A revision of the genus Diastatops and a study of the leg structures of related genera

Basil Elwood Montgomery

Iowa State College

Follow this and additional works at: https://lib.dr.iastate.edu/rtd

Part of the Entomology Commons, and the Genetics Commons

Recommended Citation

Montgomery, Basil Elwood, "A revision of the genus Diastatops and a study of the leg structures of related genera" (1936). Retrospective Theses and Dissertations. 13727. https://lib.dr.iastate.edu/rtd/13727
INFORMATION TO USERS

This manuscript has been reproduced from the microfilm master. UMI films the text directly from the original or copy submitted. Thus, some thesis and dissertation copies are in typewriter face, while others may be from any type of computer printer.

The quality of this reproduction is dependent upon the quality of the copy submitted. Broken or indistinct print, colored or poor quality illustrations and photographs, print bleedthrough, substandard margins, and improper alignment can adversely affect reproduction.

In the unlikely event that the author did not send UMI a complete manuscript and there are missing pages, these will be noted. Also, if unauthorized copyright material had to be removed, a note will indicate the deletion.

Oversize materials (e.g., maps, drawings, charts) are reproduced by sectioning the original, beginning at the upper left-hand corner and continuing from left to right in equal sections with small overlaps.
NOTE TO USERS

This reproduction is the best copy available.

UMI
A REVISION OF THE GENUS DIASTATOPIS AND A STUDY
OF THE LEG STRUCTURES OF RELATED GENERA

BY

Basil Elwood Montgomery

A Thesis Submitted to the Graduate Faculty
for the Degree of

DOCTOR OF PHILOSOPHY

Major Subject Entomology

Approved:

Signature was redacted for privacy.

In charge of Major work

Signature was redacted for privacy.

Head of Major Department

Signature was redacted for privacy.

Dean of Graduate College

Iowa State College 1936
LIST OF TABLES .................................................. 3
LIST OF PLATES .................................................. 4
INTRODUCTION AND ACKNOWLEDGEMENTS ....................... 5
HISTORICAL REVIEW ............................................. 14
DISTRIBUTION ..................................................... 26
   List of Localities ........................................... 30

THE GENUS DIASTATOPS .......................................... 47
   References .................................................. 47
   Type of the Genus .......................................... 47
   Characters of the Genus .................................... 47
      Original Description ..................................... 47
      Author's Description ..................................... 48
      Variation .................................................. 55
      Summaries of Tabulated Characters (Tables) .......... 58
   Relationships within the Genus ......................... 78
   Relationships with Other Genera ....................... 84

THE SPECIES OF DIASTATOPS .................................. 91
   Key to Species ............................................. 91
   Specific Descriptions ..................................... 96
      Pullata .................................................. 96
      Emilia ................................................. 106
      Intensa ............................................... 108
      Estherae .............................................. 115
      Obscura ............................................... 119
      Nigra .................................................. 127
      Maxima ............................................... 129
      Dimidiata ............................................. 131

LEG CHARACTERS OF RELATED GENERA ......................... 136

BIBLIOGRAPHY .................................................. 177

EXPLANATION OF PLATES ....................................... 183

PLATES ................................................................ 188

APPENDIX ................................................................ 199
Table 1. Number of antenodal cross veins (fore wing) . . . 58
2. Number of antenodal cross veins (rear wing) . . . 59
3. Number of postnodal cross veins . . . . . . . . . . 60-61
4. Number of accessory bridge cross veins . . . . . . 62
5. Number of supra-triangular cross veins . . . . . . 63
6. Number of cubito-anal cross veins (rear wing). 64-65
7. Number of cells in triangle . . . . . . . . . . . . . . . 66
8. Number of cells following triangle (fore wing) . . 67
9. Number of cells in "loop" of fore wing . . . . . . 68
10. Number of cells in secondary loop (rear wing). . . 69
11. Number of rows of cells subtended by Rpl . . . . 70
12. Number of rows of cells subtended by Mpl . . . . 71
13. Number of rows of cells between M3 and M4 . . . 72
14. Number of rows of cells between bisector and A2 . 73
15. Number of rows of cells between bisector and Cu3 . 74
16. Length of wings . . . . . . . . . . . . . . . . . . . . . 75-76
17. Length of the abdomen . . . . . . . . . . . . . . . . 77
LIST OF PLATES

Plate I. Wings of *D. obscura* .......................... 188
II. Wings of *D. pullata* and *D. estherae* ............... 189
III. Wings of *D. intensa* ................................. 190
IV. Wings of *D. nigra* and *D. maxima* ................. 191
V. Male genitalia and appendages of *pullata*-group . 192
VI. Male genitalia and appendages .......................... 193
VII. Structures of species of *D. maxima* and *D. obscura* 194
VIII. Map showing localities ............................... 195
IX. Map showing distribution of species of
    *pullata*-group ......................................... 196
X. Map showing distribution of *dimidiata* and
    species of *obscura*-group ............................. 197
XI. Diagram of relationships of the species .............. 198
INTRODUCTION AND ACKNOWLEDGEMENTS

The members of the genus Diaatatops are distinguished from all other Libellulidae by the possession of eyes which are completely separated - a character indicated by the generic name. These insects may be separated from all other members of the family, except the species of the genera Palpopleura and Zenithoptera, also by an undulation near the base of the costal margin of the fore wing. The genus is also characterized by dense venation and deep coloration of the wings.

Until rather recently this genus was represented in collections by a very small number of specimens. However, collections made in British Guiana by L. A. and E. B. Williamson and B. J. Rainey in 1912 and along the Amazon and its tributaries by J. H. Williamson and J. W. Strohm in 1923, by S. M. Klages in the same year, and by A. H. Fassl from 1920 to 1922, contained rather long series of specimens of Diaatatops.

When an attempt was made by the late E. B. Williamson to determine the material from the Amazonian region collected by Williamson and Strohm it was seen that more species were represented than had been defined by Ris in his monograph of the family. A specimen of one of these forms was sent to Ris who replied with the following comments.

"I have now re-examined all my Diaatatops - together with the specimens of obscura and pullata from Br. Guiana is a new
obscura from Belem given me by yourself, quite a long series in the Faal collections & some odd specimens from other sources.

"I now believe, that your specimen really represents a distinct species . . . . . .

"The Faal collections contain chiefly pullata. I have a rather long series from Santarem, the Tapajoz, Rio Xingu, Obidos, Mameas, Manacapura (where?), Manaos, Coary & Teffe Ega — series from Santarem & the Tapajoz, few or only single specimens from the other places. — In this lot, there is a group of males, . . . that represent a rather striking and also puzzling form. . . . . Very nearly the same form is represented by 3 males from Paraguay . . . . . & an immature and rather poor male from Formosa, Argentina. . . . . . I am not certain, if they do not represent another distinct species.

"A single (unfortunately!) male from Teffe Ega is a curious chap . . . . . .

"If you have any interest (& I think you will have), to add descriptions of the forms submitted here to you, I should be well satisfied that you would join them to your own new species!"

One or more representatives of each of the forms mentioned were sent at the time this letter was written. When this material was received by Mr. Williamson, he suggested that the author undertake the preparation of a monograph of Diastatopra.
The preparation of such generic studies among the Libellulidae was made possible and feasible by the publication of Ris's "Libellulinae". This monumental work, forming Fascicules 9-16 of the Collections Zoologiques de Selys Longchamps (Catalogue Systematique et Descriptif) is one of the most extensive and excellent contributions to taxonomic Entomology. It includes almost 800 species arranged in 120 genera. There are not only keys and descriptions of all of these forms, but also citations to all previous references to them, records of distribution based upon specimens examined and literature, notes on ecology, and a complete synonymy of every name ever proposed in the family.

When the author accepted the opportunity to make this study Mr. Williamson attempted to bring together all the specimens of Diaestatops that could be secured. A letter to Ris explaining the proposed plan brought a ready, enthusiastic assent that his material be made available to me; all of the remaining specimens of the genus in his collection were sent at once. Dr. P. P. Calvert sent some material from the collections of the Academy of Natural Sciences at Philadelphia and a few specimens were secured from the American Museum of Natural History and the Cornell University Collection.

Two weeks study of this material in the Williamson Collection, then at Bluffton, Indiana, late in the summer of 1937, was
sufficient to separate the species represented. Five distinct forms were found and two of these exhibited certain diversities of characters. With more intensive study later each of these two was found to be made up of two separate species.

Although the recognition of species was comparatively easy and readily made, difficulties were encountered when an attempt was made to associate names with the forms. Six specific names had been proposed in the genus - dimidiata, marginata, obscura, pullata, fuliginea and tinota. With the exception of dimidiata and marginata which have been recognized as referring to the same, clearly distinct, species since the time of Fabricius, the exact status of none of these names could be determined without information concerning the specimens described by Burmeister and Rambur. Such essential information was not available in literature and no method of securing it from the specimens in Vienna and Brussels was available to the author at that time. Therefore, the specimens and the notes which had been compiled were laid aside and more or less forgotten for several years.

In 1933 one of the author's students, Miss Elizabeth M. Heiss, made a trip to Europe and very kindly arranged her itinerary so that she could examine specimens in the Collection de Selys at Brussels. A set of excellent notes and drawings of the Ramburian specimens, the results of her two days study in the
Musee Royal d'Histoire Naturelle, made plain the synonymy of the names used by Rambur. At approximately the same date drawings and brief notes on Burmeister's type of L. pullata were received from the Naturhistorisches Museum at Vienna. Somewhat later specimens which had formed the basis of the Diastatops records by Kirby were received on loan from the British Museum. Finally, a visit to the Carnegie Museum at Pittsburgh, in December, 1934, yielded a rather long series of specimens, including those upon which Calvert's records were based and a considerable number belonging to one of the new species. In the meantime, several additional specimens had been acquired for the Williamson Collection, now in the Museum of Zoology, University of Michigan, and these were sent to be included in the study.

With this material before him the author has attempted to prepare a monograph of the genus Diastatops, defining and describing the species, pointing out their relationships with each other and their distribution and determining the relationships of the genus to other Libellulid genera.

The notes and drawings of types and other specimens studied by the earlier authors and many of the scattered references, especially the original descriptions, have been reproduced in the monograph because, of course, the author's conclusions are based, in part, upon these and most of them are not readily a-
Because the veins and cells of the wings offer the most easily defined, and, therefore, the most usable characters for separating species, a number of areas of the wings were selected for intensive study. Within these areas counts were taken from all specimens studied. The summaries and tabulations of these counts, showing, as far as represented in the material available, the variation within species, are believed to present the results of the most extensive statistical study yet made in Odonate taxonomy.

The Comstock-Needham terminology of wing veins is used in this paper, not because the author agrees entirely with Professor Needham's interpretation of the morphology of the dragonfly wing but because most of the recent and more important taxonomic literature relating to the Libellulidae employs this terminology. The work of Lamere, Martynov and Tillyard indicates very clearly that certain fundamental changes must be made in the terminology (as first applied by Needham and generally accepted for a quarter of a century) of the veins of the Odonate wing. However, until an interpretation is generally accepted by students of wing venation and of the Odonata, terminologies based upon rather rapidly changing theories need not be introduced into systematic literature. Nevertheless, it is not necessary to return to the old Selysian nomenclature, as some authors have done in recent papers, to avoid bringing this
dispute into systematic papers. The terms applied to the wing veins of the Odonata in the Comstock-Needham system have been used so widely in all entomological literature that they may be used, and they are so used in this paper, as mere names without prejudice or implication of the author's views concerning their morphological correctness.

The measurements tabulated at the beginning of the study (length of wings and abdomens of specimens available for study in 1927) were made by the use of dividers, the points of which were first set at the ends of the line of measurement and then applied to a millimeter scale. All other measurements were made by the use of a millimeter scale carefully ruled on a narrow strip of thin, stiff cardboard, which was applied directly to the line of measurement. This method was found to be equal in accuracy to the method of using dividers, was more rapid and involved less liability of damage to the specimens. The length of the abdomen was measured on the side, from the base to the tip of the appendages. The lines along which the measurements of the wings were taken are indicated in figure 10. Measurements of the length of the wings and abdomen were made with the unaided eye, and were recorded to the nearest half unit (millimeter). Those of the legs, the pterostigma and the widths of the rear wing were made under a binocular microscope, and were recorded to the nearest half millimeter with indication of less (<).
or greater (>) if such variation from the half unit was apparent, except the widths of the wing which were estimated to the nearest quarter unit. The measurements given for the legs and the pterostigma are based upon a limited number of average sized specimens. The recorded widths and ratios (of length to width) of the rear wing for each species are based upon measurements of two to four specimens of each sex, including those with maximum and minimum (and, in the more variable or best represented species, average or intermediate) lengths of rear wing.

The collection from which every specimen studied was obtained is indicated under "material studied" for each species. In accordance with a statement accompanying the specimens when they were sent, paratypes of emilia and intense from the Ris Collection will be deposited in the Williamson Collection and in the collection of the author. Duplicates from all of the more extensive series will likely be deposited in the collection of the author.

The author wishes to acknowledge his indebtedness and express his appreciation to all who have assisted in this work. He is especially indebted to the late E. B. Williamson, who suggested the study and gave considerable assistance through criticism and advice during the early stages of the work. He wishes to extend his thanks to the following who have secured
the loan of specimens for study, or have furnished information concerning specimens, records, localities, etc.: Miss Elizabeth M. Heiss, M. Antoine Ball, who assisted Miss Heiss in her examination of specimens at Brussels, Prof. E. J. Kohl, who made some of the photographs used in the plates, Dr. P. P. Calvert, the late Dr. F. Rie, Mr. Nathan Banks, Dr. Hugo Kahl, Mr. D. E. Kimmins, Dr. Erich Schmidt, Dr. H. Zerny, Mrs. Leonora K. Gloyd, and Mr. F. M. Gaige.

To Professor W. H. Wellhouse under whose direction this study has been completed and the manuscript prepared and whose helpful advice and suggestions on this and other investigations over a period of years have been most valuable, the author here expresses his sincere thanks and appreciation.
HISTORICAL REVIEW

The genus Diaatatopa was erected by Rambur in 1842, for three species - *fuliginea* and *tintota* which were described as new, and *Libellula pullata* Burmeister. *Fuliginea* was apparently intended as a new name for the species which Burmeister had referred to *Libellula obscura* Fabricius. Although Rambur cited the description of *obscura* by Fabricius under *fuliginea*, he placed a question mark after it, adding, "(L'Obscura de Fabricius paraît plutot se rapporter a la Fulvia de Drury.)" However, all later authors have disagreed with Rambur and have considered *obscura* Fabricius to be the species so-called by Burmeister. Rambur's description of *fuliginea* is less complete than his descriptions of *tintota* and *pullata*, and he did not list any specimen which he had seen. Nevertheless, his description must have been based upon a specimen, as it contains considerable data not given in Burmeister's description of *obscura*. There is a specimen in the Collection de Selys, bearing the label "fuliginosa," which Rie considered to be Rambur's type ("wahrscheinlich trotz des abweichenden Namens Rambur's Type D. fuliginea"). From Rambur's description - "un peu rougeatres a la base des postérieures ou les areoles sont plus nombreuses que chez la Tintota, mais un peu moins que chez la Pullata" - it appears that *fuliginea* is a synonym of *pullata*. This view is supported by the specimen in the Collection de Selys. Concerning this specimen Miss Heise wrote, "areas of coloration dim
but can be distinguished on microscope as faintly coral colored. Secondary reticulation most closely resembles photo # 4 (pullata); it seems to be identical. It is not like # 1 which is marked 'obscura'.

Furthermore, it appears that tinota is a synonym of obscura. Rambur's description of the wings of this species clearly indicates obscura characters — "Ailes courtes, d'un brun roussatre fonce, ayant un reflet d'un vert-metallique en dessus, d'un bleu violet en dessous; . . . . areoles nombreuses, presque egales". Concerning the type specimen of tinota, now also in the Collection de Selys, Miss Heiss wrote, "No areas of secondary reticulation or coloration of veins (obscura group)".

After noting the significance of the name chosen by Rambur for this genus and reading his comment, "Ces especes presentent une anomalie dans les Libellulines par leurs yeux a fait separe", one may well wonder why he referred Libellula dimidiata Linne to Palpopleura. Perhaps, the specimen upon which his study was based was so damaged that this character was not easily seen as he noted "(Male tres-deterior.)". The distribution of the species had no significance for Rambur, even if he had known it, (although his specimen carried no locality label, both Linne and DeGeer had given America as the origin of their material), as he included the American species fasciata Linne (americana Fabricius), now placed in Zenithoptera, in
the otherwise old world genus Palpopleura.

Thus it is seen that all of the previously described species recognized as valid in this paper were already described before Rambur erected the genus. Linne had described *dimidiata* in 1758, Fabricius *obscura* in 1793 and Burmeister *pullata* in 1839. DeGeer described a species under the name *Libellula marginata* in 1773 but this was placed as a synonym of *dimidiata* by Fabricius (1793) and has been so considered since that time.

Burmeister possessed material and gave descriptions of the three species. He placed them in a group with three others, *fulvia* Drury, *fluctana* Fabricius and *fasciata* Linne (*americana* Fabricius). His grouping of the species of Libellulidae, considered by him as the genus *Libellula*, was based upon a considerable number of characters which are still used in the arrangement of Libellulid genera, such as relative length and width of the rear wings, density of venation, shape of the triangle and the number of cells following the triangle of the fore wings.

None of the authors before Rambur had mentioned the characteristic divided eyes of the species for the undulate costal margin of the fore wings common to these and related species. Nor had Burmeister made use of the latter in his grouping of species. Thus, only one of the three species
(fasciata) grouped with the Diaatatops species has an undulate costal margin. The remaining species listed by him which possess this feature (now in the genus Palpopleura), were placed with certain species lacking it, in another, rather widely separated, group.

For many years after the publication of Burmeister's and Rambur's works, little was added to the knowledge of Diaatatops. Ericson published records of dimidiata and tingta from "Guiana" in 1848, but dimidiata had been recorded from Surinam by Burmeister. The name "Diaatatops fenestrata, new species", occurs in a table of species in a paper published by Hagen in 1855. However, no description was given and the name does not appear elsewhere in literature, except a citation of it as a synonym of D. dimidiata by Hagen (1875). In the "List of South American Neuroptera" attached to the Synopsis of the Neuroptera of North America (1861) Hagen gave citations and summaries of the distribution of four species. He considered fuliginea a synonym of obscura. The localities which he listed for the different species were compiled from the references cited, except for pullata. The distribution given for this species, "Brazil; Pernambuco; Peru; Moxoa", was probably based upon specimens which Hagen had seen, as these two localities were not listed by Burmeister or Rambur. Moreover, the "Aue Siminam" quoted by the former for this species was omitted. There is an exclamation point (!), an in-
dication that he had seen specimens, after each of the four species. These records, with some change of form to indicate more clearly the exact localities referred to by the successions of country, province and city names, were repeated in the "Synopsis of the Odonata of America" by Hagen, published in 1875.

In 1868 Brauer published a classification of the Libellulidae, characterizing and grouping the 40 genera which were recognized at that time. His "III Gruppe" was composed of Diastatops and Palpopleura. The group was defined as follows: "Coatalrand vor dem Nodus mit einer Einbuchtung. Cellula cardinalis dreieckig, Klauen mit einem Zahn". His description of Diastatops was more complete than the original by Rambur, being an enumeration or description, one by one, according to an outline followed for all genera, of the characters most useful in separating and defining Libellulid genera. No specific descriptions or characterizations were given, but the four species listed by Hagen in 1861 with the localities (but not the citations) for each, were copied without change from that author.

In his "Revision of the Subfamily Libellulinae" published in 1889, Kirby gave a detailed enumeration of the characters of 88 genera, 40 of which were described as new. With this increase in the number of recognized genera many additional characters of generic rank were noted. The description of Diastatops was
extended (from those by Rambur and Brauer) to include such of
tese characters as are applicable to the genus. An examination
of the range in number of veins and cells in different areas of
the wings given by Kirby, indicates that he had studied speci-
mens of more than one species in drawing up his description of
the genus. However, the number of specimens studied was rather
limited. *Libellula pullata* Burmeister was designated as the type
of the genus, but there was no further mention of species. Little
was added to Brauer's classification of "III Gruppo", except
that a new genus, Potamothemis was erected for the American
species previously placed in *Palpopleura*. In his "Synonymic
Catalogue of Neuroptera Odonata" published the following year
he gave a complete synonymy of all species of *Diastatopa*. The
views of Hagen (1861, 1875) were adopted without change. Only
the original description was cited for each specific name, ex-
cept for *dimidiata* and *pullata*; for these Rambur was also
cited. "S. America" was given as the distribution for *dimidiata*,
*tincta* and *pullata*, Brazil for *obscura*. Records of *dimidiata*,
*obscura* and *pullata* from the Amazonian region, based upon col-
lections by Austen, were published by Kirby in 1877. It was
stated that *obscura* and *pullata* were very abundant and were
always found together by Austen, and that both Austen and
M'Lachlan thought these were the same species. However, at
least one of the specimens from this lot called *pullata* by
Kirby belongs to one of the new species described in this paper (estherae).

Soon after the appearance of Kirby's Revision, Karasch published a classification of the "Libellulinen" (1889). This paper is essentially a critical comparison of the classifications proposed by Brauer and by Kirby. However, as these authors agreed upon the composition and relative isolation of the group containing Diastatops and Palpopleura Karasch's remarks on this group were limited. He pointed out that Kirby's genus Potamothemis was a synonym of Zenithoptera which had been erected by Selys in 1882. In a later paper (1900) dealing with the fauna of the Moluccas and Borneo, he gave a new classification for the Libellulidae (restricted by the separation of the Cordulidae) to subfamilies. Four subfamilies were recognized; one of these was the Palpopleurinae, having the costal margin of the fore wing sinuated before the nodus, and containing the genera Zenithoptera, Palpopleura and Diastatops. This was, of course, merely, the "III Gruppe" of Brauer raised to subfamily rank.

Five specimens of Diastatops from Brazil were among the material studied by Calvert in the preparation of his paper on the Neotropical Odonata fauna (1909). These were referred to three species - pullata, fuliginea and tincta. These appear to be the only records for fuliginea and tincta, other than the original Ramburian descriptions, based upon actual specimens.
Examination of Calvert's specimens in the course of the present study shows that his fuliginea was composed of a male pullata and a female obscura, and that those specimens called tinota and pullata, respectively, are really obscura and a new species (intensa).

The references to tinota in morphological studies by Needham and Anthony (1903) and Butler (1904) include no information concerning the specimen studied. From a statement by Butler concerning the source of her material, however, one may well believe that the specimen belonged to the Hagen Collection, being one of "some specimens loaned by the Museum of Comparative Zoology, which were at that time in his (Needham's) possession".

A study of the Diastatopse material of the Collection de Selys, which included Rambur's specimens of fuliginea (?), tinota and pullata, led Rie (1910) to the conclusion that, in addition to the clearly distinct dimidiata, only one species exists. "Nach dem von uns untersuchten Material scheint es unzweifelhaft, dass hier nur eine Art vorliegt und wahrscheinlich, dass die nominellen Arten eher Varietaten als geographische Formen sind." However, when the rich lot of material collected by the Williamson expedition to British Guiana in 1912 and the field notes made by E. B. Williamson were studied, this decision was reversed; "stehe ich keinen Augenblick an, diese Ansicht zu revidieren, nachdem mir Mr. Williamson's neues reiches Material
vorliegt, samt den Beobachtungen dieses so erfolgreichen wie kompetenten Forschers. In sehr vielen Fällen sehen die Dinge aus der Schreibtisch-Perspektive anders aus als in der freien Natur und das letzte Wort wird immer der Beobachter haben, der die Tiere in ihrer natürlichen Umgebung sieht." Ris' description of the genus is very complete; it includes not only a more detailed enumeration of venational characters than had been given by previous authors, but also a thorough discussion of the body and leg characters. His specific descriptions include brief descriptions of male and female genital characters and rather extensive notes on the variation in the extent of areas of secondary reticulation and in the coloration of veins and wing membrane, especially the variation illustrated by specimens from different localities. Measurements (length of abdomen, rear wing and pterostigma) are given for many specimens. This great monographic work on the "Libellulinen" includes a thorough study of the characters and relationships of genera. Ris arranged the 120 genera which he recognized as valid into ten groups. His "III Gruppe" contains in addition to the Palpopleurinae of Karasch the genus Perithemia, although he noted, "Die Stellung der Gattung im System ist zweifelhaft; sie könnte auch zur VII Gruppe (Leucorrhinia, Celithemia, etc.) gestellt werden".

There have been numerous references to Diastatopas since the publication of the Libellulinen, but most of these have
consisted merely of records of *obscura* and *pullata* without descriptive or ecological notes (Navas, 1931, 1933–3 papers, 1934; Sjøstedt, 1918; Ris, 1938), or have been mere passing or comparative notations concerning the group in discussions of faunae of other regions (Ris, 1931; Bartenev, 1915, 1929).

Several of the papers by Williamson dealing with other genera (1915, 1916, 1917) have referred to the capture of one or more species of this genus, and the accounts of the University of Michigan–Williamson Expedition to Brazil (1932; J. H. Williamson, 1923) described a number of habitats of *Diaatatopa*. However, the field notes from the several Williamson expeditions are quoted extensively in this paper, as many of the specimens are discussed for the first time herein.

In her paper on the Odonata of Matto Grosso, Longfield (1939) lists *obscura* and *pullata*. However, her record of *obscura* is based upon Calvert's *tinota* determination discussed above. Some of her *pullata* specimens have been studied and were found to be *intensa*, but her note concerning the differences in coloration exhibited in her material would indicate that another species was represented also.

Navas (1933) recorded a specimen from Piquette, Santa Fe (Argentina), under the name "*Diaatatopa fuecata* F." The name, however, must be a lapsus calami as I have been unable to find any other reference to any such specific name in the Odonata. As
nothing is included in the record except the date, locality and collector, one can only guess what species is intended, except that no species of Diastatops other than intenae appears to have been taken so far to the south.

