

UNIVERSITY OF MICHIGAN
MUSEUM OF ZOOLOGY

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THE GENUS PERILESTES (ODONATA)

By E. B. WILLIAMSON AND J. H. WILLIAMSON

The genus *Perilestes* contains three hitherto described species to which six are added in this paper. They are of similar general appearance and have long slender abdomens and relatively short wings. They bear a striking superficial resemblance to species of the protoneurine genus *Protosticta* of the Oriental fauna. The obvious superficial difference is in the shape of the apical segments of the female where *Protosticta* has the characteristic protoneurine apical enlargement beginning at the apex of segment 6, while in *Perilestes* 7 is only of normal size, and the great development in *Perilestes* of segment 9 into an almost globular form does not occur in *Protosticta*, though both have the segment relatively very large when compared with the abbreviated eighth segment.

The genus is characterized by the following venational characters: the apical posterior angle of the quadrangle reaches the wing margin, M_3 arises at the first or between the first and second postnodals and R_s arises from the fifth to the ninth postnodal. Kennedy has erected for the genus the subfamily *Perilestinae* of the family *Lestidae*. It had been placed in the Legion *Podagrion* by De Selys (*Megapodagrioninae* of more recent authors). The genotype is *fragilis* Hagen as redescribed in this paper.

GENERIC AND SPECIFIC CHARACTERS

In addition to the venational characters mentioned above, which make the recognition of the genus an easy matter, the species have a number of other characters in common. The dorsum and rear of the head are black, largely shining and with greenish or bronzy reflections. The thorax is dark striped with pale, the sterna are black, and the abdomen is patterned in light and dark colors, the most striking of which is a bright pale ventral area on the apical segments of the male. The wings are hyaline with unicolored stigmas and largely black venation. The legs are moderate in length, rather weak and with a few relatively long spines. The two to five basal spines in the ventro-anterior row of the first femur are modified similarly to those forming the comb-like grouping of spines in the same row near the apex of the first tibia. The superior male appendages are forcipate, and the inferior appendages are rudimentary. In the female the valves of the ovipositor are smooth along the ventral edge except at the extreme apex where each valve terminates in two strong, nearly equal, ventrad directed teeth, these two teeth in tandem, one anterior to the other.

Specific differentials are given in the synoptic key and in the descriptions which follow. They may be briefly indicated. In Group II, probably including the more primitive species of the genus, the venation is more reduced than in species of Group I, as indicated especially by the origin of M_{1a} . In counting the cells behind Cu_2 we have used as the apical point

the first cell basal to the first cell extending from Cu_1 to the wing margin. Usually there are scattered or more or less continuous double cells between Cu_1 and the wing margin distal to the first single cell behind Cu_1 , so the real termination of Cu_2 is indefinite, but it seemed that no more precise way of indicating this character could be employed. There is a real difference in the development of Cu_2 in different species and the method of counting cells as we have done indicates this as accurately as any other method. In fact the only other method is to begin at the most distal double cell between Cu_1 and the wing margin and count the marginal cells from there to the origin of Cu_2 . Another venational character, which occurs occasionally and which gives a rather peculiar venational pattern but which offers no difficulty to precise description or tabulation, is the arising of M_2 and R_s at the same level. More rarely they are separated at their origin by two postnodal spaces.

There are two colors of stigmas, black (brown in teneral) or distinctly reddish brown. Both colors exist in each group. The posterior border of the hind lobe of the prothorax and the mesostigmal lamina offer specific characters. The color of the face, the leg color pattern, the abdominal color pattern, especially of segments 3-5, and in the female of segment 9, and the color of the metasternum differ in different species. In the male the anterior lamina with its posterior process, the second hamule and especially the superior abdominal appendages offer specific characters. In the male of *remotus* the anal plate is more conspicuous in dorsal view than in any other species. The longer anterior lamina of species of Group I, as compared with Group II, is associated with a relatively longer second segment in species of Group I. The length of the ovipositor is a specific character.

