the lower part of sides of segment 10. (The abdomen in this species is very narrow and is only about two-fifths longer than the wings.)

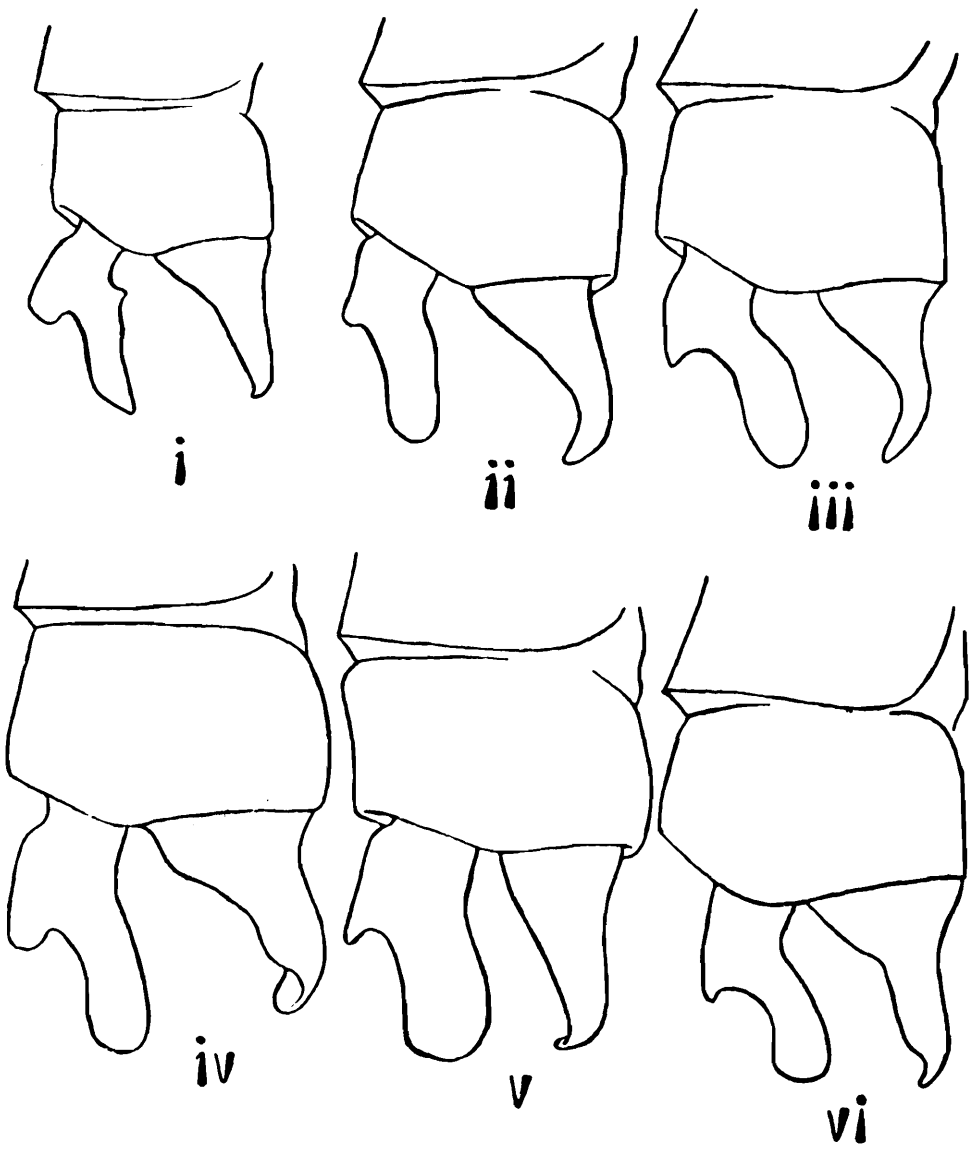

Fig. 6.—Right lateral view of anal appendages of :—

i. *Indoneura risi*, sp. nov.
ii. *Indoneura ramburi* Fras.
iii. *Indoneura gomphoides* (Ramb.).
iv. *Esme mudiensis*, sp. nov.
v. *Esme cyaneovittata* Fras.
vi. *Esme longistyla*, sp. nov.