The published illustrations of Diastatops have been both poor in quality and few in number. Rambur's illustration of pullata, showing the venation in one pair of wings and the course of the principal veins in the other is an artist's drawing and is not accurate. Ris' photographic illustration of the wings of pullata is not distinct and shows very little of the venation. (I have not seen Drury's figure.)

The classification of Libellulid genera by Ris was adopted with a few minor changes by Tillyard (1917), who divided the group into eight tribes; his tribe Palpopleurini is Ris' "III Gruppe".

In a study of the venation of the Libellulidae, based, for the most part, upon the photographs of wings in Ris' Libellulinen, Needham and Broughton (1927) gave a new arrangement of genera. Diastatops was placed in the tribe Celithemini, characterized chiefly by having the bisector of the anal loop nearly straight (the outer end forming an angle of less than 30° with the basal portion) and containing "a preponderance of forms with colored wings" and copious venation. Twenty genera were included in the tribe but natural subgroups were recognized.
"Diastatops, Zenithoptera, and Palpopleura have long been set apart on the possession of a costal vein that is undulate before the nodus. This alone is hardly a character of tribal value. It fails in species of Palpopleura. Ris included Perithemis with these three genera and on venational evidence we add others."

The relatively frequent suppressions and resurrections of nominal species which have occurred indicate that Diastatops would have been a "splitters' and lumpers' paradise" had an abundance of material been available to students of the Odonata. The numerous mistakes in application of specific names have been due to the inadequacy of Rambur's diagnosis of species and the unavailability of his material to most authors. The present interpretation of the names used by authors is possible because much of the material listed by Kirby, Calvert, Ris and Longfield, to-gether with critical notes and drawings of the speci­mens studied by Burmeister and Rambur, has been brought to­gether for comparative study.
The distribution of Diastatops, as known, extends from the lower Magdalena (Sevilla, Colombia) and Orinoco (Cano d’Vagre, Venezuela) basins to the lower Parana basin (Santa Fe, Argentina). Although there are no records for southern Colombia and Venezuela and for the great central plateau of Brazil, this is probably due to inadequate collecting. The localities along the Amazon from which we have records of Diastatops form an almost unbroken chain of the river ports from Belem to Iquitos. At least three lines of distribution may be seen to lead from this chain of records to the Rio Parana. These lines consist of the Tapajoz-Paraguay, the Madeira-Guapore-Paraguay, and the Madeira-Mamore-San Miguel systems. However, as indicated above, these lines are probably only apparent paths of distribution created by the vagrancies of collecting through an area in which the occurrence of the genus is continuous. There is an almost continuous line of records along the coast from the mouth of the Magdalena to Rio Grande do Sul, and there are also records from the minor river systems in the interior of eastern Brazil.

The metropolis of the genus is the middle Amazonian region - from the Rio Tapajoz to the Rio Japura. All of the known species, with the possible exception of dimida, occur in this area, and three of them - emilia, maxima, and nigra - are now known only from this region.
Neither of the three natural groups of the genus is confined entirely to the Amazon. In the *obscura*-group, *maxima* and *nigra*, known from only one and two localities respectively, very likely occur only here, but *obscura* is the most widely distributed species of the entire genus. Its known range extends from Colombia to Paraguay and eastern Brazil. However, it has not been taken on the upper Amazon.

Of the *pullata*-group only *emilia*, found at three localities on the Rio Tapajoz (all of these probably close together and rather close to the mouth of the river), has not been found outside of the middle Amazonian region. However, *esterae* is known from only one locality outside of this area - southern British Guiana. This record indicates a range extending far up the Rio Jaupery and/or Rio Branco basins from the Mannos district where this species is comparatively common. The available records indicate that the distribution of *intensa* along the Amazon is limited - probably including only the vicinity of the Rio Tapajoz and, thus, being identical with that of its near relative, *emilia*. However, *intensa* is not confined to this area but extends by the Rio Tapajoz-Paraguay "pathway" into the edge of the south temperate zone. Here, it occurs over a wide area - Argentina to Rio de Janeiro - and reaches much farther to the south than any other species of the genus.

*Pullata* has been taken throughout the length of the Amazon and along many of the principal tributaries, especially those from
the south. It is found also along the coast in either direction from the mouth of the Amazon, at least as far as British Guiana to the north and the State of Bahia to the south.

*Dimidiata*, which stands alone in the third group of the genus, is primarily a coastal species; all the records, except those from the Rupununi River and the Parana de Buyassu, are from localities within a few miles of the sea.

Although further collecting will no doubt extend the known range of several, if not all, of the species, it is probable that the limits of distribution of the genus are approximately matched by the outlying records. However, the discovery of *Diastatops* in Central America or even in Mexico would not be a complete surprise in view of the occurrence there of other groups centered in the Amazonian region and the presence of one species of *Diastatops* as far south as 30° and of another to about 25° south latitude. Of special interest in this respect is the recent capture of specimens of *Zenithoptera*, the most closely related group to *Diastatops*, (both in structure and distribution) in Nicaragua.

The distribution of the several species has been determined as accurately as possible by mapping the records from literature and the material studied. Considerably difficulty was encountered in locating many of the place names given by collectors and several of them could not be definitely mapped. Many of the cities and villages of Brazil (and other South American countries?)
have local names which are entirely different from the "official" names used on maps. Furthermore, many places appear to be known by two or more names, and certain names exhibit considerable metamorphosis in spelling among the maps consulted. The collectors of Diastatops in addition to using such variants without comments, have frequently given as the locality of a capture the name of a cattle ranch or estate which does not appear on any map and which, in the case of the earlier collectors, may have ceased to exist now.

Most of the places mapped have been located by means of the maps in the atlas of the Century Dictionary, those in Stiehler's Atlas of Modern Geography, the National Geographic Society map of South America, and a "Carta Geographica do Brazil" published by the "Club de Engenharia" (of Brazil?) and furnished by me by Mrs. Concha Romero James, Chief of the Division of Intellectual Cooperation of the Pan-American Union. Information concerning the location or identity of certain specific place names was given me by Mrs. James, Dr. P. F. Calvert, Dr. Hugo Kahl, Dr. J. Chester Bradley, and Mrs. Leonora K. Gloyd.

The location and interpretation of each place name as used in this paper is indicated in the following list of localities. This list also contains such information as I have been able to compile concerning the conditions existing at collecting stations when specimens of Diastatops were secured as almost the only contribution to the ecology of the genus possible.
List of localities at which specimens of Diastatops have been collected

"Alegre is a small town in the State of Espirito Santo, near the Itabapuana River". (Mrs. James)

Alta Mira, Para, a town on the Rio Xingu at about 3° south latitude, a point where the river bends abruptly to the south-east.

Amazonas, the largest of the states of Brazil. It has an area of approximately 730,000 square miles and contains the major portion of the upper Amazon basin. Many specimens are labelled "Amazon." or "Amaz." but in most cases such labels refer to the river or the Amazonian region in general. Most of the material so labelled, however, could be assigned to more definite localities, usually in the State of Para, from additional information on the labels or from a knowledge of the route followed by the collector.

Barreiras, Para, along the Rio Tapajoz but not definitely located.

"Bauru is located in the central part of the State of Sao Paulo, Brazil, something like half way between the city of Sao Paulo and the Rio Parana. It is an important railroad and agricultural center, but is on the edge of a virgin forest of a very tropical nature which extends from west of Bauru to the river. As Harris and myself stopped in Bauru only over night we had no great opportunity for collecting, and in fact the only
collecting that I recall was done in a patch of ground near the railroad station in the town, although it is possible that we may have also walked out a ways into the open country." (Dr. Bradley, in litt., March 9, 1938)

Belem, (also called Para), the capital of the State of Para. It is located on the Rio Para, the estuary of the Rio Tocantins, which also receives channels from the Rio Xingu and the Amazon delta.

"Benevides, Para, is situated about 22 miles from the city of Para (or Belem as the Brazilians call it) on the Braganca Railroad. Benevides is on slightly elevated ground, originally unbroken forest, but largely cleared and under cultivation; however there are fair-sized patches of virgin forest in the Benevides district". (Dr. Kahl, in litt., March 16, 1938)

Boqueirao, Bahia, "near the junction of Rio Preto and Rio Grande". (Label on specimens collected January 7, 1908, by J. D. Haseman.)

Bota Io Pinto, not definitely located. Two specimens in the His collection bear the label "Para, Bota Io Pinto, Matto, November 6, 1901. Hagman."

Cachoeira, Matto Grosso, "This is a stream, or small river, which rises near Chapada, flows N. then N. E. and finds its way to the R. Cuyaba. The collections with this label were made at a place about fifteen miles N. E. of Chapada, where the river passes through a gap in the hills. Forest and grass-land with
some boggy places." (Calvert, 1909, quoting from H. H. Smith.)

Cachoeira Cuyaba, Matto Grosso. Calvert (1909) has no note concerning this locality but Longfield (1929) made the following comments. "There is some doubt as to the locality 'Cachoeira Cuyaba'. Mr. Smith himself, a few years later, could not say where this was, but it may be the village of Cachoeira, south of Cuyaba, and lying a short distance back from the river of that name, on the Sangrador Grande. The further description, in every case, of 'flooded campo, Jan. 1886', makes it unlikely that he meant Cuyaba itself, as there is very little land liable to flooding so far north." However, it is in the same general locality as Cachoeira, above, and records bearing the two labels may safely be mapped together on our small scale map.

Cano d'Vagre, Venezuela. "Mr. Stewardson Brown, who made the collections at this locality was Curator of the Herbarium at the Academy of Natural Sciences. As far as I can ascertain, he published no account of the trip or of the localities at which collections were made. Mr. Brown died a number of years ago. Dr. Pennell, present Curator, has shown me a herbarium sheet of plants from this locality, and I have copied on your list the information which the label on that sheet furnishes. 'Cano del Vagre, Oronoco (so spelled on herbarium label!) Delta, Venezuela, Jan. 28-29, 1911.' The Venezuelan expedition in which Mr. Brown took part is known as the Bond Expedition, after Mr. Bond, an ornithologist who headed it." (Dr. Calvert, in litt., March, 11,
1936)

Carepi, not located.

Carvoeiro, Amazonas, a town on the right bank of the Rio Negro, almost opposite the mouth of the Rio Branco. "From Carvoeiro to the mouth of the Rio Branco many teneral Diastatops and a few other libellulines came to rest on the ropes, rails and netting of the boat. Fellow passengers and some of the crew eagerly assisted in catching them by hand." (Williamson, 1923). However, only one specimen from Carvoeiro is in the material from the Williamson collection!

Cayenne, the capital of French Guiana. It is located on the coast, at about 5° north latitude. The name is sometimes applied to the country - French Guiana - also.

Ceará, one of the states of Brazil, located approximately between 3° and 8° south latitude and 36° and 41° west longitude. It has a coast line of about 400 miles and an area of about 40,000 square miles. The capital, also called Ceará (or Fortaleza), is on the coast.

Córdoba, Amazonas, a town on the south bank of the Amazon between the Rio Purus and Teffe, at a point where the river bending to the south reaches its southernmost limit.

Corrientes, Argentina, a city on the east bank of the Rio Parana, a short distance below the mouth of the Rio Paraguay. Also the province of which this city is the capital.

Costa Aguaray, Paraguay, not located. Records of other speci-
mens from this locality furnished by Mrs. Gloyd have the further
information "Inner Paraguay" or "Central Paraguay". All the
specimens are from the Forster Collection.

Cumara, Colombia, not located.

Essequibo River, arises in the mountains forming the southern
boundary of British Guiana and flows north almost the entire
length of the country, receiving a number of tributaries from
the west but few or none from the east.

Formosa, Argentina, a city on the Rio Parana, about 75 miles
below Asuncion, Paraguay. The name is also applied to the
province or territory of which this city is the capital, an area
in the Chaco region, between the Pilcomayo and Bermejo rivers,
extending northwest from the Rio Parana for about 350 miles.

Gaitra, not located.

Georgetown, a city in British Guiana, on the coast at the mouth
of the Demerara River. Dr. Babiy (in litt., Sept. 25, 1928)
quoted the following from field notes by Dr. Forbes concerning
his collections there, Nov. 10-15, 1920, "Mostly in cultivated
fields. It is late in the dry season and everything, except
along the irrigating ditches is parched."

Iquitos, one of the leading cities of Peru. It is on the left
bank of the Amazon or Solimoes River, near 73° west longitude.
The territory north of this river, within which Iquitos is
located is also claimed by Ecuador.

"Itabapuana is a river, boundary between the States of Rio de
Janeiro and Espirito Santo. It flows into the Atlantic at approximately 21° south latitude and 2° east longitude from Rio de Janeiro. There is a small town of this same name on the banks of the river." (Mrs. James, in litt., May 22, 1936)

Itaituba, para, a town on the Rio Tapajoz, about 150 miles upstream from Santarem.

Lapango, Argentina, not found. Ris' record reads "Lapango (N.-Argentin)".

Majoary, not located.

Manacapuru, Amazonas, a town on the north bank of the Amazon, about 50 miles above the mouth of the Rio Negro. Between this locality and the "delta" of the Rio Japura is an area over 300 miles long and 100 miles (maximum) wide, between the Amazon and the Parana Codajoz, filled with paranas and lakes.

Manaus, the capital of the State of Amazonas, on the Rio Negro almost at its affluent with the Amazon.

Maranhao, one of the states of Brazil, extending along the northeast coast approximately from 41° to 46° west longitude, and extending south and southwest into the interior for 300-500 miles. It has an area of about 177,500 square miles. The Rio Tocantins and a tributary form the western boundary for a few hundred miles but receive the drainage of only a narrow strip within the state, the remainder of the area being drained directly to the Atlantic through a number of small rivers.

Massuary, not found.
Matto Grosso, one of the states of Brazil. Its area is approximately 530,000 square miles. Miss Longfield, in her paper listing the Odonata known from Matto Grosso (1929) gave the following description of this area. "The greater part of the central tableland of Brazil, where the Paraguay River, and many of the important tributaries of the Amazon River, have their origin. A small portion of the S. W. of the State is swampy alluvial land, through which flows the Paraguay River. The highest point in Matto Grosso is estimated at only 3250 feet, but the largest part of the plateau ranges between 1000 and 2000 feet. The State of Matto Grosso is not covered entirely by forests as its name would indicate; the vegetation in the southern half is largely thick scrub 8 to 10 feet high, with virgin forest along the river banks and in isolated patches of varying extent."

Maues, Amazonas, a city on the Rio Maues, which joins the Amazon at Parintins. However, the region between Maues and the Amazon from the Rio Madeira to Parintins, an irregular area about 50 miles wide and almost three times as long, called "Ilha Tupinambarara" on the "Club de Engenharia" map, appears to be a wilderness of lowlands, or swamps, containing numerous paranãs or channels.

Minas Gerais, one of the states of Brazil. It is in the east central region and has an area of about 222,000 square miles. A portion of the state is drained by minor rivers direct to the Atlantic through the neighboring state of Espírito Santo and the
southern tip of Bahia. However, a considerable portion of the area lies in the basin of the Rio Sao Francisco, a river 1800 miles long, which flows north and east through Bahia to the southern boundary of Pernambuco, thence southeast to the Atlantic.

Miritituba, Para, a town on the right bank of the Rio Tapajoz, about 150 miles above Santarem, and opposite Itaituba. Given as Uixituba on some maps.

Moura, Amazonas, a town on the right bank of the Rio Negro, about 150 miles upstream from Manaus.

"Moxos is the name of an Indian tribe inhabiting parts of eastern Bolivia and western Brazil, on the banks of the Guapore and Mamore rivers." (Mrs. James, in litt., May 22, 1936)

Mte. Christo, Para, along the Rio Tapajoz, but not definitely located.

Murucupi, not found.

"Nova Olinda, Rio Purus (Amazonas), situated about 600 miles up the Purus River, a tortuous stream. There is a large clearing surrounded by dense forest; hilly country in the back away from the river." (Dr. Kahl, in litt., March 16, 1936)

Obidos, Para, a city on the north bank of the Amazon, approximately halfway between Parintins and Santarem.

Ouquepe Island, Uassa Swamp, Para. (See Uassa Swamp.)

Para, one of the states of Brazil. It has an area of almost 450,000 square miles in the lower Amazon basin. The metropolis of the genus is located in the western part of this state and the
adjoining State of Amazonas. The name is also applied quite generally to the capital of the state - more properly called Belem.

Parana de Buyassu, in the lower Amazon region (State of Para?), not definitely located. However, it must be near, if not in the Amazon delta, as Austin while on the "Expedition of Messrs. Siemens Bros. Cable S. S. 'Faraday'" (Kirby, 1897), in 1896 obtained specimens at Para (Belem) on January 10 and at this locality during the period January 15-18.

Peba (See the following).

Peba, a city in Peru, on the north bank of the Amazon, at the mouth of the Ambiyacu River. I have followed Dr. Calvert's suggestion that his record (1910) of "Peba" for pullata refers to this locality.

Pernambuco, one of the states of Brazil. It extends inland for over 400 miles from the most eastern point of the continent, and has a north-south width of about 60 to 150 miles. This name is also applied to the capital of the state - Recife.

Pied Saut, Oyapoc (or Oyapock) River. This is on the French Guiana side of the Oyapoc River, which forms the present boundary line between Brazil and French Guiana. The locality is hilly, densely forested except for small farms or other clearings, and lies at the foot of the vast chain of rapids extending up to near the watershed. No swamp here. There is considerable current to the river, up to Pied Saut when the tide is running out, but the
flow is checked when it turns inward. Pied Saut is about 45 or 50 miles from the sea, following the bends of the river." (Dr. Kahl, in litt., March 16, 1936)

Porto Velho, Amazonas, the third largest city in the Amazon basin. It is on the Rio Madeira at approximately 64° west longitude, only four miles from the Amazonas-Matto Grosso boundary and about 1800 miles from Belem.

"From January 21 to March 5 and from April 18 till May 30 (1922), we collected in and near Porto Velho when weather conditions permitted. The original heavy forest had been cut away for at least a mile back from the river, but within this area there were sufficient second-growth trees and bushes to furnish shelter for some species of dragonflies along several streams and around a deep lagoon filled with backwater from the river. ...... A small waterfall in the eastern part of town and the same creek in the vicinity of Barbados Hill furnished convenient places to collect during short periods of sunshine on more or less rainy days."

"By following our roads and mule paths for about two miles north of town, we found several small creeks in the forest. They were similar in character, two to three feet wide, ankle-to hip-deep with soft muddy bottoms, flowing in well-wooded ravines among dense undergrowth. ...... Farther east in the woods was a much larger stream, too deep to wade, flowing swiftly between high, steep earthen banks. Several visits to this larger stream yielded very few specimens and nothing different from the smaller creek species."

"We spent January 29, ...... on one of the Company's launches. After going several miles down the Rio Madeira, which was reported to be forty feet above low water stage, we entered several creek basins and navigating among treetops with flooded woodland on all sides. Only a few dragonflies were caught, but we secured quite a collection of ants and spiders that fell into the launch along with twigs and bark as we bumped and crashed through the branches." (J. H. Williamson, 1923)

Progreso, Amazonas, "a fazenda between Maues (which see) and Parintins on a parana of the Amazon River". (Field notes, J. H. Williamson)
Rio Cuyaba, one of the three branches of the Rio Sao Lourenco, a tributary of the Rio Paraguay. Miss Longfield's record (1929) is from near Cuyaba, concerning which she wrote, as follows.

"This is the small and very isolated capital of the State. It stands 1000 feet above sea-level on the small Cuyaba River, a tributary of the Paraguay. The soil of the surrounding country is largely composed of broken-down slate, and the vegetation is of fairly thick scrub, containing many conspicuously flowered trees, but with no forest."

Rio de Janeiro, one of the states of Brazil. It is located on the southeast coast, approximately between 41° and 45° west longitude.

Rio Grande do Sul, the most southern of the states of Brazil, consisting of a roughly quadrangular area of about 91,000 square miles, south of the Uruguay and Polatas rivers. Concerning the specimens (Acad. Nat. Sci. Phil.) from this locality, Dr. Calvert wrote (in litt., December 6, 1927), "The history of the spms. 'Supposedly (from) Rio Grande do Sul, Brazil' is as follows: The B. C. A. Collections were sent to me from Berlin, as Karsh had been my immediate predecessor in accepting the job of working them up and had ended by giving them up. Among the lot was a box of Odonata with no locality or other labels than numbers, such as these 3 spms. bear. The B. C. A. people in London didn't know anything about them and finally, I can't now remember how, a clue seemed to run to H. von Ihering at R. G. do S. I
wrote to him and described the spms. & his reply made it probable that they were some which he had sent to Berlin for identification but never heard from. I can't now find v. Ihering's letter, and there is of course some possibility of error. I think I sent him some spms. or labels to examine and these helped to identify them."
The Selysian specimens (His, 1910) from this locality also came from von Ihering.

Rio Japura (or Rio Yapura), rises in the mountains of southern Colombia, within less than 200 miles of the Pacific and joins the Amazon near Teffe. Dr. Sjostedt (1918) has only the following brief comment concerning Dr. Roman's visits in this region and at Masaos, "Die von ihm besuchten Orte sind: ...... Rio Japura, am Landgut Chicago im Deltagebiet, April, 1915; ........ - Manaos: Bosque Municipal gleich N. W. und Cachoeirinha gleich O. von der Stadt u. a. Platze in der Nahe von Manaos, Dezember 1914- Mai 1915."

Rio Paraguay, the northern branch of the Rio de la Plata system. Its headwaters are found in the tablelands of Matto Grosso, intermingled with the sources of the Rio Tapajoz so that the two systems form a pathway from the lower Amazonian region into the rivers of southern Brazil and Argentina.

Rio Purus, one of the principal tributaries of the Amazon, arising in central east Peru and the southern part of western Brazil, and flowing by a very tortuous course to join the Amazon about 100 miles above the mouth of the Rio Negro.
Rio Sao Lourenco, Matto Grosso, a tributary of the Rio Paraguay, flowing into the latter at about 18° south latitude. Its lower course, where Miss Longfield's Diastatops captures were made, is through an area indicated as swamp lands on the Club de Engenharia map. It consists of three main branches, the Rio Pequiiry, Rio Sao Lourenco, and Rio Cuyaba. The latter rises in the vicinity of Cachoeira (which see).

Rio Tapajoz, one of the major tributaries of the Amazon, formed from streams arising on the watershed of western Matto Grosso, and flowing into the Amazon at Santarem. The sources of this river and those of the Rio Paraguay are in the same locality and the two systems form a continuous pathway for those species found in both the Amazonian and the Parana-Uruguay basins.

Rio Tucabaca (Rio Tucavaca), the Club de Engenharia map shows a river of this name in the Bolivian Chaco, arising near 18° south latitude and 60° west longitude. It flows to the southeast for almost 200 miles through an area indicated as swamp land and joins the Rio San Rafael, a tributary of the Rio Paraguay.

Rio Xingu, rises in the tableland of central Matto Grosso, near the sources of the Rio Tapajoz and the Rio Paraguay and flows northward approximately 1000 miles to enter the Amazon delta.

Rupununi River, arises in the mountains of the extreme south-
east corner of British Guiana. It flows north about half the length of the country, then turns abruptly to the east and after uniting with the Ouitaro enters the Essequibo.

Santa Cruz, Bolivia. "Province del Sara: the collections so stated were made at his home, Santa Cruz de la Sierra and vicinity in the Department of Santa Cruz, Bolivia, by the late Mr. Jose Steinbach." (Dr. Kahl, in litt., March 16, 1936)

Santo Fe, Argentina, a city on the Rio Parana, about 250 miles from the junction of this river with the Rio Uruguay. Also the province of which this city is the capital.

Santarem, Para, a city on the Amazon at the mouth of the Rio Tapajoz.

"Sao Antonio de Guapore, Rio Guapore, (Matto Grosso), situated at the junction of Rio Guapore and a small tributary from the Brazilian side, Rio Sao Miguel, about Lat. 13° South and about Long. 63° West of Greenwich. Dr. Haseman told me that the Rio Guapore with its virgin forest would be an Eldorado for collecting by a young, healthy and energetic collector. Rio Guapore forms the border between Brazil and Bolivia. Dr. Haseman collected fishes, insects incidentally, and brought to the Carnegie Museum the largest collection of fishes during his 2 years travel." (Dr. Kahl, in litt., March 16, 1936)

S. Lorenzo, Bolivia, not located except by His' record (1928) "S. Lorenzo (Rio Tucabaca)". (See Rio Tucabaca.)

Sao Luiz (also called Maranhao), capital of the State of
Karanhao. It is about 300 miles from Belem and is situated on an island between bays at the mouths of a number of rivers, which together drain a major portion of the interior of the state.

Sao Paulo de Olivença, Amazonas, a town on the south bank of the Amazon, about 80 miles below the Brazil-Peru boundary. The labels read, "Sao Paulo de Olivença, Alto Rio Solinoes", and some maps have this portion of the river marked "Rio Solinoes", but the Club de Engenharia map applied this name to that part of the main river above its junction with the Rio Javary.

"Sapucay, a small town in Paraguay, at about 60 miles to the southeast of Asuncion." (Mrs. James, in litt.) In his paper on Orthoptera from Paraguay, collected by W. T. Foster, the late A. N. Caudell (1904), quoted the following remarks concerning this locality from a letter (May 14, 1902) from Mr. Foster.