HISTORICAL

Hagen, in 1862 (in De Selys' Syn. des Agrionines, Legion Podagrion), described the genus *Perilestes* and the species *fragilis* from two female specimens, one from Congonhas, Brazil, the other, a smaller female, from the Essequibo River, British Guiana. The specimens were in two European museums and there is nothing to indicate that direct comparison of the two was ever made. At the present time there are several reasons for thinking the two specimens are not conspecific and no reason for thinking they are. In this paper the name *fragilis* is retained for a Brazilian species.

In the Revision du Syn. des Agrionines, Premiere Partie, 1886, De Selys adds to the original generic description and describes a male and female (or females) from the Amazon, referring them doubtfully to *fragilis* which he knew only from Hagen's inadequate description, but in the final paragraph proposing the name *cornuta* for the Amazonian specimens if they should later prove different from the two females described by Hagen. The name *cornuta* (*cornutus*) is retained in this paper for one of the five known Amazonian species and it is assumed that the two

or more specimens seen by De Selys are really conspecific, though females in this genus are not readily recognized. But it happens that *cornutus* belongs to one group in the genus while the remaining four Amazonian species belong to another group, and these groups are venationally distinct. De Selys calls attention to this character in the male, and almost certainly recognized it in the female. Of the latter sex he probably had more than one specimen, as he gives two measurements for the female abdomen, but the text, excepting the localities, implies a single specimen of each sex.

Immediately following the description of *cornutus* De Selys describes *attenuata* (*attenuatus*), apparently from a single female collected by Bates at Santarem. The description is so complete that we are able to almost certainly identify one of the four Amazonian species of the group to which *attenuatus* certainly belongs as that species.

Calvert in the B. C. A. doubtfully refers a single immature male from Costa Rica to *fragilis*. This is a specimen of *remotus* described in this paper. In the Odonata of the Neotropical Region he discusses two males and two females from Chapada, Brazil, and summarizes in a tabulation the characters of these specimens, of *cornutus* from De Selys' description, and of the Costa Rican male, but because of the inadequacy of the earlier descriptions he was unable to certainly identify the Chapada specimens which were referred doubtfully to *fragilis*. We have examined these specimens, through the kindness of Mr. Kahl, and they are discussed below under the name *solutus*.

RELATIONSHIPS WITHIN THE GENUS AND GEOGRAPHICAL DISTRIBUTION

Species of *Perilestes* are found from Costa Rica in the north to Rio Janeiro, Brazil, in the south, approximately between parallels 10° north and 25° south. In South America at least, they are confined to the Atlantic drainage. The genus probably had its origin in the Brazilian highlands. Two well defined groups, as indicated in the synoptic key to groups and species, exist in the genus. Group I of this key is northern, Group II southern. The northern extension of Group I may indicate that this group originated during the time of and on the front ranks of the invasion of the present Amazonian valley.

The northern Group I of four species has only one species in the Amazonian basin. *Cornutus*, while clearly a member of Group I, is very distinct from the remaining three species of the group. It has been taken on the upper Amazon and on the Madeira River and is thus widely separated geographically from the nearest member of the same group, *guianensis*, known certainly only from French Guiana and doubtfully from British Guiana. The two remaining species of the group, *magdalenae* and *remotus*, occur in the lower Magdalena Valley in Colombia, and *remotus*, like several other northern Colombian dragonflies, is found also in Central America, in this particular case in Panama and Costa Rica. It seems clear that Group I has penetrated to the north over two routes, one by

the Rio Negro and the Magdalena, the other probably by way of the Rio Branco and Guianan rivers. At least the southern tributaries of the Orinoco should yield some species of *Perilestes* but at present none is known from Venezuela.

The southern Group II has its headquarters in the Amazonian basin. It is probably older and is certainly not as homogeneous as Group I. One very distinct species, *fragilis*, which about equals in size the larger species, *remotus* and *magdalenae* of Group I, is, like these two species, the most widely separated from the Amazonian basin, being known only from the vicinity of Rio Janeiro. Its nearest rival in size in its group is *kahli*, probably its nearest relative, also a very distinct species, and also one on the fringe of the geographical distribution of the group, being known only from the Madeira River in Matto Grosso, and from the Rio Japacani in eastern Bolivia. Another very distinct species of the group is *attenuatus*. In fact, as regards probable relationship with other species of the group, it is the most distinct of all. It has a wide distribution, occurring on the Rio Beni in Bolivia, on the Madeira at Porto Velho, Amazonas, on the Rio Negro at Manáos, and on the lower Amazon at Santarem. The two remaining species of the group, *solutus* and *minor*, are closely related. *Solutus* occurs on the Madeira River in Matto Grosso, and its range extends southward into the Paraguay in the same state. It is also probably along the entire lower Amazon as it has been taken at Pará. *Minor* is the smallest species of the genus and is known only from the Madeira River at Porto Velho, Amazonas.