(Camera lucida studies all drawn to the same scale.)

Anal appendages rather longer than segment 10, of equal length; superiors black, of the conventional *Indoneura* shape, broad at base, lower border markedly angulated and bayonet-shaped, superior process about one-third the length of the inferior which is directed straight back and of only moderate length, its extreme apex directed slightly downwards. Inferior appendages brownish black or paler, directed almost horizontally straight back or but slightly downward, broad at base, then tapered and tongue-like as seen in profile, the apex not visible from this direction but turned horizontally and abruptly inward to end in an acute point.

Female unknown.

Habitat.—Known only from a small area in S. Malabar, near Tamaracherri. It is the only known species of the genus so far recorded

from sea-level, and is easily distinguished from all other species by its small size and delicate build, as well as by the shape of the anal appendages. Type will be deposited in the British Museum.

Esme longistyla, sp. nov.

Male. Abdomen 44 mm. Hindwing 28-29 mm.

Head.—Labium pale brownish white or white; labrum azure blue, its base moderately broadly bordered with black; ante- and post-clypeus black; bases of mandibles, genae and a broad fascia traversing frons azure blue, a large black spot on each cheek narrowly confluent with the black of clypeus; rest of head above and beneath matt black; eyes deep marine blue capped with black.

Prothorax black with the whole of anterior lobe and a broad stripe traversing the lower part of sides of middle lobe blue, the two blue areas being confluent.

Thorax velvety black on dorsum as far back as the middle of mes-epimeron, marked with very narrow blue antehumeral stripes, broadening below and falling well short of antealar sinus above. Laterally azure blue traversed by a moderately broad black oblique stripe which overlaps the postero-lateral suture on both sides. Beneath pale greenish yellow or blue, pulverulent in adults.

Legs black with a bluish stripe on the outer and inner sides of hind pair of femora; tibiae with extensor surfaces pale bluish; tarsi black; coxae and trochanters pale blue.

Wings hyaline, palely enfumed in adults, petiolated to a point well proximad of *ac*, which nervure lies nearest the distal antenodal nervure, *ab* complete; pterostigma with sides subequal, subquadrate in shape, black; 22 postnodal nervures in forewings, 20 in the hind.

Abdomen long and slender, black, marked with blue as follows:—segment 1 entirely blue save for a large triangular black dorsal spot, the apex of which just reaches the apical border of segment; segment 2 with a broad irregular blue stripe traversing each side, the upper border of the stripe with two broad indentations; segments 3 to 7 with narrow basal blue annules, narrowly bisected by the finely black mid-dorsal carina on segment 3 and partially so on the other segments; segments 8 to 10 wholely azure blue but the latter segment with the sides and apical border narrowly black.

Anal appendages black, superiors slightly longer than inferiors and segment 10; superiors of the usual *Indoneura* shape, strongly curled in towards each other, broad at base, inferior border shallowly concave, superior process obtuse, very short, a mere angular projection; inferior process very long, rather narrow, a little constricted at its middle, a little clubbed and obtuse at its apex; inferior appendages broad at base after which there is a short constriction, then slightly tapered as far as apex, which is curled up and inward and ends in a very acute point.

Female. Abdomen 42-43 mm. Hindwing 28 mm.

Remarkably similar in markings to the male, differing only by the anterior lobe of prothorax which is blue at its middle only. Wings

with 19-20 postnodal nervures in forewings, 18 in the hind; pterostigma warm brown, more diamond-shaped than in the male, especially in the hindwings, where the costal and posterior borders are longer than the lateral.

Anal appendages very short, conical, black, projecting over a conical blackish brown protuberance of the same length as appendages. Vulvar scales blue at the sides, long, robust.