"Sapucay is a small village situated at the base of a low tableland, the elevation of which is 500 feet above the surrounding country. The trend of the face of the tableland is northwest and southeast. The country to be southwest and east is generally level, broken by low hills rising abruptly from the plains, which extends to the level cattle-breeding lands of the Missions, which in turn give place to the low swamp-land of the southeast corner of Paraguay, which with the exception of a narrow fringe along the rivers Paraguay and Alto Parana, is given over to the anaconda and tiger (jaguar). I was several months down there collecting water-birds, but do not have any very pleasant recollections of the district. Periodical floods extent for leagues inland filling the swamps, which in turn extend for miles; patches of forest from a few hundred feet to a mile in diameter occupy any land rising a few feet above the swamp. A few wandering tribes roam the large forests of the Alto Parana, but the rest is a desolate waste.

"I do not find that the tableland mentioned above bears a different fauna than that of the low lands, nearly all speci-
mens taken by my collecting boys on the higher lands being dupli-
cicated by others from the plains."

"Sevilla (or Seville), Colombia, south of Santa Marta, and
probably between Cienaga and Fundacion, or Fundacion and Cienaga
Grande. Collecting dates also indicate that it is not far from
Rio Frio (at the junction of the Rio Frio and the railroad)."
(Mrs. Gloyd, in litt., Mar. 10, 1936)

"St. Louis de l'Aragnon", the French name for Sao Luiz.
Surinam, another name for Dutch Guiana.
Taperinha, near Santarem, Para. "Taperinha is probably
Terapixum, a little town to the north of Santarem, on the
Amazon River, at about 2° south latitude and 42° west longitude
from Rio de Janeiro." (Mrs. James, in litt., May 22, 1936)

Teffe (also called Ega, and especially, Teffe Ega), Amazonas,
a town on the south bank of the Amazon, at the mouth of the Rio
Teffe, and opposite the lower mouth of the Rio Japura.

Touanina, Amazonas, a city on the left bank of the upper
Amazon, a few miles below the mouth of the Rio Putumayo or Ica.

Tumaturi, a city of British Guiana, on the Potaro River,
which flows east to join the Essequibo at a point about 150 miles
from the coast.

Turaty, not found.

Uacaryzal, Matto Grosso, "a plantation in Matto Grosso either
near the R. Paraguay, or near Cuyaba. I think that it is on
the Paraguay, not far above the junction of the R. Cuyaba; at
any rate there is a cattle plantation there, where we worked for
some time." (Calvert, 1909, quoting from a letter from H. H. Smith). The Uacaryzal records are mapped at the locality on the Paraguay indicated by Mr. Smith.

"Uassa Island, Uassa Swamp. This island was the first place in this swamp where Mr. Klages pitched his camp. He collected here and on Oucoupe Island in June." (Dr. Kahl, in litt., March 16, 1936). (See the following).

"Uassa Swamp, Para. This large swamp region is situated in Brazil, east of the Oyapoc River; it has many small and large elevations, called islands, scattered over the swamp. The islands in the Uassa Swamp are mostly of volcanic origin, except Cajary Island, which is largely quartz and granitic or schistose rock, with overlying soil sufficient to support a heavy growth of forest." (Dr. Kahl, in litt., March 16, 1936)

Victoria (Porto Victoria), Para, a town on the Rio Xingu, about 100 miles above its junction with the paran as of the Amazonian delta. The Rio Xingu here resumes its normal direction of somewhat east of north, after a rather blunt quadrangular "ox-bow" bend to the southeast.

Villanova, Para, a town on the north bank of the Amazon, northwest of Gurupa on the Rio Xingu.

Wismar, a city of British Guiana, on the Demarara River, about 60 miles from the coast.
THE GENUS DIASTATOPS

References


Genotype

The type of the genus Diastatops is Libellula pullata Burmeister, as designated by Kirby in 1889.

Characters of the Genus

Original Description:

"Tête ayant le front tres-saillant et les yeux non contigus. Ailes ayant les principales nervures tres-saillantes et le bord costal echancre, avec le réseau extrêmement serré; pièce
acous-stylaire chez les mâles au moins aussi large que longue, largement échancrée, plus étroite à la base. Pattes grêles, ayant des ailes très-longues, presque comme chez Calopteryx. Six ou sept rangées d'aréoles discoidales.

"Ces espèces présentent une anomalie dans les Libellulines par leurs yeux tout à fait séparés; elles se rapprochent cependant beau coup par leurs ailes, de celles du genre Polyneura, qui ont les yeux contiguës, mais elles ont les nervures plus saillantes, les nervures plus sensibles, et les ailes des trois espèces que je décris sont entièrement d'un brun fuligineux plus ou moins foncé. Les familles me sont inconnues."

**Author's description:**

Head rather small; eyes separated by about one-third their width in dorsal view. Fronto projecting forward rather conspicuously; cephalic surface flattened, the flattened space divided into two more or less circular areas by the furrow; flattened areas and dorsal surface rugose; furrow rather wide and deep. Vertex wide; cut off rather straight in front; apex bicuapid; coarsely punctate or rugose. Occiput trapezoidal (instead of the usual triangular shape in other genera of Libellulidae); smooth and shining, sometimes sparsely and finely punctured. Rear of head smooth, shining black, concolorous. Head without distinct color markings. Labium varying from dull cream, through light yellowish browns to dark reddish brown; however, the particular color in any specimen appears to be due to conditions affecting its drying as there seems to be no constant specific differences and in most cases the original color appears to have been lost. Mandibles greenish or olive brown at base, red or reddish brown at apex. Labrum black or dark brown. Face (clypeus)
dull greenish or olive brown. Cephalic surface of frons dark brown or black, usually with a slight purplish sheen; dorsal surface dark iridescent or metallic purple (bright red in *caterae*). Vertex and occiput metallic purple. Face and vertex clothed with moderately dense black hairs; caudal margins of eyes and occiput fringed with long, rather dense, brown or yellowish hairs.

Lobes of prothorax very distinct; third lobe very large, erect, consisting of two semi-circular lobes, densely fringed with long hairs. A tuft of similar hairs on caudo-ventral angles of middle lobe; remainder of prothorax glabrous, or with very sparse, short, whitish hairs. Pterothorax rather small, slightly compressed; without distinct color markings. Entire thorax dark brown or black on dorsum, varying to light brown or olive gray on sides and below; with moderately dense pubescence, varying in color, more or less, with cuticle, from black above to light brown, or even tawny yellow near the legs and on the coxae.

Legs very long and slender, with conspicuous armature; light to dark brown, sometimes black, especially on feet, usually much lighter at base; all spines black except those in tibial comb which are frequently reddish.

Femora rounded beneath; with more or less distinct carinae on dorsal margins. Caudo-ventral margins with rows of spines more or less confused, the first with a rather distinct row of
10-14 spines and dorsad of this an incomplete row of shorter spines; second with two or three confused rows of very slender spines; third with a row of 15-20 fine spines, and just ventrad of this a row of less numerous, longer spines. Cephalo-ventral margins with a distinct row of spines of unequal length; the first with a row of four to six equally spaced spines in middle third or half of femur, gradually increasing in length outward, then following a space of about twice the usual distance a very long spine and at the apex of the femur a fine spine or hair of moderate length; the second with a row of eight to 12 spines, the first very small, sometimes only a short triangular tooth, spines in proximal half of row gradually increasing in length, those in distal half equal in length, at the end a more slender spine of moderate length; frequently a trace of a row of hairs just dorsad of the base of this row of spines; the third with a row of 10-16 spines, gradually increasing in length outward from the first short triangular "tooth", except near the end a very long, more widely separated spine and then a fine spine of medium length. Ventral surface of femora usually with a row of slender spines; dorsal surface frequently bearing a few fine, rather long, yellowish hairs; dorsal carinae, especially on second and third femora, with triangular, black teeth or serrations.

Tibiae flattened beneath and to a considerably less degree
above; dorsal carinae serrate, teeth acute, decumbent, black.

Tibial spines very long at base - one-third to one-half the length of the tibiae, gradually decreasing in length outward; more distal spines of each row frequently conspicuously shorter and more closely placed; caudo-ventral row containing approximately eight to 10 spines on first tibia, 12-17 on second and 13-19 on third; cephalo-ventral margin of first tibia with a row of about five spines on proximal half, followed by a "comb" of 9-12 flattened, somewhat curved, closely placed spines of about equal length on distal half; cephalo-ventral row on second tibia consisting of eight to 13 spines, that on third of 11-13.

Claws long and slender; tooth small, distad of middle.

Wings very broad; wholly or in large part dark; venation very dense and with a considerable degree of variation in the number of cross veins and cells even in the most definitive areas; a considerable development of well-defined sectors and planates in many parts of the wings. Costal margin of the fore wing undulate, having a broad arc-like emargination at or slightly less than half the distance to the nodus. Many antenodal cross veins (15-22 in fore wing, eight to 15 in rear wing), the last usually incomplete. Three to seven cells after the first in the costal postnodal region of the fore wing bisected by a longitudinal vein or with anastomosing cross veins in this area (except in dimidiata); eight to 17 postnodal cross veins in the
rear wing. Many accessory bridge cross veins (usually two to eight or more). M_{1a} arising about one cell before the proximal end of pterostigma. M_2 rather weakly undulate; Rs smoothly curved. Rpl and Mpl well formed, subtending two to four rows of cells each. Arculus on first antenodal cross vein or slightly distad in fore wing, slightly distad of first to mid-way between first and second in rear wing. M_3 and M_4 arising separately from arculus or united for a very short distance in the fore wing, united for a slightly greater distance in the rear wing. Usually many supra-triangular cross veins (three to 11 in fore wing, one to four in rear wing). Triangle of fore wing widely distad (about five cells) of proximal angle of that of rear wing; distal side of both triangles concave; many celled (three to eight in fore wing, two to eight in rear wing). Cu_1 of fore wing strongly curved, approximately concentric to M_4 in distal two-thirds of its length; discoidal area of fore wing narrowed somewhat in proximal third, thence parallel to wing margin; usually five to 13 cells following triangle and five to eight rows in middle portion; in proximal portion of area in both wings well-defined transverse sectors divide the area into fields of two to four rows of cells. Cu_2 of fore wing two to four branched; all branches usually well-defined to the wing margin. Regularly one cubito-anal cross vein in fore wing, but sometimes a second far distad of the first; usually two in the rear wing.
wing, sometimes one, more frequently three, or, rarely, even four; the most distal one sometimes branched, or the area near the triangle containing a network of veins. No internal triangle in the fore wing, the area proximad of the triangle divided into two to four fields of two or more rows of cells each by transverse sectors arising from the anal vein; a branch arising from Cu₂ runs proximad to join A and form a more or less elliptical "loop" of about five to ten cells. Anal area of rear wing very broad; loop long and broad; outer angle well rounded; anal angle about on a level with the distal angle of triangle; gaff less than sole, frequently only two-thirds as long; bisector nearly straight, having an angle of 30° or less, arising about one-fifth or less of the distance from A₂ to A₁, forked at the bend, the outer branch running to the outer angle of the loop; area proximad of the loop divided into long narrow fields of two or more cells (in width) by numerous sectors; usually a secondary loop (corresponding to or identical with the patella of Needham) of a few to many cells just proximad of the base of the loop. Pterostigma very large, reddish brown; membranule moderately large, smoky gray to dull black.

Abdomen rather short, slightly swollen at base; more or less spindle-shaped in the male, segments four to 10 triangular in cross-section; sides more nearly parallel in the female,
also sides and venter rounded out more than in the male. Transverse carinae on segments 3 and 4. Segment 1 and, sometimes, anterior half of 2, black on dorsum; 2-3 red on dorsum, dull brown to olive green on sides and venter; 4-9 red on dorsum and sides, reddish brown below, margine and carinae sometimes black; 10 usually black, sometimes with more or less red.

Superior appendages rather small, each with a row of four to seven teeth below, very dark reddish brown or black; inferior appendage about two-thirds as long as superiors, caudal margin hollowed out, sides divergent or sub-parallel, usually red or reddish brown with black margins. Male genitalia small; front lobe infrequently equal in length to hamule, usually less, caudal margin sinuate; hamule with strongly recurved hook on mesal margin, outer lobe not greatly developed; genital lobe equal to or greater than hamule in length, size and shape varying with the species, strongly margined; caudal margin of front lobe and margins of genital lobe fringed with moderately long hairs.

Appendages of female cylindrical; straight or slightly curved; apex acute, extending beyond tip of abdomen; very dark reddish brown or black. Margins of segment 8 in female turned down, not expended; vulvar laminae small, scale-like, covered by folded down margins of segment 8.
Variation:

There is little color variation among individuals or species of *Diastatops*. In dried specimens, at least, no distinct color markings are evident. The colors most common in dried specimens are browns of varying shades, red, purple and black. Tenerals are lighter in color than mature specimens; the increase in the intensity of coloration with age is most marked in the wings. Wings of tenerals, even of the *obscura*-group, are rather transparent and the postnodal light areas are usually quite evident. In mature specimens (except in *dimidiata*) most of the wing membrane is opaque and the postnodal light areas are much less evident, even in many specimens of the *pullata*-group. The brilliant red veins found in areas of secondary reticulation in mature specimens of the *pullata*-group are bright yellow in tenerals.

The most evident and most easily studied characters in *Diastatops* showing variation are found in wing venation. In order to study the variation within each species and, if possible, to discover characters useful in distinguishing species the number of cross veins or of cells in each of 16 different areas in the wings were tabulated. (The "number of wings examined" varies considerably in the summaries of these tabulations as torn, crumpled or folded wings frequently made the examination of
certain areas impossible in some specimens.) The location and the general characteristics of these areas are indicated in Figure 1.

Also, as far as possible, the lengths of the wings and the abdomen of each specimen were determined. (Here, again, the condition of many specimens, especially broken or shrunken abdomens, rendered impractical or impossible the securing of one or more of these measurements in such cases.)

Summaries of these tabulations are presented in Tables 1-17. In order that the tabulations for the different species may be compared directly with each other, they have been reduced to approximate percentages (nearest whole number) of the number of wings of the respective species examined.

In almost every area in which cross veins were counted one or more species exhibited some branching of cross veins. This branching varied from single Y-veins to areas of secondary reticulation within which the identity of individual cross veins was lost. A very common form of branching consisted of an intercalary vein extending over some portion of the area with the parts of the individual cross veins on either side of it displaced, and in some cases with an increase in their number on one side over that on the other. The percentage of cases showing branching is shown in each table. Usually, however, all cases of branching were included also in the proper columns.
indicating the number of cross veins - the smaller number in each area of branching being used.

Very little sexual dimorphism was found in the tabulations of venational characters and most of the summaries include the total count for the several species regardless of the number of each sex examined. However, all original tabulations were made separately for males and females of each species and these are listed in all cases where any marked difference was noted.

Almost all of the species show more or less overlapping in each of the characters tabulated. Therefore, an individual specimen could not be placed specifically by reference to any particular table. However, the variation in any one character is more or less independent of that in other characters, and an undetermined specimen of the genus could be placed in the proper species by comparing it, in turn, with each of the tables.

The lengths of wings and abdomens were recorded to the nearest half millimeter. Only one wing of each pair was measured as preliminary measurements showed that variation between the two wings of each pair of any specimen was negligible.
<table>
<thead>
<tr>
<th>species</th>
<th>number of wings examined</th>
<th>number of cross veins</th>
</tr>
</thead>
<tbody>
<tr>
<td>emilia</td>
<td>18:</td>
<td>44: 33: 17: 6:</td>
</tr>
<tr>
<td>intensa</td>
<td>36:</td>
<td>14: 31: 1: 14: 11: 6:</td>
</tr>
<tr>
<td>estherae</td>
<td>68: 1:</td>
<td>3: 2: 41: 22: 7:</td>
</tr>
<tr>
<td>obscura</td>
<td>178: 2:</td>
<td>4: 11: 31: 29: 18: 5: 2:</td>
</tr>
<tr>
<td>nigra</td>
<td>6:</td>
<td>33: 17: 3: 17:</td>
</tr>
<tr>
<td>maxima</td>
<td>2:</td>
<td>100:</td>
</tr>
<tr>
<td>dimidiata</td>
<td>22: 5: 14: 64: 14: 5:</td>
<td></td>
</tr>
<tr>
<td>emilia</td>
<td>18:</td>
<td>44: 44: 11:</td>
</tr>
<tr>
<td>intensa</td>
<td>14: 25: 36: 14: 6: 6:</td>
<td></td>
</tr>
<tr>
<td>estherae</td>
<td>68: 1:</td>
<td>28: 40: 28: 1:</td>
</tr>
<tr>
<td>nigra</td>
<td>6: 17: 35: 33: 17:</td>
<td></td>
</tr>
<tr>
<td>maxima</td>
<td>2:</td>
<td></td>
</tr>
<tr>
<td>dimidiata</td>
<td>22: 9: 41: 36: 14:</td>
<td></td>
</tr>
</tbody>
</table>

*In this and the following tables, except No. 10, the numbers (other than those in the first column - number of wings examined) are approximate percentages (nearest whole number) of the number of wings of the respective species examined.

Except as indicated otherwise, all cases of branching cross veins listed in the tables are also included in the proper places for the number of cross veins - the smaller number in each area of branching being used.
Table 2. Number of antenodal cross veins (rear wing)

<table>
<thead>
<tr>
<th>species</th>
<th>number of wings examined</th>
<th>number of cross veins</th>
</tr>
</thead>
<tbody>
<tr>
<td>pullata</td>
<td>166</td>
<td>1; 10; 35; 36; 18; 2; 1</td>
</tr>
<tr>
<td>emilia</td>
<td>18</td>
<td>22; 72; 6</td>
</tr>
<tr>
<td>intensa</td>
<td>36</td>
<td>25; 69; 6</td>
</tr>
<tr>
<td>estherae</td>
<td>67</td>
<td>3; 37; 52; 7</td>
</tr>
<tr>
<td>obscura</td>
<td>178</td>
<td>7; 40; 42; 10</td>
</tr>
<tr>
<td>nigra</td>
<td>6</td>
<td>7; 17; 67</td>
</tr>
<tr>
<td>maxima</td>
<td>2</td>
<td>2; 100</td>
</tr>
<tr>
<td>dimidiata</td>
<td>22</td>
<td>5; 27; 85; 14</td>
</tr>
<tr>
<td>pullata</td>
<td>166</td>
<td>5; 23; 40; 25; 5; 1</td>
</tr>
<tr>
<td>emilia</td>
<td>18</td>
<td>6; 56; 39</td>
</tr>
<tr>
<td>intensa</td>
<td>36</td>
<td>6; 36; 44; 14</td>
</tr>
<tr>
<td>estherae</td>
<td>67</td>
<td>1; 36; 31; 12</td>
</tr>
<tr>
<td>obscura</td>
<td>178</td>
<td>3; 29; 38; 22; 7</td>
</tr>
<tr>
<td>nigra</td>
<td>6</td>
<td>50; 50</td>
</tr>
<tr>
<td>maxima</td>
<td>2</td>
<td>100</td>
</tr>
<tr>
<td>dimidiata</td>
<td>22</td>
<td>9; 36; 41; 9; 5</td>
</tr>
<tr>
<td>species</td>
<td>number of wings examined</td>
<td>number of cross veins</td>
</tr>
<tr>
<td>-------------</td>
<td>--------------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>pullata</td>
<td>166:13</td>
<td>5; 6; 7; 8; 9; 10; 11; 12; 13; 14; 15; 16; 17; 18; 19</td>
</tr>
<tr>
<td>emilia</td>
<td>18:6</td>
<td>1: 5; 25; 29; 24; 13; 2; 1</td>
</tr>
<tr>
<td>intensa</td>
<td>56</td>
<td>6: 17; 33; 33; 11</td>
</tr>
<tr>
<td>estherae</td>
<td>68</td>
<td>8: 19; 31; 31; 8; 3</td>
</tr>
<tr>
<td>obscura</td>
<td>178</td>
<td>3: 1</td>
</tr>
<tr>
<td>nigra</td>
<td>6</td>
<td>33; 50; 17</td>
</tr>
<tr>
<td>maxima</td>
<td>2</td>
<td>50; 50</td>
</tr>
<tr>
<td>dimidiata</td>
<td>22</td>
<td>9; 9; 14; 32; 32; 9; 5</td>
</tr>
</tbody>
</table>
Table 3b. Number of postnodal cross veins in rear wing

<table>
<thead>
<tr>
<th>species</th>
<th>number of wings examined</th>
<th>branched number of cross veins</th>
</tr>
</thead>
<tbody>
<tr>
<td>estherae</td>
<td>67: 1</td>
<td>1: 3: 13: 34: 36: 10: 1: 1</td>
</tr>
<tr>
<td>obscura</td>
<td>178: 1</td>
<td>1: 6: 12: 40: 28: 12: 2</td>
</tr>
<tr>
<td>nigra</td>
<td>6:</td>
<td>1: 33: 33: 33:</td>
</tr>
<tr>
<td>maxima</td>
<td>2:</td>
<td>1: 50: 50: 50: 50:</td>
</tr>
<tr>
<td>dimidiata</td>
<td>22:</td>
<td>9: 14: 27: 14: 32: 5:</td>
</tr>
<tr>
<td>pullata</td>
<td>165: 5</td>
<td>1: 2: 8: 28: 34: 20: 5: 1</td>
</tr>
<tr>
<td>intensa</td>
<td>36:</td>
<td>6: 25: 33: 19: 8: 3:</td>
</tr>
<tr>
<td>obscura</td>
<td>178: 8</td>
<td>8: 54: 32: 19: 6: 1: 1:</td>
</tr>
<tr>
<td>nigra</td>
<td>6:</td>
<td>50: 33: 17:</td>
</tr>
<tr>
<td>maxima</td>
<td>2:</td>
<td>50: 50:</td>
</tr>
<tr>
<td>dimidiata</td>
<td>22:</td>
<td>5: 23: 41: 18: 14:</td>
</tr>
</tbody>
</table>
Table 4. Number of accessory bridge cross veins

<table>
<thead>
<tr>
<th>Species</th>
<th>Number of wings examined</th>
<th>Number of veins</th>
</tr>
</thead>
<tbody>
<tr>
<td>intensa</td>
<td>36</td>
<td>:16:33:31:14:</td>
</tr>
<tr>
<td>nigra</td>
<td>6</td>
<td>:33:17:50:</td>
</tr>
<tr>
<td>maxima</td>
<td>2</td>
<td>:50:50:50:</td>
</tr>
<tr>
<td>dimidiata</td>
<td>22</td>
<td>:5:27:18:41:5:5:</td>
</tr>
<tr>
<td>emilia</td>
<td>18</td>
<td>:11:11:72:6:</td>
</tr>
<tr>
<td>intensa</td>
<td>36</td>
<td>:28:33:22:14:3:</td>
</tr>
<tr>
<td>nigra</td>
<td>6</td>
<td>:33:17:17:17:17:</td>
</tr>
<tr>
<td>maxima</td>
<td>2</td>
<td>:50:50:</td>
</tr>
</tbody>
</table>


Table 5. Number of supra-triangular cross veins

<table>
<thead>
<tr>
<th>species</th>
<th>number of wings examined</th>
<th>number of cross veins</th>
</tr>
</thead>
<tbody>
<tr>
<td>pullata</td>
<td>166: 0; 1; 2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12; 13; 14; 15; 16; 17; 18; 23;</td>
<td></td>
</tr>
<tr>
<td>emilia</td>
<td>18: 17:39; 22; 17; 6;</td>
<td></td>
</tr>
<tr>
<td>intensa</td>
<td>36: 6; 11; 22; 28; 25; 6; 3;</td>
<td></td>
</tr>
<tr>
<td>estherae</td>
<td>68: 1; 3; 4; 7; 15; 18; 12; 6; 15; 6; 6; 4; 1; 1;</td>
<td></td>
</tr>
<tr>
<td>obscura</td>
<td>178: 5; 18; 31; 28; 12; 4; 2;</td>
<td></td>
</tr>
<tr>
<td>nigra</td>
<td>6: 17; 67; 17;</td>
<td></td>
</tr>
<tr>
<td>maxima</td>
<td>2: 50; 50;</td>
<td></td>
</tr>
<tr>
<td>dimidiata</td>
<td>22: 5; 5; 9; 5; 5; 18; 14; 14; 9; 14; 5;</td>
<td></td>
</tr>
<tr>
<td>pullata</td>
<td>166: 1; 14; 58; 23; 4;</td>
<td></td>
</tr>
<tr>
<td>emilia</td>
<td>18: 83; 17;</td>
<td></td>
</tr>
<tr>
<td>intensa</td>
<td>36: 6; 56; 28; 11;</td>
<td></td>
</tr>
<tr>
<td>estherae</td>
<td>67; 13; 4; 19; 28; 31; 13; 3;</td>
<td></td>
</tr>
<tr>
<td>obscura</td>
<td>178: 3; 61; 32; 3; 1;</td>
<td></td>
</tr>
<tr>
<td>nigra</td>
<td>6: 40; Q</td>
<td></td>
</tr>
<tr>
<td>maxima</td>
<td>2: 30;</td>
<td></td>
</tr>
<tr>
<td>dimidiata</td>
<td>22: 27; 27; 16; 23; 5;</td>
<td></td>
</tr>
</tbody>
</table>
Table 6. Number of cubito-anal cross veins in rear wing

<table>
<thead>
<tr>
<th>species</th>
<th>number of wings examined</th>
<th>number of cross veins branched</th>
</tr>
</thead>
<tbody>
<tr>
<td>pullata</td>
<td>168</td>
<td>1: 2: 3: 4</td>
</tr>
<tr>
<td>emilia</td>
<td>18</td>
<td>1: 2: 3: 4</td>
</tr>
<tr>
<td>intensa</td>
<td>36:14</td>
<td>5: 6</td>
</tr>
<tr>
<td>estherae</td>
<td>67:73</td>
<td>9: 4</td>
</tr>
<tr>
<td>obscura</td>
<td>176:2</td>
<td>8: 9</td>
</tr>
<tr>
<td>nigra</td>
<td>6</td>
<td>1: 2</td>
</tr>
<tr>
<td>maxima</td>
<td>2:50:50</td>
<td>1: 3</td>
</tr>
<tr>
<td>dimidiata</td>
<td>25:45:5</td>
<td>19:32:5</td>
</tr>
</tbody>
</table>

*Because of the extent of branching of the distal cubito-anal cross vein, especially in estherae, in which this region is frequently a densely reticulated area, no attempt was made to count the number of cross veins in wing with branching of this vein.