HABITS

All *Perilestes* are forest stream dwellers. The small creeks where we have invariably found them may be briefly described. The three streams at Cristalina, Colombia, have been described in Misc. Publ. No. 30, Univ. of Mich., Mus. of Zool. To briefly summarize this description, the creeks flow in a rolling or hilly, heavily forested country at an elevation of about 320 meters. They vary in size from a few inches to ten or twelve feet in width. Generally the flow is gentle, pools alternating with short ripples. The beds are mixed mud and gravel. The flora is rich with overhanging bushes and clumps or stretches of aquatics. When we collected there the streams were at low water stage and the water was clear. This description will do equally well for the two streams in the Canal Zone, Panama, where we found *Perilestes*. In Brazil, similar streams were found at Porto Velho (60 meters above sea level), Albuñá, Villa Murtinho, Manáos and Pará, each inhabited by from one to three species of *Perilestes*. The streams near Cashuelo Esperanza, Bolivia, contained a few outcroppings of rock but otherwise fell within the general description given above. On Mt. Tijuca, in the vicinity of Alto Boa Vista, a suburb of Rio de Janeiro, there are several creeks about one foot deep, varying in width from eight to twenty feet and having a rapid descent among boulders and outcroppings of solid rocks. *Perilestes* was found in limited numbers along the wooded portion of these creeks.

On the position at rest and in flight, we made the following note on *remotus* at Cristalina. In so far as we did not in the field recognize *magdalenae* as distinct it is probable the note will apply equally well to both species. "Rest with abdomen hanging, wings half spread, and with the last four abdominal segments often curled up over the back. Flight swift, abdomen 'dragging'." And at the same locality on February 14, we noted of both sexes: "Flies till at least 4:30 P. M., when the ravine is dark and gloomy. Always rests with the abdomen hanging but the flight is strong. Males frequently hover head on just as *Heteragrion* does. At rest they are easily caught in the fingers." Of *attenuatus*, J. H. W. noted, "First male seen (at Abunà) hanging with folded wings from tip of leaf eight feet above the ground; the second was flying in the woods a few inches above the ground."

On pairing habits we have the following note on *remotus*, made at Cristalina: "Female hung from vine; male alighted on the apex of her abdomen and walked up to her head which he held by his feet while he fastened his appendages. He then filled his seminal vesicle, kicking the female vigorously about the head with his hind legs while doing so. Copulation followed immediately, and then the seminal vesicle was filled again, with more kicking." And at Villa Murtinho, J. H. W. noted of *solutus*: "Saw a female resting on an almost horizontal twig. A male came up from below and grasped her, she apparently aiding by using front legs. They then flew to a perpendicular twig about a foot away and the tip of the male's abdomen was brought for an instant into contact with his genitalia. Female then brought the tip of her abdomen to genitalia. After a second or two the sun was clouded and I captured the pair by catching the male by the wings, in my fingers."

SOURCES OF MATERIAL AND METHODS OF STUDY

We are indebted to Mr. Morton and Mr. Kahl for the privilege of studying certain specimens as indicated under each species in the material studied. The bulk of the material available to us, representing by far the larger number of all known specimens, has resulted from two of our collecting trips. Of first importance is the Brazilian collection made by J. H. Williamson and John W. Strohm, in 1922. The other trip which resulted in considerable material in this genus was the University of Michigan-Williamson Expedition to Colombia. We failed to find *Perilestes* on our trips to British Guiana, Trinidad, Venezuela and Peru. This was especially surprising to us in Venezuela, but the suitable streams (as we understand them) which we collected in Venezuela were on the north side of the mountains. Evidently the Magdalena species, doubtless derived from the Amazonian headquarters, have been able to work northward into Central America, but have not spread eastward across the Maracaibo region into the Venezuelan streams flowing into the Caribbean.