Distribution.—South Kanara, South India. A few pairs only of this rare insect were taken at Peraje, South Kanara, during September and October by the author, settled on ferns and scrub beside a broiling stream. Its habits are similar to the rest of the group, and like most species it appears to be very local. The species is considerably smaller than either *cyaneovittata* or *mudiensis*, the only two other known species of the genus; it differs from the former by the aborted superior process of the superior appendages, the slender shape of the inferior appendages, by the anterior lobe of prothorax wholely blue and by the hind pair of legs marked with blue, this latter character serving to separate them at a glance. From *mudiensis*, the labrum entirely blue save for the base is in striking contrast to the entirely blue-black metallic structure of that species. Type and co-type in British Museum.

Esme mudiensis, sp. nov.

Male. Abdomen 46 mm. Hindwing 32 mm.

Head.—Labium white, palely tinted with blue; labrum glossy metallic blue-black, quite unmarked with blue; anteclypeus glossy black, postclypeus metallic blue-black; genae pale azure blue, traversed by a broad black stripe which is continuous with the black of clypeus; rest of head velvety black, but the blue of genae continued on to frons, being only narrowly interrupted at the middle line; antennae black; eyes dark blue during life; the adjacent part of occiput, beneath head, black.

Prothorax velvety black, the anterior lobe with a transversely oval blue spot at its middle, the middle lobe azure blue at its lower lateral border, more broadly behind than in front.

Thorax velvety black on dorsum as far lateral as the middle of mesepimeron, marked with a narrow azure blue antehumeral stripe on each side, the outer border of stripe convex, the inner border straight, its upper end tapering to an obtuse point which falls well short of the antealar sinus. Laterally azure blue marked with an oblique complete black stripe on the postero-lateral suture and adjacent part of mesepimeron; beneath palest blue, unmarked.

Legs black, coxae and trochanters azure blue.

Wings hyaline, palely enfumed in adults, petiolated to well proximal of the level of *ac;* pterostigma blackish brown, framed finely in paler brown and thick black nervures, diamond-shaped, its sides equal in length, strongly braced; 23 postnodal nervures in forewings, 21 in the hind; *ac* situated slightly nearer the distal antenodal nervure and meeting *Ab*, which is complete, well distad of its origin.

Abdomen black marked with azure blue as follows:—segment 1 broadly blue at the sides, this colour extending dorsalwards along the apical border of segment and almost confluent over its dorsum; segment 2 with a broad stripe on each side at its lower part, extending the whole length of segment; segments 3 to 6 with very small paired dorsal spots at base, obsolete on segments 4 to 6 in some specimens; segment 7 entirely black; segments 8 to 10 azure blue but the lower parts of sides black, the black border broadening towards the base of each segment and forming a narrow basal annule on segment 8.

Anal appendages black, slightly longer than segment 10 and of the usual *Indoneura* shape; superiors with a short upper process and a very long lower one, which latter is strongly curved inwards as seen from above, and at first down and then analwards as seen from the side, the apex slightly tumid and turned a little down; inferiors of the same length as superiors, broad at base, compressed laterally, tapering gradually to the apex which is turned abruptly upwards and inwards.

Female. Abdomen 40 mm. Hindwing 28-29 mm.

Resembles the male closely, differing only in sexual characters and the markings of abdomen. Wings with 20-22 postnodal nervures in the fore, 19-20 in the hind; basal paired spots on abdomen present only on segment 3; segment 8 with an apical blue dorsal spot shaped like a crown or, in some, as 3 spots narrowly united; segment 9 with a similar spot but the central point prolonged as far as or nearly as far as base of segment; segment 10 with an oval dorsal blue spot, whilst segment 8 has a pair of ventral apical pale blue spots.

Anal appendages short, conical, black; vulvar scales robust, extending to end of abdomen, black.

Habitat.—Annaimallai and Mudis Hills at from 3,000-4,500 ft. prior to the monsoon. Travancore, common on all streams near Munnar on both Eastern and Western Ghats during May and June. Distinguished from all other species by the blue-black metallic labrum without any blue markings. Type and co-type will be deposited in the British Museum collection.

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