‡There is a high degree of sexual dimorphism in this character in estherae, and differences of less degree between the two sexes of dimidiata. More or less branching of the
distal cubito-anal cross vein was noted in 46 of the 47 male wings of estherae examined, but such branching was evident in only three of the 30 female wings of this species examined.

In dimidaea, however, branching of this vein occurred in five of the eight female wings examined, and in five of the 14 male wings seen.
Table 7. Number of cells in triangle

<table>
<thead>
<tr>
<th>species</th>
<th>number of cells</th>
</tr>
</thead>
<tbody>
<tr>
<td>pullata</td>
<td>165</td>
</tr>
<tr>
<td>emilia</td>
<td>18</td>
</tr>
<tr>
<td>intensa</td>
<td>36</td>
</tr>
<tr>
<td>estheraeae</td>
<td>68</td>
</tr>
<tr>
<td>obscura</td>
<td>177</td>
</tr>
<tr>
<td>nigra</td>
<td>6</td>
</tr>
<tr>
<td>maxima</td>
<td>2</td>
</tr>
<tr>
<td>dimidiata</td>
<td>22</td>
</tr>
<tr>
<td>pullata</td>
<td>166</td>
</tr>
<tr>
<td>emilia</td>
<td>18</td>
</tr>
<tr>
<td>intensa</td>
<td>36</td>
</tr>
<tr>
<td>estheraeae</td>
<td>67</td>
</tr>
<tr>
<td>obscura</td>
<td>178</td>
</tr>
<tr>
<td>nigra</td>
<td>6</td>
</tr>
<tr>
<td>maxima</td>
<td>2</td>
</tr>
<tr>
<td>dimidiata</td>
<td>22</td>
</tr>
</tbody>
</table>

Note: The numbers represent the number of cells examined for each species.
Table 8. Number of cells following the triangle of the fore wing

<table>
<thead>
<tr>
<th>species</th>
<th>number of cells</th>
</tr>
</thead>
<tbody>
<tr>
<td>similis</td>
<td>6:34:43:16: 1: 1:</td>
</tr>
<tr>
<td>intensa</td>
<td>8:56:28:11:</td>
</tr>
<tr>
<td>sathérea*</td>
<td>8:59:25: 8:</td>
</tr>
<tr>
<td>obscura</td>
<td>17:48:37:16: 1:</td>
</tr>
<tr>
<td>nigra</td>
<td>6:17:67:17:</td>
</tr>
<tr>
<td>maximíma</td>
<td>10:</td>
</tr>
<tr>
<td>dimidiata</td>
<td>23: 9:33:50:18:</td>
</tr>
</tbody>
</table>

*There is some sexual dimorphism in this character in sathérea; the area of secondary reticulation in the fore wing, more marked in the male than in the female includes the region following the triangle. Of the 30 females examined the number of cells following the triangle varied as follows: seven cells - 28%, eight - 50%, nine - 10% and ten - 1%. Forty-eight male wings were examined and the following distribution was found: nine cells - 4%, 10 - 31%, 11 - 26%, 12 - 17%, 13 - 21%, 14 - 4% and 15 - 8%.
Table 9. Number of cells in "loop" of fore wing

<table>
<thead>
<tr>
<th>species</th>
<th>number of wings examined</th>
<th>Loop not formed</th>
<th>number of cells in &quot;loop&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxima</td>
<td>2: 50: 50: 50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>dimidiata</td>
<td>21: 5: 33: 45: 10: 10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 10. Number of cells in the secondary loop (patella) of the rear wing.

<table>
<thead>
<tr>
<th>species</th>
<th>number of cases examined</th>
<th>number of cases not formed</th>
<th>minimum</th>
<th>maximum</th>
<th>average</th>
</tr>
</thead>
<tbody>
<tr>
<td>nigra</td>
<td>6: 0: 7: 10: 8: 17</td>
<td>0: 0: 8: 10: 9: 00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>maxima</td>
<td>2: 0: 3: 10: 9: 00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Figures refer to actual number of cases observed (not) percentages of the number of wings examined.

* * unknown.
Table II. Number of rows of cells subtended by Rpl.

<table>
<thead>
<tr>
<th>species</th>
<th>No. of rows containing three or more cells per row</th>
<th>Maximum no. of rows of cells</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number examined</td>
<td></td>
</tr>
<tr>
<td>pullata</td>
<td>l: 2: 3: 4: 5:</td>
<td></td>
</tr>
<tr>
<td>emilia</td>
<td>l: 2: 3: 4: 5:</td>
<td></td>
</tr>
<tr>
<td>intensa</td>
<td>l: 2: 3: 4: 5:</td>
<td></td>
</tr>
<tr>
<td>estherae</td>
<td>l: 2: 3: 4: 5:</td>
<td></td>
</tr>
<tr>
<td>obscura</td>
<td>l: 2: 3: 4: 5:</td>
<td></td>
</tr>
<tr>
<td>nigra</td>
<td>l: 2: 3: 4: 5:</td>
<td></td>
</tr>
<tr>
<td>maxima</td>
<td>l: 2: 3: 4: 5:</td>
<td></td>
</tr>
<tr>
<td>dimidiata</td>
<td>l: 2: 3: 4: 5:</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Maximum no. of rows of cells</th>
</tr>
</thead>
<tbody>
<tr>
<td>pullata</td>
<td>l: 2: 3: 4: 5:</td>
</tr>
<tr>
<td>emilia</td>
<td>l: 2: 3: 4: 5:</td>
</tr>
<tr>
<td>intensa</td>
<td>l: 2: 3: 4: 5:</td>
</tr>
<tr>
<td>estherae</td>
<td>l: 2: 3: 4: 5:</td>
</tr>
<tr>
<td>obscura</td>
<td>l: 2: 3: 4: 5:</td>
</tr>
<tr>
<td>nigra</td>
<td>l: 2: 3: 4: 5:</td>
</tr>
<tr>
<td>maxima</td>
<td>l: 2: 3: 4: 5:</td>
</tr>
<tr>
<td>dimidiata</td>
<td>l: 2: 3: 4: 5:</td>
</tr>
</tbody>
</table>
Table 13. Number of rows of cells subtended by Mpl.

<table>
<thead>
<tr>
<th>species</th>
<th>number of wings not formed</th>
<th>maximum number of rows of cells containing three or more cells each</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>number of rows examined</td>
<td></td>
</tr>
<tr>
<td>pullata</td>
<td>174: 71:39: 143:57:</td>
<td></td>
</tr>
<tr>
<td>emilia</td>
<td>18: 94: 1: 172:28:</td>
<td></td>
</tr>
<tr>
<td>intensa</td>
<td>38: 95: 5: 74:26:</td>
<td></td>
</tr>
<tr>
<td>obscura</td>
<td>180: 1:98:1: 83:17:</td>
<td></td>
</tr>
<tr>
<td>nigra</td>
<td>6: 120: 67:33:</td>
<td></td>
</tr>
<tr>
<td>maxima</td>
<td>2: 100:</td>
<td>200:</td>
</tr>
<tr>
<td>dimidiata</td>
<td>23: 5:59:32: 50:41:</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>species</th>
<th>number of wings not formed</th>
<th>maximum number of rows of cells containing three or more cells each</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>number of rows examined</td>
<td></td>
</tr>
<tr>
<td>pullata</td>
<td>177: 5:93: 1:80:19:</td>
<td></td>
</tr>
<tr>
<td>emilia</td>
<td>18: 100:</td>
<td>94: 6:</td>
</tr>
<tr>
<td>intensa</td>
<td>38: 3:95: 3: 97: 3:</td>
<td></td>
</tr>
<tr>
<td>obscura</td>
<td>179: 1:99: 1: 93:7:</td>
<td></td>
</tr>
<tr>
<td>nigra</td>
<td>6: 120:</td>
<td>100:</td>
</tr>
<tr>
<td>maxima</td>
<td>3: 200:</td>
<td>100:</td>
</tr>
<tr>
<td>dimidiata</td>
<td>23: 18:77: 73: 9:</td>
<td></td>
</tr>
</tbody>
</table>
Table 13. Maximum number of rows of cells between M₃ and M₄.

<table>
<thead>
<tr>
<th>Species</th>
<th>Fore Wing</th>
<th>Rear Wing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of Rows</td>
<td>Number of Rows</td>
</tr>
<tr>
<td></td>
<td>1: 2: 3: 4: 5</td>
<td>1: 2: 3: 4: 5</td>
</tr>
<tr>
<td>semilia</td>
<td>18: 56:44:</td>
<td>18: 83:17:</td>
</tr>
<tr>
<td>intensa</td>
<td>38: 34:66:</td>
<td>38: 55:45:</td>
</tr>
<tr>
<td>obscura</td>
<td>179: 10:87: 3: 179: 78:22:</td>
<td></td>
</tr>
<tr>
<td>nigra</td>
<td>6: 50:50:</td>
<td>6: 100:</td>
</tr>
<tr>
<td>maxima</td>
<td>3: 100:</td>
<td>3: 100:</td>
</tr>
<tr>
<td>dimidiata</td>
<td>23: 100:</td>
<td>22: 100:</td>
</tr>
</tbody>
</table>
Table 14. Maximum number of rows of cells between the bisector of the loop and A2 at the level of the origin of the outer branch of the bisector.

<table>
<thead>
<tr>
<th>species</th>
<th>number of rows</th>
</tr>
</thead>
<tbody>
<tr>
<td>pullata</td>
<td>1; 2; 3; 4; 5; 6; 7; 8</td>
</tr>
<tr>
<td>emilia</td>
<td>1; 2; 3; 4; 5; 6</td>
</tr>
<tr>
<td>intensa</td>
<td>1; 2; 3</td>
</tr>
<tr>
<td>estherae</td>
<td>1; 2; 3; 4; 5; 6</td>
</tr>
<tr>
<td>obscura</td>
<td>1; 2; 3; 4; 5; 6</td>
</tr>
<tr>
<td>nigra</td>
<td>1; 2; 3; 4; 5; 6</td>
</tr>
<tr>
<td>maxima</td>
<td>1; 2; 3; 4; 5; 6</td>
</tr>
<tr>
<td>dimidiata</td>
<td>1; 2; 3; 4; 5; 6</td>
</tr>
</tbody>
</table>

*This area is included within the region of secondary reticulation of the rear wing, the distinguishing characteristic of the pullata-group. As the density of the venation within the area is much more pronounced in the male than in the female wing the tabulations of wings of males and of females of species of this group are given separately.*
Table 15. Number of cells in the first row following the forking of the bisector of the loop, between the outer branch of the bisector and Cu₂.

<table>
<thead>
<tr>
<th>species</th>
<th>number of cells</th>
</tr>
</thead>
<tbody>
<tr>
<td>pullata</td>
<td>178: 6:69:36: 1:</td>
</tr>
<tr>
<td>emilia</td>
<td>18: 67:68: 6:</td>
</tr>
<tr>
<td>intensa</td>
<td>38: 13:39:32:11: 5:</td>
</tr>
<tr>
<td>estherae</td>
<td>67: 1:28:31:36:10: 1: 1:</td>
</tr>
<tr>
<td>obscura</td>
<td>180:14:84: 3:</td>
</tr>
<tr>
<td>nigra</td>
<td>6:33:67:</td>
</tr>
<tr>
<td>maxima</td>
<td>23:10:</td>
</tr>
<tr>
<td>dimidiata</td>
<td>23:55:45:</td>
</tr>
</tbody>
</table>
Table 16a. Length of the fore wings.

<table>
<thead>
<tr>
<th>species</th>
<th>number of wings measured</th>
<th>length of fore wing in millimeters; all measured as the nearest half unit</th>
</tr>
</thead>
</table>

* ♀ unknown.
Table 16a. Length of the fore wings.

Length of fore wing in millimeters; all measurements recorded as the nearest half unit.

<table>
<thead>
<tr>
<th>Measured</th>
<th>19</th>
<th>20</th>
<th>21</th>
<th>22</th>
<th>23</th>
<th>24</th>
<th>25</th>
<th>26</th>
<th>27</th>
<th>28</th>
<th>29</th>
<th>30</th>
<th>31</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>15</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>16</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>17</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>18</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>19</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>20</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>21</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>22</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>23</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>24</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>25</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>26</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>27</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>28</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>29</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>30</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>31</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>32</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>33</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>34</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>35</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>36</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>37</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>38</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>39</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>40</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

♀ unknown.
Table 16b. Length of the rear wings.

<table>
<thead>
<tr>
<th>species</th>
<th>number of wings measured</th>
<th>length of rear wing in millimeters; all measured as the nearest half unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>pullata</td>
<td>♂: 61; 20; 20; 20; 21; 21; 22; 22; 23; 23; 24; 25; 25; 25; 26</td>
<td></td>
</tr>
<tr>
<td></td>
<td>♀: 25; 19; 20; 20; 21; 21; 22; 22; 23; 23; 24; 24; 25; 25; 26</td>
<td></td>
</tr>
<tr>
<td>emilia</td>
<td>♂: 7; 2; 14; 43; 29; 14</td>
<td></td>
</tr>
<tr>
<td></td>
<td>♀: 2; 100;</td>
<td></td>
</tr>
<tr>
<td>intensa</td>
<td>♂: 17; 6; 6; 18; 29; 29; 12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>♀: 1; 100;</td>
<td></td>
</tr>
<tr>
<td>estherae</td>
<td>♂: 23; 4; 13; 4; 4; 17; 30; 13</td>
<td></td>
</tr>
<tr>
<td></td>
<td>♀: 10; 20; 10; 10; 10; 30; 20;</td>
<td></td>
</tr>
<tr>
<td>obscura</td>
<td>♂: 61; 20; 21; 28; 5; 11; 2; 8; 3; 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>♀: 28; 4; 4; 18; 11; 36; 4; 11; 4; 11</td>
<td></td>
</tr>
<tr>
<td>nigra *</td>
<td>♂: 3; 18; 11; 36; 4; 11; 4; 11</td>
<td></td>
</tr>
<tr>
<td>maxima *</td>
<td>♂: 7; 29; 29; 29; 14</td>
<td></td>
</tr>
<tr>
<td>dimidiata</td>
<td>♂: 4; 25; 25; 25; 25</td>
<td></td>
</tr>
</tbody>
</table>

* ♀ unknown.
Table 16b. Length of the rear wings.

**length of rear wing in millimeters; all measurements recorded as the nearest half unit.**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**known.**
<table>
<thead>
<tr>
<th>species</th>
<th>number of specimens measured</th>
<th>length of abdomen in millimeters (all measurements recorded as the nearest half unit)</th>
</tr>
</thead>
</table>

* Specimens not examined by the author; measurements from Ris (1910).

*/ Female unknown.
The genus Diastatops is divided into three well-defined groups, consisting of four, three and one species, respectively. These groups are distinguished from each other by the density of the venation, the color of the veins and the pigmentation of the wing membrane.

In the pullata-group (pullata, emilia, intensa and estherae) certain areas in the wings are more densely veined (secondary reticulation or anastomosing of veins) than the remainder of the wings, and the veins within such areas are red and usually somewhat thickened. These areas reach their maximum extent in estherae, and their maximum intensity in intensa. The veins in both the fore and the rear wings of the former species, from the base almost to the level of the nodus, except along the margins, are considerably more numerous than usual, somewhat thickened and bright red in color. The region of secondary reticulation is confined to a rather limited area in the basal portion of the rear wing in intensa. However, within this area the veins are exceedingly numerous and very much thickened, occupying as much or more of the total space as the cells which they enclose. These veins are brilliant scarlet in color. In pullata and emilia the area of secondary reticulation is confined to the basal region of the rear wing, is somewhat more extensive but much less intense than in intensa. In all four
species these areas of secondary reticulation are more pronounced in the males than in the females. However, the corresponding areas in the females' wings are, at least slightly, more densely veined than the remainder of the wings. In all the species of the pullata-group there is an area just distad of the nodus in which the membrane is more lightly pigmented than in other parts of the wings.

In the obscura-group (obscura, nigra and maxima) there are no areas of secondary reticulation or thickened veins. However, the veins in the anal area of the rear wing of the (mature) females are usually red in color. The spot of light pigmentation distad of the nodus, although frequently present, is very faint and much reduced in area.

In dimidiata, the single species making up the third group, there are no areas of secondary reticulation, but sometimes the veins in the anal area of the rear wing of the female are red. In this species the pigmentation is absent from all of the distal half of the wings except a narrow marginal band. In the wings of the males and of some females a broad white band extends across the wings at the base of this otherwise hyaline area. This white band appears to have no counterpart in the species of the other two groups.

The other characters which distinguish the several species cut across these group lines.
Size, as expressed by the length of the wings and the abdomen, is of considerable value in separating species although there is more or less overlapping in almost all of the eight species. On the basis of size (approximate average length in millimeters of fore wing, of rear wing, and of abdomen, respectively, of the males) the species are arranged in the following order:

<table>
<thead>
<tr>
<th>Species</th>
<th>Maxima</th>
<th>Pullata</th>
<th>Nigra</th>
<th>Estherae</th>
<th>Emilia</th>
<th>Intensa</th>
<th>Obscura</th>
<th>Dimidiata</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>31</td>
<td>26.5</td>
<td>25</td>
<td>24</td>
<td>23</td>
<td>24</td>
<td>23</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>32</td>
<td>37</td>
<td>35.5</td>
<td>34.5</td>
<td>34</td>
<td>34</td>
<td>33</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>33</td>
<td>19.5</td>
<td>36</td>
<td>18</td>
<td>18</td>
<td>18</td>
<td>17</td>
<td>17</td>
</tr>
</tbody>
</table>

On the basis of the relative width of the wings (ratio of length to width of rear wing at the nodus) the species may be divided into four groups: 1. obscura (2.33-2.51); 2. dimidiata (2.50-2.54) and emilia (2.53); 3. intensa (2.61-2.68), estherae (2.61-2.73), nigra (2.73) and pullata (2.74-2.77); and 4. maxima (2.84).

Two forms of the inferior appendage (of the male) are found in the genus; in one group of species the sides of the inferior are almost parallel or only slightly divergent, in the other the sides are widely divergent. The sub-parallel form is found in
eatherae, nigra, maxima and dimidiata, the divergent form in the other species. The inferior appears to be relatively shorter — only about one-half as long as the superiors — in emilia, obscura and dimidiata than in the other species, in which it is about two-thirds as long as the superiors.

The pullata- and obscura-groups are more closely related to each other than either is to dimidiata. Evidence of this relative isolation of dimidiata can be found in the undivided costal postnodal cells, the wide extent of unpigmented areas in the wings and the form of the median planate.

Within the pullata-group the two smaller species, emilia and intansa, are very closely related. The only clear distinction between them is found in the region of secondary reticulation (both area and extent) although there appears to be a slight difference in the relative length of the inferior appendage. Pullata and eatherae exhibit a more or less close relationship and a common distinctness from emilia and intansa in such characters as large size, long wings, and range in the number of cross veins (or cells) in many areas. However, each of these exhibits distinctness in certain characters of which the other has the form found in emilia and intansa. In eatherae the superior surface of the frons is red, that of the other species metallic purple; the sides of the inferior appendage are sub-
parallel, those of the others widely divergent; areas of secondary reticulation are found in both wings, such areas in the other species are confined to the basal portion of the rear wing. In pullata the teeth of the superior appendage are not raised into a keel, but the superiors in emilia, intensa and estherae are distinctly keeled; the range in number of antenodal and postnodal cross veins is different (more numerous and with a greater spread) from those of the other three which are much alike.

The three species of the obscura-group differ little from each other in venational characters, but in size, relative width of wings, form of inferior appendage and location of teeth on the superiors obscura is quite distinct from the other two closely related species.

The primitive type of Diastatops was probably an intermediate form with regard to the characters now possessed by dimidiata and the species of the obscura-group. The wings were richly, but uniformly veined, with a large hyaline spot in the distal half of the wings and with red veins in the basal areas. The sides of the inferior appendage were sub-parallel and the superiors were keeled. The dimidiata- and obscura-groups have been developed by rather slight divergence in certain characters, the pullata-group by a more divergent evolution from the primitive type, largely in the direction followed by the obscura-
group, and the acquisition of certain new characters.

That the division of the costal postnodal cells by a longitudinal vein occurred in the *pullata-obscura* stem soon after the *limidita* stem had split off is indicated by the constancy of this character in all species of those groups. However, secondary anastomosing of cross veins made little further development until the *pullata* and *obscura* lines had separated; rather lately it has had considerable development in the *pullata* line. The recency of the thickened and densely reticulated areas in the proximal portion of the wings is indicated by the variation, both among and within the four species which possess this feature.
Relationships with Other Genera

The immediate generic relationships of Diaatatopa are rather clear. A single character, the separated eyes, is sufficient to set the species of the genus apart from all other Libellulidae and a second character, the undulate costal margin of the fore wing, unites them with the only closely related genera, Zenithoptera and Palpopleura. These three genera have many other, more or less distinctive, common characters (broad wings, intense venation, deep coloration, transverse carina of fourth abdominal segment, small and undifferentiated female genitalia, etc.) and they have long been recognized as a distinct and somewhat isolated group. The very close relationship of Diaatatopa and Zenithoptera is shown by uniform very dark coloration, form of body (head and thorax small, abdomen short, very slightly expanded near base and generally tapering slightly in remainder of length), form and position of the arcus, the number and high degree of variation in the antenodal cross veins, form of the bridge, bridge cross veins and cubito-anal cross veins, location and form of triangles and the occurrence of sectors dividing areas of the wings into transverse fields of two to four cells each. Certain characters of Palpopleura (light, although deep colors; larger head and thorax; broad and somewhat depressed abdomen; slightly more
distal location of the arculus; smaller number of antenodals; variation in cubito-anal and bridge cross veins) indicate relationships with other groups and this genus may well be considered as intermediate in position between the Diastatops-Zenithoptera complex and the main stem of Libellulid evolution.

Rio (1910) united Perithemia with the old Gruppe III of Brauer on the basis of primitive trends in the venation, especially the form of M₂, Re and Repl. This group (III of Rio, Palpopleurini of Tillyard) thus constituted possesses a combination of rather distinctive features and can be easily characterized, as in the following description.

Wings relatively broad and deeply colored. Arculus between first and second antenodals, often very near the first. Sectors of the arculus separated in the fore wing, with a short common stem in the rear wing. Bridge cross veins usually present. Last antenodal of fore wing incomplete. Anal area of rear wing very broad; bisector of the loop nearly straight; cells between loop and anal margin frequently arranged in transverse rows. Lobe of prothorax large. Legs rather long and slender; tarsal claws usually short, tooth small and near apex.

However, Perithemia possesses several characters in common with the genera of the Leucorrhiniini (Gruppe VII of Rio) - form of head, triangle and posttrigonal field of fore wing - and could easily be placed in that group.

Needham and Broughton (1937) further expanded the group by the addition of 16 other genera. The group thus formed (Celi-themini of Needham and Broughton) contained genera scattered
almost throughout the entire system erected by Ria. In addition to Gruppe III, one genus from IV (Thermochoria), seven from VI (Neurothorium, Philonomon, Brachythemia, Deielia, Crocothemia, Bradinopga and Pseudoleon), two from VII (Planiplax and Celi-themia) and six from X (Selysiothemia, Ephidatia, Aethriamanta, Macrodiplax, Urothemia and Rhyothemia) were included. However, this arrangement has little to support it. It appears to have been based largely, if not entirely, upon data tabulated from the photographs of wings in Ria's Libellulinen! In a study of the paper by the late E. E. Williamson and the author an attempt was made to run specimens of seven species through the key; only one of these ran out to the correct genus, the others went to wrong genera or could not be traced to any genus by the key. An analysis of the characters involved indicated that, in one case at least, the inaccuracy of the key was due to a misinterpretation of the halftone reproduction - a mistake which would not have been made had the characters been compiled from, or even checked with, specimens. Furthermore, this study is, as stated by Ria (in litt., October 10, 1927), "a model of what comes out of using a single group of facts for taxonomy; in many points sheer nonsense".

Nevertheless, the idea prompting the Needham and Broughton study is worthy of much attention. "This monumental work of Dr. Ria has brought the study of the group to the point where
special investigations of particular structures are needed to further clarify relationships." This is especially true because all previous classifications of the Libellulidae, even including the one by Ria, have been based wholly or chiefly upon venation. "Alle Autoren die die Gattungen der Libellulinae bearbeitet haben, benutzten die Unterschiede in der Flugeladerung als wesentlichstes Kriterium, . . . . Die folgende Gattungstabelle ist fast ausschließlich auf die Flugeladerung aufgebaut." Needham and goughton's mistake was in the choice of particular structures; they selected venation (!) but conducted an infinitely more limited investigation than Ria had made.

In line with this idea and as a part of a study of leg characters throughout the Odonata the author had studied and tabulated (see pages 135-175) the leg characters of all the genera included in the III, IV and VII groups of Ria and the Celithemini of Needham and goughton.

This line of investigation has been most disappointing in this particular problem. Several lines of specialization were found but almost all of them were slight or in isolated genera and gave little evidence of relationships or lines of development. Perhaps, when all genera of the Libellulidae have been studied minor variations can be properly interpreted and used
in the arrangement of genera.

In the Palpapleurini (sensu Ris) the legs are moderately long and slender and the armature conforms very closely to the general form for the family. The claws are usually rather short (long in Distaatops), the tooth small and near the apex.