In this paper, in the section *Generic and Specific Characters*, we have explained the method followed in counting the wing cells, posterior to Cu_2 .

Sometimes the first cross-vein normally crossing Cu_2 stops at Cu_2 and does not reach the hind margin. In such a case the basal cell posterior to Cu_2 is the equivalent of two cells, and in counting cells posterior to Cu_2 this basal peculiarity reduces the number of cells by one, but has nothing to do with the length or distal termination of Cu_2 , thus introducing a misleading factor in the description of Cu_2 .

All measurements in this paper are in millimeters. Length of abdomen includes the appendages. The color descriptions of preserved specimens, because of indefinite patterns and obscure markings, are not very satisfactory and there is a possibility that they give a very imperfect picture of the living insects. However our brief color notes, made from fresh material, while certainly less complete than we now wish, indicate no particularly striking differences between the living and preserved individuals. Probably even in life, color patterns are obscure and indefinite, and detailed descriptions would be difficult, tedious and more or less incomprehensible. It is not impossible that some delicate and evanescent colors, overlooked by us in our hurried note making of freshly caught specimens, may be detected in the future by more leisurely and better equipped students. It must be remembered also that an obscure or indefinite color pattern may, by a slight increase of pigment, become sharp and definite and that such increase of pigment may take place nearly at the end of imaginal life and after sexual maturity has been attained. Abdominal appendages of both sexes are measured in dorsal view from apex of dorsum of segment 10 to apex of appendages. The anterior lamina is measured from the apex of the sternum of segment 1 to the apex of the posterior process. Possibly better fixed points might be selected, as a bending of the abdomen between segments 1 and 2, either dorsally or ventrally, moves the basal point. But in measuring the length of the expanded postero-ventral wing of the tergum of 2, and the distance from its apex to the base of the segment, while the antero-ventral angle of the tergum is theoretically an admirable fixed point, in actual practice it was found that due to bending of the abdomen this angle was often concealed. The valve is measured from the posterior angle of the basal plate of the ovipositor to the apex of the valve. The form of the hind border of the prothorax is described as seen in antero-dorsal view. And similarly the mesostigmal lamina is described as seen in postero-dorsal view.

KEY TO GROUPS AND SPECIES OF PERILESTES

1. M_{1a} arising usually at the level of one cell before the stigma or more proximad. Abdominal segments 3-6 each with a pale postbasal ring or area proximal to an extensive dark median area. Face similar in the two sexes, dark to black, not sharply patterned, the anteclypeus if paler only slightly so and not strikingly different from the labrum and postclypeus. Male superior appendage with a basal dilatation ending on the inner border in an acute spine. Blade of the second hamule slender, narrowly spoon-shaped or tapering, if flattened the apical blade with its flat surface in the line of the long axis of the abdomen; anterior lamina longer (1.5 or more), slenderer,