In the Brachydiplax-series (Gruppe IV) there is considerable specialization. In several genera there is sexual dimorphism, arising chiefly through the reduction of the spines of the third, and frequently also of the second femora of the male to short denticles. Such specialization is found in Thermochoxia; also in Mannophya, Brachygonia and Porpax. In Porpax, in addition to wide sexual differences in armature the legs are specialized by being densely clothed with long black pubescence.

Three genera of the Uraoia-series (Gruppe V) were studied but no specialization was noted, except the short, powerful form of the legs of Nanathemis.

The species of the Symphetrini which were examined indicate a tendency to greater robustness of the legs and more powerful claws (Neurothemis and Brachythemis are exceptions) but little sexual differentiation.

The genera of the Leucorrhinini vary somewhat in leg structure; in Celithemis and planiplax the legs are slender,
but in the other genera they are robust or powerful. A tendency towards more luxuriant armature is strong in Leucorrhinia and Brachthemia.

As might be expected in a group standing at the top of a line of evolutionary development, much specialization was found in the genera of Trameini studied. Reduction in the spines of the ventral margins of the femora, especially of the third, increase in the differentiation of the dorsal margins and specialization of the tibial spines (increase in number, reduction in length, modification in form and distribution) were found in these genera. A striking modification in form, great length of the third legs with no increase in length of the others, was noted in Ephidatia and Macrothemis. Certainly, no evidence for the union of these genera with the Palpopleurini can be found in the structure of the legs.

The author is inclined to restrict the Palpopleurini to the three genera with undulate costal margin of the fore wings and to place Perithemia with the Leucorrhinini. These two lines (Palpopleurini and Leucorrhinini) probably split from the general Libellulid stem at or near the same point. The apparent relationship of Palpopleura and Perithemia is due to their parallel development following an early separation in each case.
from the tribal line of evolution. The separation of Dinastatops and Zenithoptera has been comparatively recent and the formation of species within each is in an early stage.
THE SPECIES OF DIASTATOPS

Key to Species

1. Wings more or less colored throughout; three to seven cells following the first in the costal postnodal area bisected by a longitudinal vein, or with anastomosing cross veins in this area.

2. Base of wings to level of nodus dark brown or black, followed by a broad white band in mature specimens; remainder of wings transparent or almost so, except the costal area and tip in both wings and a band two to four cells wide along caudal margin of rear wing which are brown; costal postnodal cells not crossed.

2' (1). No secondary anastomosing of veins; veins usually uniformly black or brown throughout wings (sometimes red in anal area of rear wing in obscura); light spot beyond nodus very indistinct and limited to area near costal margin, if present.

2' (2). Veins in anal area of rear wing, or in more extensive areas, more numerous ("secondary anastomosing" or "secondary reti-
oulation") than in remainder of wings, usually red or yellow and somewhat thickened; usually with a distinct light spot or band, frequently extending half or two-thirds of the width of the wing, just beyond nodus

3(2). Wings relatively long and narrow, 25 mm., or more long, ratio of length to width at nodus about 2.75 to 1; abdomen 18 mm., or more long; teeth on ventral margin of superior appendages not reaching the level of the tip of the inferior appendage, more caudal teeth most elevated; sides of inferior sub-parallel

3'. Wings relatively short and broad, usually less than 25 mm., long, ratio of length to width at nodus about 2.30 to 1; abdomen usually less than 18 mm., long; teeth of superior appendages reaching to or beyond the level of the tip of the inferior appendage, median teeth most elevated; sides of inferior divergent

obscura Fabr.

4(3). Wings about 25 mm., long; abdomen about 18 mm., long

nigra n. sp.

4'. Wings about 30 mm., long; abdomen about 32
5(2'). No area of dense venation (secondary reticulation) and no red veins in fore wing; triangle of fore wing usually containing three to eight cells, that of rear wing three to six cells; superior surface of frons brown or metallic purple . . . . . . . . . . . . 6

5'. Areas before and after the triangle in the fore wing with secondary reticulation, veins in these areas red; triangle of fore wing containing five to 20 or more cells, that of rear wing four to 20 or more cells; superior surface of frons red . . . . . . estherae n. sp.

6(5). Wings usually less than 35 mm., long; usually less than 18 costal antenodal cross veins in fore wing and less than 12 in rear wing; two rows of cells subtended by Rpl and by Mpl; superior appendages distinctly keeled below . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 7

6'. Wings 35 mm., or more long; usually 18 or more costal antenodal cross veins in fore wing and 12 or more in rear wing; three or four rows of cells subtended by Rpl and by
Mpi; teeth on ventral margin of superior appendages not elevated into a keel . . . . . pullata Burm.

7(6). Area of secondary reticulation in anal area of rear wing rather extensive, extending caudad in loop about two-thirds of distance from forking of bisector to tip of loop; veins of this area dull red, not especially thickened; three to four rows of cells between A3 and the bisector opposite fork of latter (one to two rows in female); usually not more than two cells between A1 and outer branch of bisector at its origin; secondary loop (patella), if formed, containing 25-50 cells (nine to 12 in female). emilia n. sp.

7'. Area of secondary reticulation in rear wing very dense but more limited in extent, extending caudad in loop less than half of distance from forking of bisector to tip of loop; veins in this area carmine (brilliant yellow in teneral specimens), much thickened, frequently as broad as cells enclosed (less dense in female); usually five to seven rows of cells between A2 and the
bisector (three rows in female) and three to six cells between A₁ and outer branch of bisector (only two in female); secondary loop, if formed, containing very many cells (usually 65-140, infrequently less than 60; 21-30 in female). . . . . . . . . . . . . . intense n. sp.
Diastatopa pullata (Burmeister)


Recorded distribution: America (Rambur, 1843); S. America (Kirby, 1890). BRITISH GUIANA: Georgetown, Tumatumari, and Wismar (Ria, 1916). SURINAM: (Burmeister, 1839; Ria, 1910). FRENCH GUIANA: Cayenne (Ria, 1910). BRAZIL: Para: (Ria, 1910); Parana de Buyassu (Kirby, 1897); Villanova, Santarem, and Obidos (Ria, 1910); Amazonas: Manaus (Kirby, 1897); Matto Grosso: (Ria, 1916); Pernambuco: (Hagen, 1861, 1875; Brauer, 1868). PERU: Moxos (Hagen, 1861, 1875; Brauer, 1868); Pebas?
("Peba", Ris, 1910).


FRENCH GUIANA: Pied Saut, Oyapok River, November, 1917, 2♂♀ and December, 1917, 1♂♀ (S. M. Klages; Cam. Mus.).

BRAZIL: Para: Uassa Swamp, Ocuatopi Island, June, 1918, 1♂♀ 1♀ and Uassa Island, June, 1918, 1♀ (S. M. Klages; Cam. Mus.);
Parana de Buyassau, January 15, 1918, 1♂♀ (E. E. Austen; Br. Mus.); Bota Io Pinto, November 6, 1901, 3♂♀ (Hagman; Coll. Ris); Rio Xingu, Alta Mira, January, 1931, 1♂♀ 1♀ and Victoria, May, 1921, 1♀ (A. H. Fassal; Coll. Ris); Rio Tapajoz: Itaituba, February, 1922, 1♂♀, Mts. Christo, June, 1920, 3♂♀ 2♀, Barreiras, May, 1930, 2♂♀ 3♀, June 25, 1920, 3♀ (A. H. Fassal; Coll. Ris); Santarem, February, 1930, 1♂♀ 2♀, February, 1921, 1♂♀, March, 1922, 1♀, July, 1930, 1♂♀, January 6, 1922, 1♂♀, and Taperinha, near Santarem, June, 1920, 2♂♀ 1♀ (A. H. Fassal; Coll. Ris); Amazonas: East Amazonas, 1♂♀ (Am. Mus. Nat. Hist.); Manic, April, 1921, 1♂♀ (A. H. Fassal; Amazons: East Amazonas, 1♂♀ (Am. Mus. Nat. Hist.); Manic, April, 1921, 1♂♀ (A. H. Fassal;

Original description:

"24. L. pullata": fusca, alia concoloribus, posticarum macula basae abdominisque ferrugineae. Long. 1" 1\'\".
Auss Surinam; in Sommer's Sammlung."

Original description (of fuliginea):

"Rufa; alia fuliginea; posticis ad basem rufescenbus, nervis praecipuis elevatis 0³."

Handb. der Ent., II, pag. 854, n° 35. (L'Obscura de Fabricius paraît plutôt se rapporter à la Fulvia de Drury.)

"A peu pres de la taille de la Pullata, a laquelle elle ressemble beaucoup et dont elle n'est peut-être qu'une variété. Corps semblable; pièce sous-stylique plus étroite, a peine retrecie a la base, sur laquelle les cotes tombent presque carrément, ayant le fond de l'échancre non arrondi, mais formant un angle rentrant. Ailes d'une teinte plus palte, avec un léger reflet violet des deux cotes, un peu rougeatres a la base des posterieures ou les areoles sont plus nombreuses que chez la Tineta, mais un peu moins que chez la Pullata."

A large, rather dark species.

Male: Thorax black above. Wings long; dark from base to nodus, especially along costal margin; a conspicuous light area, extending backward from the costal margin in a triangle or arc about one-half to two-thirds of the width of the wing, just beyond nodus; remainder of wing moderately dark. Reticulated area in rear wing extending to level of the outer angle of loop, separated from caudal margin by about four or five cells; veins within this area thickened and anastomosing. Veins within reticulated area and those bordering this area red; those in corresponding area in fore wing reddish brown; veins in remainder of wings black. Cephalic surface of anterior lamina smooth; caudal margin sinuate, with a deep, wide, V-shaped emargination in center. Superior appendages about as long as segments 9 and 10, teeth not elevated on a distinct keel; inferior about two-thirds as long as superiors, sides widely divergent.

Female: Similar to male; venation less dense in reticulated
area. Appendages about two-thirds as long as segment 9.

Measurements: ♀: abdomen ~ 17-21 mm.; femora, second ~ 4 mm., third ~ 5 mm.; tibiae, second ~ 5 mm., third ~ 7 mm.; fore wing ~ 24-28.5 mm., pterostigma ~ 4 mm.; rear wing ~ 25-29 mm., pterostigma ~ 4 mm., width, base ~ 10.5-12 mm., nodus ~ 9-10.25 mm. (ratio: base ~ 3.33-3.45, nodus ~ 2.74-2.77).
♀: abdomen ~ 16-30 mm.; femora, second ~ 4 mm., third ~ 5 mm.; tibiae, second ~ 5 mm., third ~ 7 mm.; fore wing ~ 24-28 mm., pterostigma ~ 4 mm.; rear wing ~ 24-28.5 mm., pterostigma ~ 4 mm., width, base ~ 10.5-11.5 mm., nodus ~ 9.5-10.5 mm. (ratio: base ~ 3.33-3.48, nodus ~ 2.53-2.71).

Type: ♀, "Aus Surinam; in Sommer's Sammlung" (now in the Naturhistorisches Museum at Vienna).

The specific names (pullatus, clad in black garments - of mourners; fuligo (gen. fuliginis), soot) selected by Burmeister and Rambur for this species are very appropriate for the rather dark and somber insect depicted by specimens of this species. However, the appearance presented in its native habitat as it darts into the sunlight from a shaded creek or river bank, with flashing iridescent wings and brilliant scarlet abdomen would seem to be most unlike a mourner!

In length of wings and abdomen, form of superior appendages (teeth not elevated on a keel), and in many venational characters pullata exhibits more or less close relationship to estherae,
but in the more limited area of dense venation, coloration of frons and shape of the inferior appendage it approaches *emilia* and *intensa*. In spite of some overlapping in the range of variation found in the specimens studied, *pullata* is distinctly a larger insect than *emilia* or *intensa*. The number of antenodal and postnodal cross veins and the number of rows of cells between Re and Rpl, especially in the fore wing, are greater than in any other species of the genus. Dr. H. Zerny (in litt., Sept. 14, 1933; freely translated here) furnished information from Burmeister's type on three specified characters:

1. Color of frons - "dark metallic blue, on vertical surface yellow-brown".

2. Extent of red or reddish areas in wings - "border of red spots of rear wings include t, Cu, M₁, 2 or 3 cells distal from t, 2 or 3 cells distal from forking of Cu₂; at the anal loop the edge of the red spot is four cells distant from the wing margin, then it approaches the latter toward the anal angle and reaches it at the root of the wing."

3. Extent of thickened, or condensed, venation - "identical with 3, not especially dense."

Miss Heise made the following notes from the Ramburian specimens in the de Selys Collection.

"Rambur's type of *E. fuliginea* - Specimen broken, but has one complete front wing and one damaged complete hind wing on
left, very small portion of base of front wing and about \( \frac{1}{2} \) of the hind wing on right. Entire abdomen missing - there were two abdomens in a triangle in the corner of the box but there were also four other specimens with whole or part of Abd. missing so I did not think it worth while to make drawings of the pieces. Color of front - brown; same color as wings exactly. Wing counts: a. maximum number of cell rows enclosed by Mpl, front wing - 3, hind wing - 4; b. Approximate no. of cell rows between bisector and \( A_3 \) - 4 to 5, covered by sec. ret. in center; c. No. of cells in triangle, front wing - 5 on left and four on right, hind wing - 4. No secondary reticulation at all on front wing. Areas of coloration (in rear wing) dim but can be distinguished on microscope as faintly coral colored. Secondary ret. most closely resembles photo # 4 (pullata); it seems to be identical.

"(Probably) Rambur's example of D. pullata - Front - light brown. Genitalia of segment 2 too badly gummed up to see at all. Wing counts: a. Max. no. of cell rows enclosed by Mpl, on front wing - 4, hind wing - 3; b. Approximate no. cell rows between bisector and \( A_3 \) - 5 and 6, or 4 and 5; covered by sec. ret.; c. No. of cells in triangle, front wing - 4 on 1., 6 on right, hind wing - 4. Secondary reticulation about as dense as # 4 (pullata) but slightly more extensive in area."

All of the female and many of the male specimens of this
species available for study are more or less teneral.

J. H. Williamson made the following notes on the coloration of a fresh specimen, a male collected at Porto Velho, January 24, 1933. "Eyes uniform, dull dark brown. Face - same dull dark brown. Lower lip a dull greenish gray. Thorax - very dark on top with a purple cast, changing to dull brown on sides and below. Legs - dark with slight purple cast. Abdomen - 1, black on top; 2-8, a dull red on top; 9, red anteriorly and black posteriorly; 10, black; on ventral surface - 2, same dull brown as sides of thorax; 3, changing to lighter brown; and the rest lighter brown. Upper appendages black." The specimen has retained most of this coloration. The labium has lost the greenish tint and is now yellowish brown. The labrum and anterior surface of frons have an orange or reddish cast, but the clypeus is brown (olive or greenish brown) and, especially when viewed by the unaided eye, is very nearly the same color as the eyes. The legs are distinctly not "dark with slight purple cast", except possibly the anterior pair and all feet; the second and third pairs of legs are rather light and the tibiae are distinctly reddish. The abdomen is largely red; the dorsum of segment 1 and the anterior half of 2, black; sides of 2 and 3 changing from the olive brown of the sides of the thorax to the light reddish brown of the under side of segments 4-10; seg-
ment 9 not black except dorsal and caudal carinae and segment 10 with an anterior reddish spot on either side.

Ris (1910) quotes two brief notes by Bates concerning the habits of this species, "banks of pools in valley near Obidos, 13. X. 49", and "woods Santarem, settling on twigs in the shade of trees". Somewhat more extensive notes (parts of which were quoted by Ris, 1916) accompany some of the specimens collected by the Williamson expeditions. "Both species occur together in brush about pools in the Botanical Gardens at Georgetown, but pullata is much the more brilliant and active species. Contrary to what one might expect in such brilliant insects they are brush-loving, especially pullata, which never occurs anywhere else, and always takes to brush to escape, except in the case of obscura, when it is found away from brush, which is often the case." "This and related species (obscura) captured January 25, 1912, frequented dense brush near canals in Bot. Gardens. Very difficult to capture because of dense growth. Had a habit of low flight and walked on twigs - sometimes several inches - a most peculiar species in actions." "Seemed to stay in toward trunk of small trees on bank or over flooded creek bed and dart out to sun-exposed twigs or even onto leaves. Sometimes walked out several inches toward end of twig after alighting thereon. Not common to date at any place seen." (Porto Velho, February 10, 1923). "Caught from the river steamer when we stopped to
cut grass 6' high along the bank of the parana at 8 a.m." at Progresso, January 11, 1933. "Collected at swampy creek. ......
between 8:30 and 10 a.m. Little sunshine and at 10 heavy rain
started", Porto Velho, January 24, 1923. "Taken at flooded
creeks entered by launch from River Madeira, all within 5 or 6
miles below town (Porto Velho)"., January 23, 1922.

A small, moderately dark species.

Male: Wings rather broad; dark, especially in basal half and along costa. Reticulated area very similar in extent to pullata but somewhat more dense; veins in this area and those cephalad of it to the level of the arculus red. Veins in vicinity of arculus of fore wing slightly reddish brown at most, usually black. Cephalic surface of anterior lamina with a few denticles; caudal margin sinuate, with a broad arc-shaped emargination in center. Superior appendages about equal in length to segments 9 and 10, teeth elevated on a keel; inferior slightly more than one-half as long as superiors, sides widely divergent.

Female: Similar to male, except that the reticulated area of the male is indicated only by red, very slightly thickened veins.

Measurements: ♂: abdomen - 17-19 mm.; femora, second - 4 mm., third - 5 mm.; tibiae, second - 4.5 mm., third - 6.5 mm.; fore wing - 23-25 mm., pterostigma - 3 mm.; rear wing - 23-26 mm., pterostigma - 3.5 mm., width, base - 10.5-10.75 mm., nodus - 9.5 mm. (ratio: base - 2.23-2.38, nodus - 2.52). ♀: abdomen - 16.5-17 mm.; femora, second - 4 mm., third - 5 mm.; tibiae,
second - 5 mm., third - (7 mm.; fore wing - 33 mm., pterostigma - 3 mm.; rear wing - 23 mm., pterostigma - 3.5 mm., width, base - 10.75 mm., nodus - 9.75 mm. (ratio: base - 2.14, nodus - 2.36).

Types: Holotype ♀ and allotype ♂ - Miritituba, April, 1930 (Coll. Ria); paratypes - all other specimens studied.

This species is named for my young daughter, Emily Joan Montgomery.

This species is very close to intensa, differing only in the extent and degree of intensity of the secondary reticulation and coloration in the anal area of the rear wing. This is more extensive, but less intense in emilia, which approaches pullata in this character. The difference in degree of intensity of the venation in the two species is well illustrated in the tabulations of the number of rows of cells between the bisector of the loop and A3 and the number of cells in the first row between the outer branch of the bisector of the loop and Cu3.

In the female from Mts. Christo, which is slightly teneral, the veins to the level of the nodus in both wings are reddish brown.
Diastatops intensa, new species

Ria, 1916, Coll. de Selys, 16 (2): 1110 (in part); Longfield, 1939, Tr. Ent. Soc. Lond., 77: 137 (in part?).
Diastatops pullata (forma), Ria, 1938, Konowia, 7: 45.
Diastatops obscura, form (or var.) pullata, Ria, 1910, Coll. de Selys, 11: 311 (in part); Navas, 1921, Estudios, 25: 49;

Recorded distribution: BRAZIL: Para; Rio Amazonas (Ria, 1938); Matto Grosso; Cachoeira and Cachoeira Cuyaba Lagoa (Calvert, 1909); R. Paraguay, Rio Sao Lourenco and Rio Cuyaba (Longfield, 1939); Rio de Janeiro; (Ria, 1910); Rio Grande do Sul; (Ria, 1910). PARAGUAY: (Ria, 1910). ARGENTINA: Lapango and Formosa (Ria, 1938); Santa Fe (Navas, 1931); Corrientes (Navas, 1923).

A rather dark species.

Male: Wings rather long; dark, postnodal light areas frequently absent. Second cubito-anal cross vein running to inner angle of triangle or more proximad. Reticulated spot in rear wing very dense, but rather limited in area, not extending into triangle or cubital cell and separated from anal margin of wing by six to eight cells; veins within this area much thickened, heavily anastomosed - veins occupying almost as much space as membrane - and deep scarlet in color. (In tergals these veins are bright yellow.) Remainder of veins black, except those in triangle and a few others immediately adjacent to reticulated area which are red. Cephalic surface of anterior lamina bearing a few fine spines or denticles; caudal margin sinuate with a wide, shallow, arc-like, e-margination in center. Superior appendages about equal in length to segment 9, teeth elevated on a keel; inferior about two-thirds as long as superiors, sides widely divergent.

Female (somewhat immature): Postnodal light spots very prominent, Without dense reticulated area of male, but veins in this area, and also those in the postnodal light areas and
in center of fore wing from base to five or six cells beyond
triangle light in color (cream yellow in dried specimen).

Measurements: ♀: abdomen - 17-19.5 mm.; femora, second -
4 mm.; third - 5 mm.; tibiae, second - (5 mm., third - 6.5
mm.; fore wing - 21.5-25.5 mm., pterostigma - 3 mm.; rear
wing - 21.5-25.5 mm., pterostigma - 3.5 mm., width, base - 9-
11 mm., nodus - 8.35-9.5 mm. (ratio: base - 3.32-3.39, nodus -
2.61-2.68). ♂: abdomen - 16 mm.; femora, second - 3.5 mm.,
third - 4.5 mm.; tibiae, second - 4 mm., third - 5.5 mm.; fore
wing - 24 mm., pterostigma - 3 mm.; rear wing - 24 mm., ptero-
stigma - 3.75 mm., width, base - 11 mm., nodus - 10 mm. (ratio:
base - 3.18, nodus - 3.40).

Types: Holotype ♀ - Taperinha, July, 1920 (Coll. Ris);
allotype ♂ - Rio Cuyaba, May 6, 1937 (Br. Mus.); paratypes: all
other specimens studied, except the female from Rio Grande do
Sul.

Intensa (from intense, extreme in degree, excessive) was
chosen as the name for this species because of the great in-
tensification of the venation in the anal area of the rear
wing.

This species is very close to smilia, being distinguished
from that species, in so far as I have been able to ascertain,
only by the much greater density, more intense coloration, and
more limited area of the secondary reticulation of the rear
At first I was somewhat inclined to make this form a variety of *emilia*. However, my personal aversion to trinomials and the fact that specimens of *intensa* from such widely separated localities as Santarem, Matto Grosso, Rio Grande do Sul and Argentina show very little variation in the density of the reticulated area (such variation as does occur being in specimens from localities far removed from the region in which *emilia* was found) led me to accord the two forms specific distinctness.

The female from Rio Grande do Sul is rather doubtfully placed in this species. It is very teneral; the head and body are flattened and twisted and have the undifferentiated light brown color of dried tenebras, and the wings are very light in color - semi-transparent. Except for a slight thickening and secondary anastomosing of veins in a limited area caudo-distal of the triangle it agrees very well with *obscura*. In the number of cells in the secondary loop (11-13), the number of rows of cells between the bisector and A3 (3 in both wings), and the ratio of length to width of rear wing at the nodus it differs, slightly, at least, from the allotype female of *intensa* and is quite characteristic of *obscura*. In such other characters as can be determined from such an immature specimen (chiefly venational) it falls within limits common to the two species.
Of the two males from Rio Grande do Sul, one, although very
teneral, appears to be typical of this species, but the other
(almost mature) differs from all other specimens of the species
in having the red color of the veins in the spot at the base of
the rear wing less bright and somewhat more extensive in area.
However, the number and thickness of the veins in this area are
approximately the same as in other specimens and the lighter
color appears to be due to fading of an original bright red.

The abdomen is missing from the allotype female; broken
bits of an abdomen were present in the shipping box when it was
received from London, but the abdomen of a female pullata in
the box was also missing and there was nothing to indicate to
which, if not to both, the fragments belonged; furthermore they
were too broken up to be of any value.

Because of the unsatisfactory condition of the females of
this species available to me for study I am quoting certain notes
from Ris (1910, 1916, 1928), referring to material not avail­
able to me.

"Paraguay (coll. Selys), Prov. Rio Janeiro (Hamburg) und
Rio Grande do Sul (coll. Selys). Die Exemplare sind unter sich
ziemlich gleich, eine Form, die in der Ausdehnung der Verdich­
tung und des Basisflecks ziemlich mit den surinamischen und
Santarem-Exemplaren übereinstimm (♂ bis auf das Niveau der
Aussenecke der Schleife, die ausserste Spitze der Schleife und
ca. 5-6 Zellbreiten am Analrand freilassend; ♀ in etwa gleichem Umfang helle Adern aber geringe oder gar Verdichtung), aber kleiner, vor allem kurzflugliger ist. ♂ Abd. 19, Hfl. 25, Pt. 3 (Paraguay); Abd. 19, Hfl. 28, Pt. 3.5 (Prov. Rio); Abd. 17, Hfl. 24, Pt. 3.5 (Rio Grande do Sul). ♀ Abd. 16, Hfl. 23, Pt. 3 (Paraguay); Abd. 16, Hfl. 24, Pt. 3.5 (Rio Grande do Sul).

"Bei den ♀ von Paraguay ist der Fleck kleiner, bleibt vom Analrand fast 3 mm entfernt; die Aderverdichtung ist in seinen centralen Teilen eine ganz extreme, die Farbung (subjuv.) noch gelb, teilweise gelbrot. Die Proportionen zeigen eine gewisse Annäherung an obscura: Abd. 17, Hfl. 24.5: 10.5, Pt. 3."


The references by Navas have been placed under this species
because it is the only one of the pullata-group, for which there are verified records more than 50 or 100 south of the equator.
Diastatops estherae, new species


Recorded distribution: BRAZIL: Amazonas, Manaos (Kirby, 1897).


A very bright colored species.

Male: Labrum and face, including superior surface of frons, bright red. Vertex and occiput purple. Prothorax and anterior margin of pterothorax black; dorsum of pterothorax usually red, infrequently dull brown; remainder of thorax olive brown. Legs reddish brown. Wings long; not deeply colored except along costa before nodus; postnodal light areas large. In place of second cubito-anal cross vein an area of anastomosing veins, usually with several running to the inner side of the triangle. Veins in base of both wings, almost to level of nodus, except near caudal margins and along costal margin.
of fore wing, somewhat thickened and anastomosed; bright red. Veins in remainder of wings black. Cephalic surface of anterior lamina without denticles; caudal margin almost straight, with only a shallow, angled, emargination in center. Superior appendages about equal in length to segments 9 and 10, teeth elevated on a keel; inferior about two-thirds as long as superiors, sides almost parallel.

Female: Similar to male; second cubito-anal cross vein not branched; veins in reticulated areas of wings less dense and not so highly colored.

Measurements: ♂: abdomen - 17.5-30.5 mm.; femora, second - (4 mm., third - )4.5 mm.; tibiae, second - 4.5 mm., third - (6 mm.; fore wing - 23.5-38 mm., pterostigma - (3 mm.; rear wing - 23-38 mm., pterostigma - 3.25 mm., width, base - 10.5-13 mm., nodus - 9-10.25 mm. (ratio: base - 2.34-2.35, nodus - 2.61-2.73). ♀: abdomen - 16-18 mm.; femora, second - >3.5 mm., third - >4.5 mm.; tibiae, second - >4mm., third - <6 mm.; fore wing - 23-26 mm., pterostigma - >3 mm.; rear wing - 23.5-26 mm., pterostigma - >3.5 mm., width, base - 10.5-11.75 mm., nodus - 9.75-10.5 mm. (ratio: base - 3.31-3.24, nodus - 3.47-2.48).

This species is named for my wife, Esther Barrett Montgomery.

Estherae is, perhaps, most closely related to pullata as these two species resemble each other more closely than either of them, especially estherae, resembles emilia or intensa, both in the width and the central tendency of their range of variation in the characters tabulated. However, estherae is distinctly separated from all other species of the pullata-group by the coloration of the frons, the presence of secondary reticulation of veins in the fore wing, and the form of the inferior appendage. Although estherae appears to have more densely veined wings than pullata because of the more intensive and extensive secondary reticulation, in other, and, perhaps, more definitive, areas the veins are more numerous in pullata (as illustrated by the number of antenodal and postnodal cross veins and the number of cells subtended by Rpl).

Teneral females of estherae and pullata are somewhat difficult to separate. There is little difference in the coloration of the frons in dried tenderals of the two species and the venational differences are not as wide in the females as in the males.

The only information available concerning the habits and habitats of this species are the notes by J. H. Williamson (1933 and unpublished field notes on envelopes containing specimens).
concerning the creek where he and Strohm found it at Manaus.

"Owing to the unprecedented high level of the Rio Negro, creek beds were flooded for over a mile back into the country. We collected along the bushy bank of the stream which flows past the Manaus brewery, finding there many teneral libellulines .......
The back water extended inland to the old dam, built across the creek bed a half mile below the Bosque and about two miles from the river. The artificially flooded area above the dam afforded but little better collecting grounds." "Scarce and hard to catch. When approached flew towards center of bushy trees."
Diaatatopa obscura (Fabricius)


Recorded distribution: America (Fabricius, 1775); S. America (Kirby, 1890); COLOMBIA: Cumara (Navas, 1933). GUIANA: (Erichsen, 1843); Hagen, 1861, 1875; Brauer, 1868); Georgetown (Ris, 1916). BRAZIL: (Rambur, 1842; Hagen, 1861) Brauer, 1868; Kirby, 1890; Navas, 1923); Para: (Ris, 1910); Parana de Buaassu (Kirby, 1897); AMAZONAS: Mauo (Kirby, 1897; Sjostedt, 1918); Rio Japura (Sjostedt, 1918); Maranhao: "Saint Louis de Maragion" (Rambur, 1842; Hagen, 1861, 1875; Brauer, 1868); Gara (Navas, 1934); Bahia: (Burmeister, 1839; Hagen, 1875; Calvert, 1898); Mato Grosso: (Ris, 1916); Ucaryzal (Calvert, 1909; Longfield, 1939); Minas Gerain: (Hagen, 1875; Ris, 1910); Rio de Janeiro: Bom Jesus de Itabapoana (Ris, 1910). BOLIVIA: Rio Tucuaca (Ris, 1928). PARAGUAY: (Navas, 1923); Sapucay (Ris, 1910).


Original description:

"15. L. alia tota ferruginea, corpore obscurae. obscura
Habitat in America Dom. Lewin.
Statura & magnitudo L. flaveolae. Corpus to-
tum ferrugineo fusum. Abdomen cylindri-
cum. Alae ferrugineae puncto marginali, ob-
longo, fusco."

Original description (of tinota);

"Ruso-subcoerulescens; abdomine obscure rubro; alia fuligineo-
subviridi-aneiae, brevibus, posticio dilatatis, nervis
praeципius elevatis o."

"De la taille de la Flaveola ou plus petite, et ayant les
ailees plus courtes. Tete petite, ayant la face d'un brun vio-
let, avec les lobs lateraux rousautes; sommet du front marque
anterieurement de deux impressions assez larges et rugueuses,
tres-avance en avant; vertex tourne en avant, assez large a la
base, fortement retreci a l'extremite, un peu bifide; occiput
un peu plus etroit anteriument que postierieurement, ou il
est arrondi et dépasse par les yeux; bouche tres-saillante. Thorax d'un brun roux, luisant et un peubletonatre, plus foncé en dessus; bord postérieur du prothorax bilobe; lobes épaux, larges. Abdomen triangulaire, pas sensiblement renflé a la base, rouge, un peu obscur en dessus; styles mediocrement longs, cylindriques, greles, courtes l'un de l'autre a la base, un peu renflées en dessous ou it existe une carene fortement dentée, naissant un peu avant la moitié de leur longueur; piece sous-stylaire plus de moitie plus courte qu'eux, tres-large, plus large que longue, assez fortement etrechie a sa base, largement mais peu profondément échancrée a l'extrémité, dont les deux cotés forment deux angles un peu pointus. Pattes greles, noiretées. Ailes courtes, d'un brun roussatre foncé, ayant un reflet d'un vert métallique en dessus, d'un bleu violet en dessous; principales nervures tres-saillantes, antérieures, ayant avant le base une échancrure au bord costal; les postérieures tres-larges; areoles nombreuses, presque egales; mem- branule bruneatre, pterostigma de la couleur des ailes.

"De la collection du general Dejean, ou elle est étiquetée du Brésil par Latreille; et de celle de M. Serville, et indiquée de Saint-Louis de Maragnon."

A small, very dark, broad winged species.

Male: Thorax black on dorsum, dark brown on sides. Legs dark brown. Wings broad; very dark, no trace of postnodal light area in fully mature specimens; no areas of thickened or anastomosed veins; veins black. Abdominal segments 1-2 black above; 1-3 black or dark brown on sides. Cephalic surface of anterior lamina smooth; caudal margin sinuate, with a deep U-shaped e-margination in center. Superior appendages about as long as segments 9 and 10, teeth elevated on a keel; inferior about one-half as long as superiora, sides widely divergent.

Female: Very similar to male; veins at base of wings red; abdomen usually dark brown. Appendages about one-half as long as segment 9; slightly constricted at base; apex acute.
Measurements: $\sigma^2$: abdomen - 15-19 mm.; femora, second - <4 mm., third - 5 mm.; tibiae, second - 4.5 mm., third - 6 mm.; fore wing - 31-35 mm., pterostigma - 3 mm.; rear wing - 21-25 mm., pterostigma - 3.5 mm., width, base - 9.5-10.75 mm., nodus - 9-9.75 mm. (ratio: base - 2.21-2.28, nodus - 2.33-2.51). $\varphi$: abdomen - 14.5-17 mm.; femora, second - >3.5 mm., third - <5 mm.; tibiae, second - 4.5 mm., third - 6.5 mm.; fore wing - 20-34 mm., pterostigma - >3 mm.; rear wing - 20-34 mm., pterostigma - >3.5 mm., width, base - 10-10.5 mm., nodus - 9.5-10 mm. (ratio: base - 3.10-3.19, nodus - 3.21-3.30).

Type: Lost ? (The description by Fabricius, "Abdomen cylindricum", would indicate that his specimen was a female.) (Rambur's type of tinota, a male from Brazil, is in the de Selys Collection at Brussels.)

The specific names applied to this species by Fabricius and Rambur (obscura, dark; tinotus, dyed, stained) indicates that they were impressed by the dark color of these insects, as was Burmeister in his selection of a name for pullata.

Obscura is quite distinct from the other two, closely related, species of the obscura-group. Both maxima and nigra are much larger than the averaged sized obscura; only one specimen of the 63 of obscura measured, is equal in wing length to the shorest wing observed in nigra, although two specimens have
abdomens as long as those found in nigra and one exceeds all specimens of nigra examined in this character. The three species differ but little in the venational characters tabulated. The sides of the inferior appendage are quite divergent in obscura, but are sub-parallel in maxima and nigra; also the row of teeth on the ventral surface of the superior appendages usually extends considerably beyond the tip of the inferior in obscura, but reaches only to the tip, or less, in the other two species. A very decided difference is found in the shape of the rear wing, that of obscura being much wider; the ratio of length to width in the male obscura is, at the most, 2.38:1 at the level of the loop (base) and 2.51:1 at the nodus (much less in both cases in the female), while these ratios in nigra and maxima are, respectively, 2.36:1 and 2.46:1 at the base, and 2.73:1 and 2.84:1 at the nodus.

The red color of the veins in the basal portion of the wings of the female is never very bright; in some specimens it cannot be detected without considerable magnification.

The characters of Rambur's type of tinota studied and recorded by Miss Heiss fall, in every case, almost in the center of the range for obscura. No areas of secondary reticulation or coloration of veins. Color of frons - deep brown to black with purple fluorescence. Wing counts: a. Max. cell rows enclosed by Mpl, fore wing - 3, hind wing - 3; b. No. of cell rows
between the bisector and $A_3 = 3$ (most of the area); c. No. of cells in triangle, fore - 5 on l., 6 on right, hind - 4."

As in pullata the specific name of this species appears very appropriate for the dried specimen but the living insect must present quite a different appearance. Kirby (1897) quoted Austen concerning this species, as follows, "The patch at the base of the hind wing and the abdomen (except tip) brilliant scarlet when alive." Williamson wrote in his field notes, Georgetown, January 26, 1912, "This species frequents lower vegetation than other (pullata) and walks more on twigs. Abdomen of male bright red - very handsome." In letters to Rie (1916) he added further comments on the habits of this and other species, especially "on the very peculiar habit of the 3 app. of Diastatopha taken by me, of walking about on twigs. I have seen nothing to compare with this in other dragonflies. I believe the more active males were the most conspicuous walkers. .... at the Botanic Gardens in Georgetown the two species are associated. But along some of the canals through fields, obscura may sometimes be taken in the overhanging grass in considerable numbers. Pullata was never observed here at all. If one of these obscura was pursued closely but not captured, it would leave the canal and fly into the first bit of thick vegetation back from the canal bank. This vegetation might be
grass, bush or any dense cover. In the interior of British Guiana I do not recall that I saw obscura at all."

At Belem, August 9, 1932, Williamson and Strohm found obscura "along wide trail in woods far from water. Generally they were fluttering about close to ground, alighting on dead leaves or twigs. When approached they flew to bushes and then to higher branches in trees or back into woods."
Diasatops nigra, new species


A large, dark species.

Male: Wings rather long; uniform dark brown, except somewhat darker along costa before nodus, and slightly lighter in limited areas in apical half - a small area in center of wing just distal of nodus and a larger area along caudal margin; iridescent violet by reflected light; veins black. Cephalic surface of anterior lamina spinose; caudal margin sinuate, with a deep, U-shaped esmargination in center. Superior appendages considerably shorter than segments 9 and 10, bearing 5-7 teeth, forming a keel, on ventral margin; inferior about two-thirds as long as superiors, reaching slightly beyond teeth of superiors, sides almost parallel, caudal margin hollowed out into a broad arc.

Female: Unknown.

Measurements: (♂) abdomen - 18-18.5 mm.; femora, second - 4 mm., third - 5 mm.; tibiae, second - 4.5 mm., third - 6 mm.; fore wing - 35-36.5 mm., pterostigma - 3.35 mm.; rear wing - 25-36.5 mm., pterostigma - 3.75 mm., width, base - 11 mm., nodus - 9.5 mm. (ratio: base - 2.36, nodus - 2.73).

The specific name nigra (L. niger, black) was chosen for this species, first, because of the rather uniform dark color of the species, and, second, because the type specimen was collected on the Rio Negro.

This species is rather close to maxima, from which it is distinguished chiefly by its smaller size. Slight differences in venation and in the form of the genitalia and appendages, apparent in the limited material (of both species) available for study, are well within the range of variation found within species of which a considerable number of specimens were examined.

The type specimen was damaged in the field by ants; segments 5-9 were largely destroyed, but the appendages were undamaged and enough of the dorsum remained to permit accurate measurement of the length of the abdomen. (The tip of the abdomen has been fastened to the remainder of the specimen by means of cardboard and glue.) The two specimens from Maues appear not to have been properly dried and have been damaged by mold, especially on the head and thorax.
Diastatops maxima, new species

Diastatops obscura?, Ris, 1910, Coll. de Selys, ll: 310 (in part).


A very large, dark species.

Male: Wings long; rather uniformly dark brown, somewhat darker along the costa, especially before the nodus, and very slight "brightening up" in middle of wing distad of nodus; iridescent violet by reflected light; veins dark brown or black. Cephalic surface of anterior lamina spinose; caudal margin sinuate, with a deep, broad V-shaped emargination in center. Superior appendages slightly shorter than segments 9 and 10, bearing 5-6 teeth, which form a distinct keel, on ventral margin; inferior reaching beyond teeth of superiors, sides almost parallel, caudal margin slightly hollowed out, forming a broadly obtuse angle.

Female: Unknown.

Measurements: (v?) abdomen - 23 mm.; femora, second - <5 mm., third - 78 mm.; tibiae, second - 5.5 mm., third - 8 mm.; fore wing - 31 mm., pterostigma - 4 mm.; rear wing - 32 mm., pterostigma - 4.5 mm., width, base - 13 mm., nodus - 11.25 mm. (ratio: base - 2.46, nodus - 3.84).

Type: Holotype σ? - Teffe Ega, September, 1931 (Coll. Ris).
The specific name maxima (L., maximus, greatest) has been selected for this species because it so greatly exceeds all other species of the genus in size.

This species is very closely related to nigra; the chief difference between them is size. Certain structural differences (in genitalia, appendages, and venation) apparent in the limited number of specimens available for study—three of nigra and one of maxima—are slight and with the exception of the number of cells subtended by Rpl in the rear wing are well within the range of variation found within those species of which more extensive material was studied. The difference in size between the specimens is considerable (much greater than the extreme range found in any other species, if the Selysian specimen mentioned below is included in maxima), and in spite of my inability to find more definitive structural differences it seems imperative to treat the two forms as distinct species.

There is a specimen in the De Selys Collection which, from notes and drawings by Miss Heiss and a brief note by Ris (1910), appears to be conspecific with the one described here. It is slightly larger—abdomen, 34 mm., and rear wing, 34 mm. It also came from Ega, and was collected by Bates.
Diastatops dimidiata (Linne)


*Diastatops marginata*, Kirby, 1890, *Cat. Od.*, 8; Ris, 1910, *Coll. de Selys, 11: 312, 319, 321.


Recorded distribution: South America (Kirby, 1890). GUIANA (Ericson, 1848); Essequibo (Hagen, 1861, 1875; Brauer, 1868); Wismar (Ris, 1916; Williamson, 1915, 1916, 1917); SURINAM:
(Burmeister, 1839; Hagen, 1861, 1875; Brauer, 1868). FRENCH GUIANA: Cayenne (Ris, 1910). BRAZIL: Para: (Kirby, 1897; Ris, 1910); Parana de Buyassu (Kirby, 1897).


Original description:

"dimidiata 14 L. alis planis a basi ad medium nigris.
Habitat in America. Rolander
Margo alarum etiam fuscus est,
aeterum hyalinae. Cauda duobus
parvis munronibus."

A small, rather dark species, with peculiarly marked wings.

Male: Wings moderately broad; black from the base to a line running from nodus to approximately one cell distad of apex of loop in rear wing and to a corresponding location in fore wing; remainder of wings hyaline except for a dark marginal band about one cell wide (somewhat wider at apex, and frequently rather indistinct along caudal margin of fore wing), black along costa to pterostigma, brown at apex and along caudal margin, and a broad white band, two to four millimeters wide just distad of the basal black area; veins black. Postnodal costal cells
not divided by a longitudinal intercalary vein; second cubito-anal cross vein running to inner side of triangle; sometimes the venation is very slightly more dense in areas immediately caudo-distal of triangle of rear wing than in the remainder of the wings. Cephalic surface of anterior lamina smooth with scant pubescence; caudal margin almost straight, with only a slight indentation in center. Superior appendages as long as segments 9 and 10, bearing three to four short teeth on a keel below; inferior slightly more than one-half as long as superiors, reaching well beyond the teeth of the superiors, sides almost parallel, apex bifid.

Female: Very similar to male; usually without white band in wings and with veins at base of wings red. Appendages about one-half as long as segments 9 and 10.

Measurements: ♂: abdomen - 15.5-18.5 mm.; femora, second - <3 mm., third - 3.5 mm.; tibiae, second - 3.5 mm., third - 4.5 mm.; fore wing - 20-34 mm., pterostigma - 3 mm.; rear wing - 30-33.5 mm., pterostigma - 3.5 mm., width, base - 8.75-9.75 mm., nodus - 8-9.25 mm. (ratio: base - 2.29-3.41, nodus - 3.53-3.54).

♀: abdomen - 15 mm.; femora, second - <3 mm., third - 3.5 mm.; tibiae, second - 3 mm., third - 4.5 mm.; fore wing - 19-24.5 mm., pterostigma - 3 mm.; rear wing - 19-24 mm., pterostigma - 3.5 mm., width, base - 8.75-9.75 mm., nodus - 8-9.5 mm. (ratio: base - 3.35-3.46, nodus - 2.53-2.56).
All of the specific names which have been applied to this species refer to the peculiarly marked wings; *dimidiata* (dimidiatus, halved, half) was used by Linne unquestionably because the wings are (about) half black, while Drury's and Hagen's names (*marginata* and *fenestrata*) were prompted by the appearance of the outer half of the wings - a clear central portion surrounded by a colored border (*marginatus*, bordered; *fenestra*, a window).

This species is entirely distinct from all other species of the genus and, alone, forms one of the three natural groups into which the species of the genus are divided.

One of the females from Wismar has the wing coloration exactly as found in the male, but in the remainder the mid-wing white band is lacking and the veins within the black basal portions of the wing are red. Although this specimen was fully mature and some of the others were teneral, these differences did not appear to be due, entirely, at least, to age; the female from Para appears to have been fully mature, yet it does not have a trace of the white band, while the one from the Rupununi River, the most teneral of the lot, has very definite indications of this band.

This apparently is a creek species. Ris (1910) quoted Bates as finding it along "banks of creeks". Williamson (1915, 1916, 1917) also found it along a creek. "Between Wismar and
Christianburg is a small stream flowing into the Demerara River and crossed by a footpath between the two towns. In the afternoon the backward flow of the river due to tides makes this stream almost unwadeable near its mouth. We were attracted to this muddy, log-choked creek by the beautiful Diastatops dimidiata, which we found nowhere else. The banks of the creek are generally covered with impenetrable brush and the exposed margins are slippery and treacherous, due to the rise and fall of water over them. At places logs are piled so indiscriminately in the creek that progress is slow and difficult; and at places the overhanging bushes completely shade the stream. At this stream they "collected, among other things the beautiful Diastatops dimidiata, the shadowy Epipleoneura lamina and fuscaenea, and the peculiar Cyanogomphus conchinas. It was here also, and here alone, that we found Neoneura bilineata." Williamson's notes, quoted by Ris (1916), furnish some information concerning the habits of the species, and, perhaps, also indicate why specimens are comparatively rare in collections, "dimidiata is, I believe, the most aggravating dragonfly I ever tried to catch. They slip out of the bush along a treacherous muddy creek, and at the slightest move, back they go where only a snake can follow."
LEG CHARACTERS OF RELATED GENERA

Descriptions of the leg characters of 35 genera of Libellulidae are presented in the following pages. These include all the genera which have been indicated as being at all closely related to Diastatops, the three other genera of Gruppe III of Ris, the 11 genera of Gruppe IV, three representatives of Gruppe V, which Tillyard combined with Gruppe IV to form the Brachydiplacini, the five genera of Gruppe VII, which is probably closer to III than is IV (the apparent wide separation in Ris' system is due to the linear arrangement of lines of evolution which could best be represented by a tree), and all additional genera included in the Celithemini of Needham and Broughton.

These descriptions are not all equally complete as some are based upon all the known representatives of the genus, others upon one or a few species, and because the data have been collected at different times over a period of about five years as part of a general study of the leg characters of Odonata. Of a few genera (rare African or Oriental forms) no specimens have been available for study; for such genera a summary of the information given by Ris in the Libellulinen has been used. However, this source of information is very unsatisfactory for this purpose as his descriptions vary greatly in completeness and accuracy; these references to leg struc-
tures are generalizations and estimations based upon observation and although they are the result of careful work by a skilled taxonomist of wide experience the conclusions reached are sometimes quite different from the results of actual tabulation of characters.

Unless otherwise indicated the description applies to both sexes; whenever sexual differences were noted the characters of the male are described and the variation from these found in the female is indicated.

In every case the species upon which the description is based are listed. However, even in those genera in which considerable specialization was found, little inter-specific variation was evident.

The coxae in the Libellulidae are truncated cones, frequently more or less flattened on one or more aspects. The trochanters are cylindrical, but are constricted near the base to form a short proximal and a longer distal segment; the juncture of the trochanter with the femur is oblique so that the dorsal surface of the distal segment is about one half as long as the ventral. The coxae and trochanters are clothed with fine long pubescence, usually of light color.

The femora are usually flattened on the cephalic (outer) surface with definite carinae on the dorso- and ventro-cephalic edges, but otherwise rounded. The tibiae are usually flattened
on all four aspects with definite carinae on all four edges; as the upper surface is narrower than the lower the segment is trapezoidal in cross section. The tarsi consist of three segments each, of which the proximal is the shortest, the distal the longest; they are flattened below but rounded above, and each bears two claws at the apex. Each claw has a rather prominent tooth on the ventral edge, usually at about two-thirds of the distance from the base to the point.

Typically in the Odonata there are equivalent rows of spines on the two ventral edges, directed downward and outward from the leg at an angle of about 60°-75° with the perpendicular, extending from the base of the femora to the apex of the tarsi, with the spines becoming successively longer on the femora, successively shorter on the tibiae and of approximately equal length on the tarsi. However, these spines are much modified in the Libellulidae. Those of the caudal row of the femora are very slender and hair-like and the row has been doubled or tripled. The cephalic row on the first femur is almost always restricted to the distal two-thirds or one-half of the segment and the spines increase rapidly in length and spacing (that is, each spine is much longer than the preceding one and is much closer to it than to the one following). The final spine in the cephalic row on all femora is
usually very slender (hair-like), strongly curved and shorter than the preceding spine in the row. On the first tibia the spines of the distal half of the cephalic row are highly modified; they are somewhat flattened, lamellate on the ventral aspect and usually approximately equal in length and strongly curved distad. There are also other rows of spines on the tibiae (referred to hereafter as definitive hairs), usually long and very slender, a row on either side of the caudal row of spines, one just beneath the comb (of the first tibia), and another on the dorso-cephalic carina (also more or less confined to the first).

In the following descriptions variations of and deviations from this general structure are described.

The legs are described as if extended at right angles to the body. The ventral edges of the femora and tibiae (ventro-cephalic and ventro-caudal) are referred to as the cephalic and caudal margins and the rows of spines thereon as the cephalic and caudal spines (or rows). The terms, dentine, tooth, spine, hair, etc., are used to indicate variations in shape and size of the structures referred to, but these (except the teeth or serrae of the dorsal carinae) are not morphologically distinct.
PALPOPLEURINI

DIASTATOPS Rambur

Species examined: dimidiata Linne, emilia Montgomery, estherae Montgomery, intenca Montgomery, maxima Montgomery, nigra Montgomery, obscura Fabricius and pullata Burmeister.

See generic description (p. 49) for detailed description of legs.

ZENITHOPTERA Selys

Species examined: americana Linne.

Legs moderately long and fairly slender. First femur with a cephalic row of five to seven spines on distal half, gradually becoming longer distad, except the penultimate spine very long and far distant from the proceeding and the last a rather short, curved hair-like spine; a row of about 14 reddish, hair-like spines on caudal margin and similar, but less complete rows on either side. Second and third femora similar; on the second the cephalic row begins at the end of the proximal third of the segment and contains only one or two more spines than that of the first, on the third this row consists of about nine to 13 denticles, a very widely separated long spine and the final hair. First tibia with five spines before and about 10 in the comb, and about 13 in the caudal row, the more distal of these rather close-set and of fairly even length. Second tibia with
about nine and 20 spines in the cephalic and caudal rows, those in the distal third of the latter rather close-set and of almost even length, forming a comb. Third tibia with about 13 and 15 spines in the two rows, those in the distal fourth or fifth of the caudal row close-set and of even length, forming a comb; spines rather short.

Claw rather short; tooth small, near the apex.

Similar in color to thorax (brown).