- usually largely dark colored. Adult male with metasternum and femora largely or entirely black (except in *guianensis* as shown by scanty material). Adult male with sterna of 9-10 yellowish or blue (except *cornutus* which has sterna of 8-10 yellow or blue).....Group 1. Males 2. Females 5.
- 1'. M_{1a} arising usually at the level of the proximal end of stigma or more distad. Abdominal segments 3-6 each with a pale basal ring, the dark area following it continuous with the dark median area. Face dissimilar in the two sexes, in the male sharply patterned black and bright pale blue, in the female less distinctly patterned, no bright blue, duller, the black or dull labrum with pale basal areas or darker edged. Male superior appendage without a basal dilatation, or, if present, with it ending on the inner border in a tongue-like plate with a rounded apex. Blade of the second hamule wider, very broadly spoon-shaped or angled in cross-section, the flat or external surface transverse to the long axis of the abdomen; anterior lamina shorter (less than 1.5), largely pale colored. Adult male with metasternum and femora not largely or entirely black. Adult male with sterna of 8-10 bright blue (or possibly bright yellow in *fragilis*).....Group II. 8.
- 2 (1). Stigma reddish brown; spine of superior appendage small, placed slightly distad to midlength of the appendage and directed caudo-ventrad.....*cornutus*
- 2'. Stigma black.....3.
- 3 (2'). Metasternum and femora largely pale; spine of superior appendage large, placed at about midlength of the appendage, directed ventrad and only slightly caudad*guianensis*
- 3'. Metasternum and femora largely black.....4.
- 4 (3'). Anal plate a small but conspicuous cordate tubercle projecting beyond the apex of segment 10 in dorsal view; spine on superior appendage basal to midlength of the appendage and directed caudad.....*remotus*
- 4'. Anal plate inconspicuous, a small rounded tubercle concealed within the apex of segment 10 in dorsal view; spine on superior appendage distal to midlength of appendage and directed more ventrad than caudad.....*magdalenae*
- 5 (1). Hind lobe of prothorax bearing an erect median spine.....6.
- 5'. Hind lobe of prothorax not spined; stigma black.....7.
- 6 (5). Stigma reddish brown.....*cornutus*
- 6'. Stigma black; point of attachment of valvular styles under the abdominal appendages*magdalenae*
- 7 (5'). Point of attachment of valvular styles under the abdominal appendages*guianensis*.
- 7'. Point of attachment of valvular styles distal to the level of the apices of the abdominal appendages*remotus*
- 8 (1'). Six or fewer cells behind Cu_2 in the hind wing; stigma black or brown (but not reddish brown). Male appendage without spine or plate in the basal half, distal to midlength a biparted spoon-like dilatation on the inner edge, about equal in length to the narrowed apex; male labrum and anteclypeus bright light blue, almost white, the former black-bordered in front, postclypeus shining greenish black. Female with point of attachment of valvular styles about the level of the apices of the abdominal appendages; hind border of the prothorax straightened, nearly horizontal, dropping off at either end with a nearly vertical lateral margin; mesostigmal lamina low, of uniform height*attenuatus*
- 8'. More than six cells behind Cu_2 in the hind wing
- Males 9. Females 12 (female of *minor* not known).

- 9 (8'). Male appendage with only an angle on the inner edge at about two-sevenths the length; apex of dorsum of segment 10 slightly elevated in the middorsal line and concave on either side of this and dorsal to the appendages; dorsum of segments 8-10 black, 8 with about the basal third pale (yellow or blue); stigma reddish brown.....*kahli*
- 9'. Male appendage with a flattened tongue-like blade or lobe on the inner edge at about one-third the length; apex of dorsum of segment 10 not elevated but low and flat; dorsum of segments 8-10 dark but not all distinctly black, the pale basal area on 8 reduced to less than one-third the segment.....10.
- 10 (9'). Stigma reddish brown; labrum very narrowly black edged; outer end of mesostigmal lamina ending in a laterally directed free, acute point.....*solutus*
- 10'. Stigma black; labrum with more black than in *solutus*; mesostigmal lamina not ending in a free, acute point.....11.
- 11 (10'). Labrum with less than the anterior half black.....*fragilis*
- 11'. Labrum largely black.....*minor*
- 12 (8'). Stigma reddish brown; outer end of mesostigmal lamina angular or a free point13.
- 12'. Stigma black; outer end of mesostigmal lamina scarcely or not elevated but low and rounded; valvular styles at their origin proximal to the level of the apex of 10; dorsum of 9 largely dull brown, shading imperceptibly into the pale lateral basal area on either side.....*fragilis*
- 13 (12). Dorsum 8-10 black; a large distinct pale lateral basal area on either side of 9.....*kahli*
- 13'. Dorsum of 8-10 brown; pale, lateral basal areas on 9 reduced, more widely separated by the dorsal brown, less sharply outlined.....*solutus*

DESCRIPTIONS OF SPECIES

1. *Perilestes cornutus* Selys

Abdomen male 46-50.5; hind wing male 22.5-25; stigma front wing male 1.20-1.47; stigma hind wing male 1.27-1.50; abdominal appendage male 1.40; male anterior lamina from apex of sternum of segment 1 to apex of the posterior process 2.1.

Male.—Head similar to that of *remotus*; the labium with a brown area on the suture between the mentum and submentum.