**PALPOPLEURA** Rambur


Legs of moderate length, rather slender. First femur with a row of five or six spines on distal two-thirds or three-fourths of cephalic margin, increasing in length and spacing distad, followed by one or two slender, curved, hair-like spines, and a row of long, slender, hair-like spines on caudal margin, also similar rows on ventral and caudal surfaces. These hair-like spines are the same color as the femur - black in *portia* and *vestita*, yellow in *jugunda* and *sexmaculata*. Second and third femora similar to first, except the spines of the cephalic row more numerous (eight to 13 and about 14 respectively), and those on the proximal third of the second and all except the last on the third reduced to triangular denticles; also a few denticles
among the hair-like spines on the caudal margin of the third. First tibia with four spines before and 11 in comb, and about 10 in caudal row. Second tibia with about eight and 30 in cephalic and caudal rows, those in the distal half of the caudal row very close-set. Third tibia with about 12 and 16 respectively in the two rows, spines rather short and of nearly equal length.

Claw rather short, thin; tooth of moderate size, near the apex.

Color similar to thorax; brown, becoming darker distad in the dark species, yellow, changing to brown on feet, in the yellow species.

PERITHEMIS Hagen

Species examined: cornelia Ria, domitia Drury, electra Ria, intensa Kirby, laia perty, mooma Kirby, seminola Calvert, tenera Say and thais Kirby.

Legs long and rather slender. First femur with a cephalic row of five to six spines on distal two-thirds or three-fourths of segment, gradually increasing in length distad until the last which is slightly shorter than the preceding, and at the apex a short, fine, hair-like spine; caudal margin with a row of about 10-12 long, slender, yellow, hair-like spines; also similar, but less complete rows of spines on ventral and caudal surfaces. In the female and sometimes in the male the cephalic
row begins with a much smaller spine than usual. Second femur similar to first, except the cephalic spines more numerous (about 10) and extending the full length of the segment. Third femur also similar but the cephalic spines slightly more numerous (about 13) and increasing in length from the base less rapidly; frequently, however, spines of this row are missing over rather long spaces. First tibia with four spines before and eight to 10 in comb, and about 10 in caudal row; dorso-cephalic carina bearing about 15 short, rather strong, black spines. Second tibia with about eight and 14 spines in cephalic and caudal rows; third with 11 and 15 respectively; spines rather long.

Claw of moderate size; tooth rather small, very near the apex.

Yellow or light brown (dark brown or blackish with superior surface of tibiae yellow in domitia); thorax olive, or brown with yellowish or olive markings.
BRACHYDIPLACINI

NANNOPHYA Rambur

Species examined: pygmaea Rambur.

Legs long and fairly slender. First femur with a row of numerous, very short, hair-like spines on proximal half of ventro-cephalic margin, four spines on distal half, the first two rather short, the third rather widely placed and very long, and the fourth very widely placed but moderate in length, ventro-caudal margin bearing five or six hair-like spines, not all in the same row on distal third, dorsal surface with a few sparse hairs at the apex; second with eight spines in cephalic row and about 10 hair-like spines in caudal row, the latter somewhat confused and intermingled with numerous shorter, fine hairs; third with eight to 10 denticles and a spine of moderate length followed by another, shorter and hair-like, at apex, on cephalic margin and a row of 10 hair-like, almost equal spines on caudal margin, also on the caudal surface just above the latter a row of similar but shorter and more numerous spines, dorsal surface bearing a few hairs, caudal edge rounded, cephalic carinate and dentate. First tibia with four spines before and five in the comb, about 10 in the caudal row, these more or less confused with a row of hairs just ventrad, numerous hairs also on the caudal and dorsal surfaces; second with six spines in cephalic and about 15-16 in caudal row, the distal eight or 10 of the
latter row approximately equal and very closely placed, also a row of short hairs just dorsad of this row; third with about eight to 10 spines in each row, numerous short, decumbent hairs and a few long upright hairs on dorsal surface.

Claw tooth rather short, blunt; near the apex.

Dark (black or dark brown), somewhat lighter at base; thorax reddish brown with blackish markings on dorsum and near leg bases.

In the female the armatur of the third femur is similar to that of the second.

**BRACHYCONIA** Kirby

Species examined: **oculata** Brauer (♀).

Legs long and slender. First femur smooth, except a row of five spines on the distal half of the ventro-cephalic margin, first four equally spaced and gradually increasing in length distad, the fifth widely separated and very long; second with nine spines in cephalic and 12 yellow, hair-like spines in caudal row; third with ventro-cephalic margin similar to the second, other three edges marked with carinae bearing black teeth. First tibia with six spines before and six in the comb, also six in caudal row; second with seven and nine, respectively, in cephalic and caudal rows, gradually decreasing in length distad, except last six in caudal row almost equal; third with nine and 11 respectively, gradually decreasing in length.
Claw tooth rather thin, very near the apex.

Similar to thorax in color; yellow with apices of femora and bases of tibiae slightly darker; spines black except as noted.

In the male, according to Ris (1910), the third femur (ventro-cephalic) with a row of very small, rather widely separated spines and a longer spine at the end.

**TYRIOBAPTA** Kirby

Species examined: *torrida* Kirby.

Legs long, rather slender. First femur with five spines on distal two-thirds of cephalic margin, gradually increasing in length and spacing distad, except the last which is much shorter than the fourth, or even the third, and more slender and strongly curved, caudal margin rounded, bearing three somewhat confused rows of hair-like spines; second similar to first, except the cephalic row begins near the base of femur and contains eight spines, of which the middle three or four are about equal in length; third with nine to 11 in the cephalic row, similar to the corresponding row in the second except the first spine is reduced to a small, triangular tooth, caudal margin similar to first and second except for a row of five to eight short spines (beginning with a triangular tooth) among the rows of hairs in the distal half or two-thirds of the femur, dorso-cephalic.
margin carinated and bearing a few widely placed, short denticles. First tibia with five spines (decreasing rapidly) before and nine in the comb, eight spines in caudal row, also a row of short hair-like spines just ventrad of comb; second and third tibiae with nine to 11 spines in each row.

Claw tooth rather sharp, very near the apex.

Dark brown or blackish in male, lighter in female (corresponding closely to color of thorax).

Armature of male and female identical.

**BRACHYDIPLAX** Brauer

Species examined: *ghalybea* Brauer and *sobrina* Rambur.

Legs long and rather slender. First femur with a row of five spines, gradually increasing in length and spacing distad, on distal two-thirds of cephalic margin and a hair-like spine of moderate length at the apex, remainder of femur smooth and bare, except for a row of about 13-15 hair-like spines on caudal margin, flanked on either side by incomplete rows of shorter hairs; second with a cephalic row of 10-12 spines gradually increasing in length and spacing from a short, thick, triangular tooth at the extreme base of femur to a spine of moderate length at apex, caudal margin bearing two to four, somewhat confused rows of hairs, the number of rows greatest at apex, remainder of femur smooth and bare except a carina on the dorso-cephalic margin; third with a cephalic row of 14-16 short, thick, triangular
spines, increasing in length gradually distad, caudal margin similar except denticles shorter and sometimes present only on distal half and flanked by incomplete rows of hairs; dorsal edges carinated and each bearing a row of close-set, decumbent, short teeth. First tibia with four to six spines before and eight to 11 in the comb, about 10 in caudal row; second and third each with about 10 and 15 spines in cephalic and caudal rows respectively, dorsal edges similar to those of third femur.

Claw tooth rather small, near the apex.

Dark (black or dark brown), ventro-caudal surface of anterior femora sometimes light (yellow or olive); thorax light to dark brown with rather extensive dark markings.

**AETHIOTHEMIS** Martin-Ris

No specimens of this genus were available for study; the following description has been compiled from Ris (1910).

Legs long and powerful. Second femur (cephalic?) with spines at base of equal length, but rapidly becoming longer after the middle; third with numerous spines, about equally spaced, gradually becoming longer, at the end a longer spine. Tibial spines numerous, long, fairly powerful.

Claw tooth large, near the apex.
RAPHISMINA Kirby

Species examined: bispina Hagen.

Legs long and rather slender. First femur with four spines on distal three-fifths of cephalic margin, increasing rather rapidly in length and spacing, followed by a thin hair, and with three rows of hairs on the rounded caudal margin; second similar except the row of spines on the cephalic margin extending from base to apex, more numerous (about seven) and increasing in length more gradually; third also similar except the spines (of which there are about 10) shorter — those near the base reduced to triangular denticles and only the last one of moderate length — and the dorso-cephalic margin bearing a dentate carina. First tibia with four spines before and eight in comb, nine in caudal row, also a row of hairs just ventrad of the caudal spines; second with seven and 11 and third with 10 and 12 spines in cephalic and caudal rows respectively, the second with a row of hairs on ventral surface; dorsal edges of all tibiae carinate and dentate.

Claw tooth short, stout; near the apex.

Black, caudo-ventral surface of anterior femora olive; thorax black or black with olive markings.

CHALCOSTEPIA Kirby

Species examined: flavifrons Kirby.
Legs long and slender. First femur with six spines, increasing rather rapidly in length and spacing, on distal two-thirds in cephalic row and 10-11 hair-like spines, gradually increasing in length only at the base, in caudal row; second with 10-11 spines in cephalic row, increasing gradually from triangular denticle at base to long curved spine at apex, the latter more widely spaced than the remainder of the row, caudal row consisting of 12-16 yellow, hair-like spines, flanked by rather confused rows of hairs; third similar to second, except the spines somewhat more numerous. First tibia with eight spines before and nine in comb, about 11 in caudal row; second and third with about 13-14 spines in each row.

Claw long; tooth very prominent, near the apex.

Yellow at base, brown distad; thorax yellow and brown.

**HEMISTIGMA** Kirby

Species examined: *albipuncta* Rambur.

Legs long and slender. First femur with five spines followed by a slender white hair on distal two-thirds in cephalic row, the first four spines increasing in length and spacing gradually distad, the fifth very widely placed and very long, the remainder of femur smooth and bare except for three more or less complete rows of yellow, hair-like spines on caudal margin; second and third somewhat similar, but the spines of the cephalic row are more numerous (10 and 23 respectively) and extend the full
length of the segment, on the third femur these spines, except the last, are reduced to recumbent, triangular teeth and a similar row without the long terminal spine is found among the small, sparse hairs on the caudal margin; on both the second and third femora the dorso-cephalic edge is carinated and on the third the carina bears numerous close-set, triangular denticles. First tibia with five spines before and nine in the comb, nine in caudal row which is flanked with rows of white hairs; second with nine and 12 spines in the cephalic and caudal rows, the latter bordered by rows of white hairs; third with 10 spines in each row; dorsal edges of all tibiae carinate and dentate.

Claw long; tooth long and powerful, well beyond the middle.

Basal segments and ventral and caudal surfaces of anterior femora yellow, remainder black; thorax yellow with black markings.

**THERMOCHORIA** Kirby

Species examined: *equivocata* Kirby (var. *picta* Sjostedt).

Legs fairly long and slender. First femur with a cephalic row of five spines on distal three-fifths of segment, the first four gradually increasing in length distad, the fifth slightly shorter, thinner and strongly curved, the caudal margin bearing rows of hairs; second with a cephalic row of nine spines followed by a hair and with three rows of hairs, much confused, on the caudal margin; third with a cephalic row of 13 spines, beginning
with triangular denticles at the base and increasing very slowly, the last a very distinct, although not especially long spine, and with more or less confused rows of scattered hairs on caudal margin. Second tibia with nine and 13 spines in cephalic and caudal rows, third with about 15 in each.

Claw sharp; tooth moderate in size, beyond the middle.

Coxae, trochanters and under surface of anterior femora light, remainder dark; thorax dull yellow and black.

In the female the spines of the third femur are not reduced to triangular denticles but are similar to those of second femur.

**ELEUTHEMIS** Ris

No specimens of this rare genus (known only from two males of one species) were available for study and the original description (Ris, 1910), from which the following has been compiled, contains little information concerning the leg characters.

Legs moderately long and rather slender. Third femur with a (cephalic?) row of rather widely placed, moderate spines, gradually becoming longer distad; second femur with somewhat longer spines. Tibial spines numerous, long and thin.

Claw tooth moderate, near the apex.

**PORPAX** Karsch

No specimens of this genus were available for study; however the leg armature seems to be highly specialized and Ris (1911)
gave a rather complete description, from which the following has been adapted.

Legs fairly long and very robust. All femora of male thickly clothed with long, soft, black hairs; third with an extremely close-set row of very short spines on the proximal half, these gradually becoming longer from the base, and four to five powerful, fairly long, widely separated spines on distal half; second similar except differentiation slightly greater. Tibiae with about 13 spines, fairly widely separated and powerful at the beginning, crowded and short at the end. In the female the femora are clothed at the base with fairly dense long black hair; second with four small and three long, more widely separated spines; third with about eight powerful, almost vertical and slightly curved spines, gradually increasing in length from the base.

Claw short, tooth small.

**NANNOTHEMIS** Brauer

Species examined; *bella* Uhler.

Legs rather short and powerfully First femur with a cephalic row of four spines on the distal half of segment, the first two short, the third very long and the fourth of moderate length and strongly curved, and a caudal row of about eight hair-like spines. Second femur with a cephalic row of seven short spines, beginning with a short triangular denticles at the base and in-
creasing in length very gradually, followed by a long spine and two hair-like curved spines, and a row of about eight to 10 hair-like spines on the rounded caudal margin. Third femur similar to second except all spines in the cephalic row before the long one near the end reduced to triangular denticles. First tibia with three or four spines before and six in the comb, and six to seven in caudal row; spines of the comb only slightly differentiated from others. Second tibia with six and 11 spines respectively in cephalic and caudal rows; third with about nine in each row. All femora and tibiae clothed with moderately long, fine black hair. Dorso-cephalic edge of second and third femora and both dorsal edges of all tibiae carinate.

Claw long and sharp; tooth short, well beyond the middle.

Black; thorax black in male, yellow and black in female.

**NEPHEPELTIA** Kirby

Species examined: *phryne* Perty.

Legs long and rather slender. First femur with a cephalic row of seven spines on the distal two-thirds, gradually increasing in length distad except the last one which is far removed from the proceeding and very long, at the apex a curved white hair-like spine of moderate length; a row of eight to 10 white hair-like spines on the rounded caudal margin, also a similar, less numerous row on the ventral surface. Second and
third somewhat similar, the cephalic row of spines extending the full length of the segment; these spines, except the long one at the end, reduced to very short triangular denticles on the third, increasing gradually after the proximal third on the second; caudal margin of the second with about three somewhat confused rows of hairs, that of the third with only a very few scattered hairs. First tibia with four spines before and nine in the comb, and about nine in the caudal row. Second tibia with 10 and 16 spines in the cephalic and caudal rows, the distal ones of the caudal row very close-set and about even in length. Third tibia with nine to 11 spines, rather short and of almost equal length throughout, in each row. Dorsal edges of all tibiae and dorso-cephalic edges of second and third femora carinate, those of the third leg slightly serrate.

Claw long; tooth short but rather large and pointed, beyond the middle.

Black; thorax black.

**OLIGOOLADA** Karoch

Species examined: *heliophila* Borror and *umbricola* Borror.

Legs long and slender. First femur with a cephalic row of seven spines on distal two-thirds, gradually increasing in length and spacing distad except the last which is moderate in length and hair-like; rounded caudal margin with a row of about
12 rather long, straight, slender spines, similar rows on ventral and caudal surfaces of femur. Second femur similar to first, except the cephalic row of spines extends the full length of the segment and the spines increase gradually from base to apex until the more distal ones are similar to the tibial spines. Third femur with a cephalic row of 16 spines, those on proximal half short and triangular, the remainder gradually increasing in length distad; caudal margin bearing a few denticles and a very few, weak hair-like spines. First tibia with six spines before and eight in the comb, and about 11-13 in the caudal row which is flanked on either side by a row of strong hairs. Second and third tibiae with 13-14 spines in each row. Dorsal edges of all tibiae and dorso-cephalic edges of second and third femora carinate, those of third tibia with slight serrations.

Claw long, rather broad, very thin; without tooth.

Black; thorax black.
SYMPETRINI

PSEUDEON Kirby

Species studied: superbus Hagen.

Legs rather short and robust. First femur with cephalic row of about five spines graduated in length and spacing, on distal two-thirds of segment, followed by three or four slender, curved, hair-like spines; femur rounded backward from ventral and dorsal margins in front to a posterior edge which bears a row of about 20 rather large spines, also a partial row of similar spines just dorsad of this ridge, and another row of similar but shorter spines on ventral surface. Second femur very similar to first, except the cephalic row of spines more numerous (10-13), extending the full length of the segment, graduated from short triangular denticles at base to long spine at apex, but not followed by hair-like spines, and the spines of the posterior edge more numerous, forming a rather confused row. Third femur flattened beneath but otherwise of usual shape, with a cephalic row of about 16 spines, most of which are short denticles, and about 11 denticles and short stout spines on caudal margin, flanked on either side by rows of scattered hairs. First tibia with four spines before and 13 in comb, and about 13 in caudal row. Second tibia with 10 and 16 spines respectively in the two rows, third with 13 and 14. All tibiae strongly carinate and serrate on dorsal margins.
Claw long; tooth powerful, well beyond the middle.
Black with brown margins; thorax mottled black and brown.

**CROCOTHEMIS** Brauer

Species examined: *erythraea* Brulle and *servilia* Drury.

Legs of moderate length, fairly robust. First femur with a cephalic row of four spines on distal half, rapidly increasing in size and spacing from the first, followed by two or three curved, yellow, hair-like spines; caudal margin with a row of yellow, hair-like spines, and an incomplete row of similar, shorter spines just dorsad near apex, also a row of similar, much shorter spines on ventral surface. Second tibia very similar to first, except the cephalic row of spines more numerous, extending the full length of the segment and increasing in size less rapidly; dorso-cephalic edge bearing a few short, sharp teeth on the proximal fourth. Third tibia with the cephalic row consisting of about 25 close-set denticles and a long spine at the apex, and a caudal row of about 18 denticles; dorso-cephalic edge carinate and bearing close-set, very short, sharp spines or teeth. In the female the spines of the cephalic row are somewhat longer. First tibia with four spines before and about 10 in comb, and approximately 12 in caudal row. Second tibia with about nine and 14 spines respectively in cephalic and caudal rows, those in distal half of latter close-set and of
almost equal length; third tibia with 11 and 14 spines in the
two rows. All tibiae strongly carinate and serrate on dorsal
edges.

Claw fairly long; tooth of moderate size, well beyond the
middle.

Similar in color to thorax (yellow or orange).

BRADINOPYGA Kirby

Species examined: *geminata* Rambur.

Legs short and powerful. First femur with usual cephalic
row of four graduated spines on distal half and a row of hair-
like spines on caudal margin. Second femur very similar to first,
except cephalic row of nine spines extends full length of seg-
ment, beginning with triangular denticle and gradually increas-
ing in length. Third femur with similar rows on both cephalic
and caudal margins, beginning with triangular denticles at base
and gradually increasing in length (somewhat more rapidly in
cephalic row) to spines of moderate length at apex, about 14 in
each row. First tibia with four spines before and about 11 in
comb, and about 11 in caudal row. Second tibia with nine and 15
spines respectively in cephalic and caudal rows, third with
about 10 in each row.

Claw long; tooth long, very near the apex.

Yellow with darker margins; thorax blue.
NEUROTHEMIS Brauer


Legs of moderate length and slender. First femur with usual cephalic row of four or five rapidly lengthening spines on distal half, followed by a slender, curved, light colored, hair-like spine and a caudal row of hair-like spines; sometimes with similar rows on ventral and caudal surfaces, but frequently without these. Second and third femora with nine and 13 spines, respectively in the cephalic rows, those on the third gradually increasing from short denticles to spines of moderate length, those on the second somewhat longer at base and increasing in length more rapidly; caudal margin of second with numerous hair-like spines in two confused rows, that of third with about 13 denticles and only scattered hair-like spines; dorso-cephalic margins carinate, serrate at base of second and throughout entire length of third. First tibia with three spines before the comb and about nine each in comb and caudal row. Second and third tibiae each with about eight or nine spines in the cephalic row, 16 and 13 respectively in caudal row.

Claw fairly long, slender; tooth rather long and pointed, almost parallel to claw, well beyond the middle.

Very similar to thorax in color (yellow or brown).
BRACHYTHEMIS Brauer

Species examined: contaminata Fabricius.

Legs fairly long. First femur with a cephalic row of three widely separated spines on distal half, increasing in length rapidly, followed by two or three light-colored, hair-like spines; caudal margin bearing a row of very long spines. Second femur with five triangular denticles and four rather long spines in the cephalic row and the usual confused row of hairs on caudal margin; dorso-cephalic edge with a few denticles at base, not carinate. Third femur with about 13-13 denticles followed by two or three spines on the cephalic margin and about 13 denticles just caudad of a rather complete row of hairs on caudal margin; dorso-cephalic edge carinate and serrate. First tibia with three spines before comb and nine each in comb and caudal row. Second and third tibiae each with about eight to nine and 13-14 spines respectively in cephalic and caudal rows; dorsal edges carinate and usually rather sparsely serrate.

Claw rather short, thin; tooth of average size, slightly beyond middle.

Yellow or reddish brown; thorax olive or reddish brown.

DEIELIA Kirby

Species examined: phaon Selys.

Legs long and powerful. First femur with three large spines,
rapidly increasing in size, on distal half, followed by several
(6-8) curved hairs at apex; three rather complete and regular
rows of very long hairs on caudal margin. Second femur with
three to five denticles followed by six or seven spines which
gradually increase in length until the last which is very
long and far distant from the preceding; caudal margin with
three or more rows of hairs. Third femur with 25 or more denti-
cles followed by a long spine at the apex on cephalic margin and
similar, somewhat less numerous denticles on caudal margin; in
the female the denticles of the cephalic row gradually increase
in length, changing to short, stout spines on distal half or
third of segment. First tibia with a comb of about 12 spines,
preceded by three to five long, powerful spines, and a caudal
row of seven long spines. Second and third tibiae with about 13-
14 spines in each row except the cephalic on the second which
contains only 10; spines very long.

Claw long and powerful; tooth long and prominent, just
beyond the middle.

Black; thorax black and olive brown.

PHILONOMON Förster

No specimens of this genus were available for study and
Ris (1911) gave no description of leg characters, stating that
they were the same as in Sympetrum. Furthermore, the descript-
tion of Sympetrum included little distinctive information concerning the legs, merely noting: "Moderately long and fairly thin. Armature of the two sexes similar. .......... Tibial spines numerous, thin, fairly short. Claw thin, long tooth near middle."
LEUCORRHININI

LEUCORRHINIA Brittinger

Species examined: albifrons Burmeister, borealis Hagen, dubia Vander Linden, frigida Hagen, glacialis Hagen, hudsonica Selys, intacta Hagen, pectoralis Charpentier, proxima Calvert and rubicunda Linnae.

Legs rather long and powerful. First femur with numerous short semi-decumbent spines on proximal third of cephalic margin, followed by a row of eight spines about equally spaced and gradually increasing in length until the penultimate which is far distant from the preceding (about four times the usual distance) and very long, and the final one which is of moderate length, slender and strongly curved; entire ventral and caudal surfaces covered with rather long hair-like spines in somewhat confused rows. Second femur with a row of 15-19 spines gradually changing from short, close-set, semi-decumbent, triangular denticles at base to moderate length, more distant, erect spines at apex; ventral, caudal and dorsal surfaces densely clothed with long, black pubescence, and cephalic surface with a few scattered hairs. Third femur similar to second, except the denticles of the cephalic row are more numerous (20-30) and extend almost the full length of the segment, increasing only slightly in length from base to apex, at the
end a long erect spine. First tibia with five spines before and
eight to 10 in comb, and about 10 in caudal row; dorso-cephalic
margin with a row of numerous, strongly curved, hair-like
spines. Second tibia with about eight and 14 spines respective-
ly in cephalic and caudal rows; rather short and decreasing in
length from base to apex much less than usual. Third tibia
with a cephalic row of about 10 spines similar to those of
second tibia, and a caudal row of about 30, very close-set and
of equal length or even increasing slightly in length in prox-
imal half, more widely separated and decreasing in length in
distal half; rows of widely separated, long, erect hairs on
dorsal margins and ventral surface. Less specialized in the
female; second and third legs similar to second leg of male.

Claw long, broad but rather thin; tooth small or prom-
inent, beyond the middle.

Black; thorax black, brown or mottled black and brown.

CELITHEMIS Hagen

Species examined: bertha Williamson, elisa Hagen, eponina
Drury, fasciata Kirby, martha Williamson, monomelaena William-
son and ornata Rambur.

Legs long and rather slender. First femur with a cephalic
row of six spines on distal two-thirds, gradually increasing in
length and spacing distad, at the apex a slender, white, hair-
like spine; caudal margin with about 30 long, slender, light brown spines in a confused row. Second femur similar to first except the cephalic row of spines (about 17) extend the full length of the segment, beginning with close-set, triangular denticles and the caudal margin bears a few very short, sharp teeth among the hair-like spines. Third femur very similar to second, but the denticles of the cephalic row change to typical spines only at the apex of the segment and the hairs on the caudal margin are less numerous. First tibia with four spines before and about 10 in comb, and about 15 in caudal row. Second tibia with 10 and 15 spines and the third with 14 and 17 respectively in cephalic and caudal rows. In the female the third femur is very similar to the second, although the spines are somewhat shorter.

Claw rather long; tooth prominent, well beyond the middle. Usually black, sometimes light brown at base becoming dark distad; thorax varying in color with the species (black, black and yellow, black and red, reddish brown, yellow, etc.).

**PLANIPLAX Muttkowski**

Species examined: *phoenicura* Ris.

Legs very long and slender. First femur with a cephalic row of five spines on distal three-fifths, the first four about equally distant from each other and gradually increasing in
length distad, the fifth far distant from the preceding and very long; caudal row of about 13 hair-like spines, flanked on either side by somewhat confused rows of similar spines. Second femur with a cephalic row of seven rather strong spines increasing in length distad and a caudal row of hair-like spines. Third femur with a cephalic row of 14 spines, the first four or five short denticles, the remainder gradually increasing in length distad, except the penultimate which is very long and separated from the preceding by about twice the usual distance and the last which is hair-like and of moderate length; caudal row similar to that of the second femur except for two or three denticles among the hairs near apex of segment. First tibia with five spines before and seven in comb, and about 13, flanked on either side by rows of hairs, in caudal row. Second tibia with 10 and 13 spines in cephalic and caudal rows; third with about 11 in each row.

Claw long; tooth near apex - almost equal with point of claw.

Similar to thorax in color [brown].

BRACHYMESIA Kirby

Species examined: furcata Hagen and gravida Hagen.

Legs long and powerful. First femur with the cephalic row of nine spines extending almost the full length of the segment
(beginning not more than one-fifth of the length of the femur from the base), gradually increasing in length and spacing until the penultimate which is very long and widely separated from the preceding, and the last which is of moderate length and slender; caudal margin with three rather confused rows of numerous, long, hair-like, light brown spines. Second femur very similar to first, except the spines of the cephalic row more numerous (13-19), those at the base reduced to triangular denticles and the final hair-like spine not present. Third femur with a cephalic row of about 30 short denticles with a spine of moderate length at apex and a caudal row of similar denticles without apical spine. First tibia with four spines before and about 14 in comb, and about 15 in caudal row; dorso-cephalic carina with a row of about 25-30 slender spines of moderate length. Second tibia with about 12 and 20 spines and the third with approximately 15 and 20 respectively in cephalic and caudal rows; those of the caudal row on the third short and less graduated in length than others. Third leg of female less specialized, similar to second, except for a row of short, stout spines on the caudal margin.

Claw long and powerful; tooth large, at about three-fourths of length of claw from base.

Black, or reddish brown at base becoming darker distad; thorax black, brown or olive.
Species examined: nigrescens Martin.

Legs long and robust. First femur with a row of four spines on distal half, the first three equally spaced and gradually increasing in length distad, the last widely separated from the preceding and very long; caudal row consisting of yellow, hair-like spines; also a row of black hairs on ventral surface. Second femur with a cephalic row of 13 denticles (on proximal half or two-thirds) gradually becoming somewhat longer, followed by four longer teeth or very stout spines and finally after about twice the usual space a spine of moderate length; caudal row of denticles throughout. Third femur similar to second. In the female the spines of the second and third femora are of the usual type, slender spines gradually increasing in length from base to apex of segment. First tibia with five spines before and nine in comb, and a caudal row of about 10, the first of which is very long. Spines of the second and third tibiae rather short; second with eight and 11, third with 10 and 13 in cephalic and caudal rows. All legs rather densely clothed with yellow hairs.

Claw long and strong; tooth prominent, beyond the middle.

Black; thorax black and yellow.

Legs long and slender. First femur with cephalic row of five spines on distal two-thirds, gradually increasing in length from the first, except the last two of almost equal length, in the male the first is of moderate length but in the female it is very short, at the apex a long, hair-like spine; caudal margin with three rows of long hairs. Second femur similar to first except cephalic row of nine spines extends full length of segment. Third femur with a few (about eight) widely-separated, very short denticles on proximal two-thirds of cephalic margin and at the apex a spine and a curved hair of equal length; a few short yellow hairs on adjacent portion of cephalic surface in distal third. First tibia with five spines before comb and 12-13 each in comb and caudal row, spines of the comb much flattened and strongly curved. Second and third tibiae each with about 11 and 16 spines respectively in cephalic and caudal rows. All tibial spines very long; also the definitive tibial "hairs" long and prominent.

Claw of moderate length, thin; tooth near apex.
Black; thorax dark (black, dark metallic green, or dark brown marked with metallic green).

**EPHIDATIA** Kirby

Species examined: *longipes* Hagen.

Legs very slender, third pair very long. First femur with six spines on distal half of cephalic margin, the first of these of moderate length, the remainder gradually increasing in length and spacing, at the apex the usual curved, hair-like spine; caudal margin with a row of about 10 light-colored, hair-like spines beginning at the end of proximal fifth. Second femur with about nine denticles on proximal two-thirds, and six spines of gradually increasing length on distal third of cephalic margin; caudal margin similar to that of first femur. Third femur rounded except for slightly carinate cephalic edges, the usual row of cephalic spines represented by a few exceedingly small denticles and a small apical spine; caudal row of hairs limited to proximal third of segment. First tibia with seven spines preceding and eight in comb, and about 13 in caudal row; spines of the comb less flattened and more widely separated than usual. Second tibia with 11 and 17 spines respectively in cephalic and caudal rows. Third femur with cephalic row of many (more than 50) short spines of almost equal length throughout, somewhat dorsad of the margin and directed cephalad, those of the prox-
imal fifth (about 20) very close-set, the remainder gradually becoming more widely separated; caudal row of 18 very short spines gradually decreasing in length. In the female the cephalic spines of the second femur gradually increase in length from base to apex and the cephalic row of the third tibia is similar to the caudal row.

Claw of moderate length, narrow and thin; apex strongly curved; tooth prominent, but not especially large or sharp, widely distad of middle.

Black; except coxae and trochanters dark brown; thorax brown, slightly mottled with black and dark metallic green.

UROTHEMIS Brauer

Species examined: _signum_ Rambur.

Legs rather long and powerful. First femur with seven spines of increasing length on distal three-fourths of cephalic margin, usual terminal hair missing; several confused rows of hairs on caudal margin and adjacent portions of ventral and caudal surfaces. Second femur very similar to first; cephalic row consisting of about 13 spines, gradually increasing from a short, strong denticle at base to a stout spine of moderate length at apex. Third femur with about 33-34 denticles on cephalic margin, gradually increasing somewhat in length on distal half, a short stout spine at apex; caudal margin with
about 16 denticles, very small and irregularly spaced at base, becoming stouter and more regular in position near apex; dorso-cephalic edge strongly carinate and bearing numerous stout, short, pointed spines on distal half; dorso-caudal margin rounded but bearing very numerous short, pointed spines throughout its length. First tibia with about 15 spines in each row, the distal 10 of the cephalic row making up the comb; densely clothed with fine, short, yellowish hairs, but definitive hairs not prominent. Second tibia with 10 and 18 spines in the two rows, those in the more distal portion of the caudal row forming a comb; third tibia with 11 and 16; dorsal edges carinate, in the second weakly, but in the third strongly, serrate.

Claw rather long; tooth powerful, well beyond the middle.

Reddish brown at base, dark brown distad; thorax reddish brown.

**AETHRIAMANTA** Kirby

Species examined: *aethra* Ris.

Legs moderately long. First femur with seven spines on distal half of cephalic margin, gradually increasing in length from short denticle to very long penultimate spine, followed by final thin, hair-like spine of moderate length; caudal margin with two or three confused rows of rather long hairs. Second
femur with seven denticles followed by seven spines of increasing length and finally a moderate hair on cephalic margin; caudal margin with long hairs. Third femur with a cephalic row of numerous denticles, gradually becoming larger, and at the end, a stout moderate spine and the usual terminal hair; caudal margin similar to that of second. First tibia with 10 spines in caudal row, five preceding and 11 in comb, the latter very close-set. Second tibia with eight very long spines on cephalic margin and eight long followed by four much shorter ones in caudal row; third tibia similar.

Claw rather strong; tooth long, well beyond the middle.

Black; thorax dark brown.

MACRODIPLAX Brauer

Species examined: balteata Hagen.

Legs moderately stout, first and second pairs rather short, third long. First femur with five spines on distal half of cephalic margin, without apical hair; caudal margin with a row of about 13 hairs, adjacent rows of hairs very irregular and incomplete. Second femur with about 13 spines in cephalic row, gradually changing from short triangular tooth at base to long spine at apex; caudal margin with several confused rows of long hairs. Third femur with about 17 short, even denticles, and a long spine at apex on cephalic margin; two rows of long
hairs on or near caudal margin; dorso-cephalic margin strongly carinate and serrate; dorso-caudal margin rounded but bearing short, thick, yellowish hairs. First tibia with about 16 spines in each row, all except three of those in cephalic row in the comb, those in the distal third of caudal row even in length and close set, forming a comb; definitive hairs, especially those on dorso-cephalic margin very conspicuous. Second tibia with nine and 15 spines and the third with 13 and 16, respectively, on cephalic and caudal margins.

Claw long, strongly curved at apex; tooth long and sharp, well beyond the middle.

Black, except caudal surface at base yellow; thorax black, brown and yellow.

**SELYSIOTHEMIS** Ris

Species examined: *nigra* Vander Linden.

Legs long and fairly thin. First femur with a cephalic row of five spines on distal half, the last one very long and quite distant from preceding; caudal row of delicate, white hairs. Second femur with a cephalic row consisting of about 31 close-set, saw-like denticles followed by five spines; caudal margin with two to three rows of white hairs. Third femur in the male without conspicuous armature — a few very short denticles on the cephalic margin, caudal margin rounded and without spines —
in the female the cephalic margin bears a row of spines which gradually become longer on the distal third. First tibia with four spines preceding and about 13 in comb, about 15 in caudal row; second and third tibiae each with 10-12 and 20 spines, respectively, in the cephalic and caudal rows, those of the third much shorter.

Claw long, point strongly curved; tooth prominent, also strongly curved, rather blunt, well beyond the middle.

Black in male, light brown becoming black distad in female; thorax black in male, light brown in female.
BARTENEF, A. N.

1915 (Faune de la Russie et Pays Limitrophes, etc.) (In Russian) 1, (1). (Insectes Pseudoneuropterae. Libellulidae.) Petrograd. 352 pp., 1 pl.


BRAUER, FRIEDRICH


BURMEISTER, HERMANN CARL CONRAD


BUTLER, HORTENAE


CAlVERT, PHILIP P.


1909 Contributions to a Knowledge of the Odonata of the Neotropical Region, exclusive of Mexico and Central America.

Carpenter, George H.

Caudell, A. N.

Club de Engenharia (of Brazil?)
1930 Carta Geographica do Brasil. Sao Paulo and Rio de Janeiro, "Ypiranga".

De Geer, Karl

Erichson, Wilhelm Ferdinand

Fabricius, Johann Christian
*1781 Species Insectorum. 1. Hamburgi et Kilonii, Bohn. 8 / 552 pp.

Hagen, Herman August
1855 Beretning om Galetæa-Expeditionens Udbytte of Odonater.


Karsch, F.


Kirby, W. F.


Linne, Carl von


Longfield, Cynthia


National Geographic Society

1931 Map of South America. Washington, Published by the Society.

Navas, Longinos


Needham, James G., and Anthony, Maude H.


Needham, James G., and Broughton, Else


Rambur, M. P.

Rin, F.


Schmidt, Erich

Selys-Longchamps, E. de
1868 Odonates recueillis a Madagacar, et aux iles Mascareignes et Comores. Recherches sur la fauna de Madagacar et de ses dependances d'apres les decouvertes de F. P. L. Pollen et D. C. van Dam, 5me partie.

Sjostedt, Yngve
Tillyard, R. J.

1917 The Biology of Dragonflies. Cambridge, University Press.
12 + 396 pp., 4 pl.

Williamson, Edward Bruce

1923 The University of Michigan-Williamson Expedition to Brazil. (Fifth note). Ent. News, 33: 343-244.

Williamson, J. H.


* Papers indicated by a star (*) before the date have not been seen by the author.
Fig. 1. Wings of *D. obscura* showing the names of the principal veins according to the Comstock-Needham system, and the location of the areas within which the number of cross veins or cells were tabulated.

- **A_1, A_2** - Anal veins
- **aT** - arculus
- **b** - bridge
- **bi** - bisector of the loop
- **C** - Costa
- **M_1, M_1a, M_2, M_3, M_4** - branches of the Media
- **Mpl** - medial planate
- **Rpl** - radial planate
- **n** - nodus
- **o** - outer branch of the bisector
- **p** - pterostigma
- **R** - Radius
- **Rs** - Radial sector
- **S_0** - Subcosta
- **Cu_1, Cu_2** - branches of the Cubitus

1 - costal antenodal cross veins
2 - subcostal antenodal cross veins
3 - costal postnodal cross veins
4 - radial postnodal cross veins
5 - bridge cross veins
6 - supra-triangular cross veins
7 - cubito-anal cross veins
8 - cells of triangle
9 - cells of first row following triangle of fore wing
10 - "loop" of fore wing
11 - "secondary loop" (patella) of rear wing
12 - rows of cells subtended by Rpl
13 - rows of cells subtended by Mpl
14 - rows of cells between *M_3* and *M_4*
15 - rows of cells between bisector and *A_2*
16 - cells in first row between outer branch of bisector and *Cu_2*
Fig. 3. Wings of D. obscura showing the lines along which measurements were made.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>b</td>
<td>width of wing at base</td>
</tr>
<tr>
<td>l</td>
<td>length of wing</td>
</tr>
<tr>
<td>n</td>
<td>width of wing at nodus</td>
</tr>
<tr>
<td>p</td>
<td>length of pterostigma</td>
</tr>
</tbody>
</table>

Plate II

Fig. 3. Wings of D. pullata.

Fig. 4. Wings of D. estherae.

Plate III

Fig. 5. Wings of D. intensa.

Plate IV

Fig. 6. Wings of D. nigra.

Fig. 7. Wings of D. maxima.

Plate V

Fig. 8. Lateral view of the male appendages of D. pullata.

Fig. 9. Lateral view of the male genitalia of D. pullata.

Fig. 10. Ventral view of the inferior appendage of D. pullata.

Fig. 11. Lateral view of the male appendages of D. estherae.

Fig. 12. Lateral view of the male genitalia of D. estherae.

Fig. 13. Ventral view of the inferior appendage of D. estherae.

Fig. 14. Lateral view of the male appendages of D. emilia.

Fig. 15. Lateral view of the male genitalia of D. emilia.

Fig. 16. Ventral view of the inferior appendage of D. emilia.
Fig. 17. Lateral view of the male appendages of *D. intenaa*.
Fig. 18. Lateral view of the male genitalia of *D. intenaa*.
Fig. 19. Ventral view of the inferior appendage of *D. intenaa*.

Plate VI

Fig. 20. Lateral view of the male appendages of *D. nigra*.
Fig. 21. Lateral view of the male genitalia of *D. nigra*.
Fig. 22. Ventral view of the inferior appendage of *D. nigra*.
Fig. 23. Lateral view of the male appendages of *D. obscura*.
Fig. 24. Lateral view of the male genitalia of *D. obscura*.
Fig. 25. Ventral view of the inferior appendage of *D. obscura*.
Fig. 26. Lateral view of the male appendages of *D. dimidiata*.
Fig. 27. Lateral view of the male genitalia of *D. dimidiata*.
Fig. 28. Ventral view of the inferior appendage of *D. dimidiata*.
Fig. 29. Lateral view of the male appendages of *D. obscura* (Rambur's type of *D. tinota*).
Fig. 30. Lateral view of the male genitalia of *D. obscura* (Rambur's type of *D. tinota*).
Fig. 31. Ventral view of the inferior appendage of *D. obscura* (Rambur's type of *D. tinota*).
Fig. 32. Lateral view of the male appendages of *D. pullata* (Rambur's type of *D. fuliginea*).
Fig. 33. Ventral view of the inferior appendage of *D. pullata* (Rambur's type of *D. fuliginea*).

Plate VII

Fig. 34. Lateral view of the male appendages of *D. maxima* (type specimen).
Fig. 35. Lateral view of the male genitalia of *D. maxima* (type specimen).

Fig. 36. Lateral view of the male appendages of *D. maxima* (specimen in Coll. Selys).

Fig. 37. Lateral view of the male genitalia of *D. maxima* (specimen in Coll. Selys).

Fig. 38. Ventral view of the inferior appendage of *D. maxima* (specimen in Coll. Selys).

Fig. 39. Cephalic view of the second left leg of *D. obscura*.

Fig. 40. Dorsal view of the head of *D. obscura*.

Plate VIII

Fig. 41. Map showing the localities at which specimens of *Diaetatopota* have been collected.

1 - Sevilla  
2 - Cano d'Vagre  
3 - Tumatumari  
4 - Essequibo River  
5 - Georgetown  
6 - Wismar  
7 - Rupunni River  
8 - Cayenne  
9 - Pied Saut  
10 - Uassa Swamp  
11 - Benevides  
13 - Belem  
13 - Villanova  
14 - Victoria  
15 - Alta Mira  
16 - Santarem  
17 - Obidos  
18 - Itaituba  
19 - Miritituba  
30 - Progresso  
31 - Manaus  
22 - Manacapuru  
23 - Maraapuru  
24 - Moura  
35 - Carvoeiro  
26 - Coary  
27 - Taffe Ega  
28 - Rio Japura  
29 - Tonantins  
30 - Sao Paulo de Olivencia  
31 - Pebas  
32 - Iquitos  
33 - Nova Olinda  
34 - Porto Velho  
35 - Santa Cruz  
36 - Rio Tucanaba  
37 - Cachoeira  
38 - Rio Sao Lourenco  
39 - Uacaryzal  
40 - Sao Luiz  
41 - Fortaleza (Ceara)  
42 - Pernambuco  
43 - Bahia  
44 - Boqueirao  
45 - Alagre  
46 - Itatapuana  
47 - Sauru  
48 - Formosa  
49 - Sapucay  
50 - Corrientes  
51 - Santa Fe
Plate IX

Fig. 42. Map showing the distribution of records of species of the pullata-group.

- black - pullata
- green - emilia
- blue - intensa
- gold - atherae

Plate X

Fig. 43. Map showing the distribution of records of species of the obscura- and dimidiata-groups.

- black - obscura
- gold - nigra
- green - maxima
- blue - dimidiata

Plate XI

Fig. 44. Diagram showing the relationships of the species of Diastatops.
Fig. 1
Wings of D. obscura showing the names of the principal veins and the areas within which cross veins or cells were counted.

Fig. 2
Wings of D. obscura showing the lines along which measurements were made.

Plate I
Fig. 3
Wings of *D. pullata*.

Fig. 4
Wings of *D. oatherae*.

Plate II
Fig. 5
Wings of *D. intensa*.

Plate III
Fig. 6
Wings of *D. nigra*.

Fig. 7
Wings of *D. maxima*.

Plate IV
Plate VI
Plate VII
Fig. 41. Map showing localities at which specimens of Diastatops have been collected.
Fig. 42. Map showing the distribution of records of species of the pullata-group.

- **black** - pullata
- **green** - emilla
- **blue** - intensa
- **gold** - estherae
Fig. 43. Map showing the distribution of records of species of the *obscura*- and *dimidiata*-groups.

- black - *obscura*
- gold - *nigra*
- green - *maxima*
- blue - *dimidiata*
Fig. 44.
Diagram showing the relationships of the species of Diastatops.

Plate XI
APPENDIX

I. The Ria-Tillyard Arrangement of the Genera of Libellulidae

Tribe Tetrathemini
(I. Gruppe)

Hypotheria Karsoh
Tetrathemis Brauer
Archeophlebia Ris
Bironides Färster
Nannophlebia Selys
Oda Ris
Microtrigonia Färster
Hyloaethemia Ris
Calophlebia Selys
Eothele Ris
Micromacromia Karsoh
Neodythemis Karsoh
Notiothemia Ris
Allorhizocha Karsoh

Tribe Libellulini
(II. Gruppe)

Orohitheinia Brauer
Amphithemia Selys
Pornotheniia Kruger
Diplachna Brauer
Lyriothemia Brauer
Neaophenia Kirby
Lathrocista Kirby
Agrionoptera Brauer
Protorthemia Kirby
Cratilla Kirby
Potamarcha Karsoh
Lokia Ris
Oxythemis Ris
Thermorthemia Kirby
Hadrothemia Karsoh
Orthetrum Newman
Libellula Linne
Orthemis Hagen
Cannaphila Hagen
Misagria Kirby
Dasythemis Karsoh

Tribe Palpopleurini
(III. Gruppe)

Diastatops Rambur
Zenithoptera Selys
Palpopleura Rambur
Perithemis Hagen

Tribe Brachydiplacini

Brachydiplax-series
(IV. Gruppe)

Nannophya Rambur
Brachygonia Kirby
Tyrioapta Kirby
Brachydiplax Brauer
Aethiothemis Martin-Ris
Raphiomia Kirby
Chaloostephia Kirby
Thermochoria Kirby
Eleuthemis Ris
Porpax Karsoh

Uracia-series
(V. Gruppe)

Nannothemis Brauer
Agyrothemis Ris
Fylgia Kirby
Nephopesia Kirby
Edonis Neodham
Elga Ris
Oligoolada Karsoh
Podothermia Ris
Uracia Rambur
Anatyia Kirby
Microthryria Kirby
Tribe Sympetrini
(VI. Gruppe)

Nannodiplax Brauer
Acisoma Rambur
Diplocodes Kirby
Erythrodiplax Brauer
Pseudoleon Kirby
Indothemis Rie
Crocothemis Brauer
Bradinopyga Kirby
Neurothemis Brauer
Brachythemis Brauer
Dielia Kirby
Rhodothemis Rie
Cyanothemis Rie
Erythemis Hagen
Leptothemis Hagen
Rhodopygia Kirby
Neoogonia Kirby
Sympheretrum Newman
Philonomon Förster
Pachydiplax Brauer

Tribe Leuorrhinini
(VII. Gruppe)

Leuorrhinia Brittinger
Celithemis Hagen
Planiplax Muttkowski
Brachymesia Kirby
Australothemis Rie

Tribe Trithemini
(X. Gruppe)

Zygonyx Hagen
Olpogastra Karsh
Celebothemis Rie
Onychothemis Rie

Dythemis-series
(IX. Gruppe)

Dythemis Hagen
Paltothemis Karsh
Scapanea Kirby
Brechmorhogia Kirby
Macrothemis Hagen
Gynothemis Calvert

Tribe Trithemini
(VIII. Gruppe)

Pseudothemis Kirby
Huoia Förster
Lanthanusa Rie
Pseudagrionoptera Rie
Atoconeura Karsh
Thalassothemis Rie
Helothemis Karsh
Trithemis Brauer
Pseudomacromia Kirby

Leuorrhinia Brittinger
Celithemis Hagen
Planiplax Muttkowski
Brachymesia Kirby
Australothemis Rie

Tribe Trithemini
(VII. Gruppe)

Trithemia-series (VIII. Gruppe)

Pseudothemis Kirby
Huoia Förster
Lanthanusa Rie
Pseudagrionoptera Rie
Atoconeura Karsh
Thalassothemis Rie
Helothemis Karsh
Trithemis Brauer
Pseudomacromia Kirby
II. The Needham and Broughton Arrangement of Libellulid Genera

<table>
<thead>
<tr>
<th>Tetrathemini</th>
<th>Diplocodes</th>
<th>Austrothemia</th>
<th>Tauriphila</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypothemis</td>
<td>Nephepeltia</td>
<td>Pseudothemia</td>
<td>Tramea</td>
</tr>
<tr>
<td>Tetrathemis</td>
<td></td>
<td>Helothemia</td>
<td>Pantala</td>
</tr>
<tr>
<td>Archaeolebiasia</td>
<td></td>
<td>Erythrodiplax</td>
<td>Camacicna</td>
</tr>
<tr>
<td>Bironides</td>
<td></td>
<td>Brachymesia</td>
<td>Tholymis</td>
</tr>
<tr>
<td>Nannophlebiasia</td>
<td></td>
<td>Cyanothemia</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Trithemia</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Leucorrhina</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Brachydiplax</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sympetrin</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nesogonia</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Micrathyria</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Diplacina</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Acisoma</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pachydiplax</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Oligoclada</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Oxythemia</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Indothemia</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Erythemia</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rhodothemia</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Leptothemis</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Atoconeura</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orchithemini</td>
<td>Celithemini</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oda</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orchithemis</td>
<td>Palpopleura</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eoethemis</td>
<td>Diastatops</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hylactoethemis</td>
<td>Zenithoptera</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calophlebia</td>
<td>Perithemis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Argyroethemis</td>
<td>Thermochoria</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fylgia</td>
<td>Neurothemis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nesoenia</td>
<td>Planiplax</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allorhizucha</td>
<td>Selysiothemis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Notiothemis</td>
<td>Ephidatia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dasythemis</td>
<td>Aethriamanta</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amphithemis</td>
<td>Philonomon</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neoodythemis</td>
<td>Brachythemis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microrthemempia</td>
<td>Deelia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microtrigonia</td>
<td>Macrodiplex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pornothemis</td>
<td>Urothemia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Misagria</td>
<td>Crocothemia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Micromacromia</td>
<td>Calithemis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agrionoptera</td>
<td>Rhyothemis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brachygonia</td>
<td>Macrodiplex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cannaphila</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chaloostepheia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anatyra</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uradia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Edonini</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nannothelemis</td>
<td>Libellulin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nannophyia</td>
<td>Lyriothemis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Athiothemis</td>
<td>Lathrocista</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elga</td>
<td>Protorthemis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eleuthemis</td>
<td>Potamarcha</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tyriocaptta</td>
<td>Cratilla</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Edonia</td>
<td>Libellula</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nannodiplax</td>
<td>Orthemis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Podothemis</td>
<td>Lokia</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Orthebrum</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hadrothemis</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Theromthemis</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sympetrini</td>
<td></td>
<td>Pseudoagrioptera</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lanthamaea</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gynothemis</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Thalassothemis</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Huonia</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dythemia</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Macrothemia</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Zygonyx</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Celadothemia</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Onychothemia</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Brechmorgaha</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Olpagoastra</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Scapanes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Paltothemia</td>
<td></td>
</tr>
<tr>
<td>Trameini</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hydrobauleus</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Antidythemia</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Miathyria</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Zyxomena</td>
<td></td>
</tr>
</tbody>
</table>