Prothorax similar to that of *remotus*, the proepimeron dark to black and this dark area extended broadly onto the proepisternum; hind border semicircular.

Thorax similar to that of *remotus*, the dark colors possibly duller, dark brown instead of black over much of the dark areas of the mesothorax; the pale area of the metepisternum more nearly reaches the wing base above.

Mesostigmal lamina elevated from either extremity, in nearly straight edges, to a low but distinct obtuse angle placed nearer the lower extremity.

Coxae similar to those of *remotus*. Femora black, more or less pale on the anterior face, especially just before the apex. Tibiae pale to obscure, the first and second sometimes largely darker to black above, with less dark beneath, the third with little or no dark.

Venation as in *remotus*; stigma reddish brown.

Abdomen seen from above: 1 pale with obscure and indefinitely patterned median brown from base to apex, darkest at apex; 2 similar to that of *remotus* but the median longitudinal pale stripe duller, not as sharply patterned; 3 as in *remotus* but the postbasal pale area more or less reduced; 4-6 as in *remotus*, but the antepical pale area of 6 is discernible in *cornutus*, and the pale postbasal area of the same segment is less extensive; 7 brown, slightly and indefinitely paler postbasally; 8 brown, the apical half or two-thirds indistinctly darker; 9 nearly black; 10 black. Seen from the side similar to that of *remotus* but on 3-6 the postbasal pale area is slightly reduced as compared with *remotus* and on 3 the sternum, opposite the median dark area, is pale, not dark as it is in *remotus*; 7 with the postbasal pale area more extensive in *cornutus* than in *remotus* and with traces of the same area on 8 in *cornutus*; anterior lamina and posterior processes of 2 largely dark; lateral color pattern of 4-6 carried across the sterna; sternum of 7 largely dark, the basal fifth, or slightly more, pale; sterna of 8-10 bright pale colored, yellow (?) or more probably blue (?) in life. Appendages largely dark colored, black along the outer edge, shading out to brown on the inner edge and on the extreme base and apex; on the dorsal surface just basal to the spine is a smooth shallow elliptical depression which is nearly or quite white (possibly bright blue in life).

Length of the wing or lobe on the expanded postero-ventral margin of the tergum of 2 about .7, and the distance from the apex of this lobe to the antero-ventral angle of the tergum about 2.2.

Venational characters based on four males

Postnodals front wing, 13 (25%), 14 (25%), or 15 (50%); hind wing, 11 (12.5%), 12 (12.5%), 13 (62.5%), or 14 (12.5%).

M_3 in front wing arising between the first and second postnodals (100%); in the hind wing at the first postnodal (50%), or between the first and second postnodals (50%).

R_s in front wing arising at the seventh postnodal (37.5%), or at the eighth postnodal (62.5%); in the hind wing at the sixth postnodal (12.5%), at the seventh postnodal (62.5%), or at the eighth postnodal (25%).

M_2 in front wing arising at or near the eighth postnodal (37.5%), or at or near the ninth postnodal (62.5%); in the hind wing at or near the seventh postnodal (37.5%), or at or near the eighth postnodal (62.5%).

M_{1a} in front wing arising three cells before the stigma (75%), or four cells before the stigma (25%); in the hind wing two cells before the stigma (12.5%), or three cells before the stigma (87.5%).

Number of cells posterior to Cu_2 in front wing, 13 (37.5%), 14 (37.5%), 15 (12.5%), or 16 (12.5%); in hind wing, 9 (25%), 10 (12.5%), 12 (25%), 13 (12.5%), 14 (12.5%), or 15 (12.5%).

Material examined: *Brazil*, Porto Velho, Amazonas, May 2 and 24, 1922, 5 males; Villa Murtinho, Matto Grosso, April 4, 1922, 2 males; all in coll. E. B. W.

This species was associated with *solutus* and *kahli* at Villa Murтинho and with *attenuatus* at Porto Velho. Unfortunately no females were taken and our knowledge of this sex is based on De Selys' description. As to the correctness of our determination of the seven males before us as *cornutus* there can be little or no doubt. De Selys' description of the male clearly indicates the group of the genus to which our specimens belong (origin of M_{1a} and spine on the superior appendage). No other species of the group is known in the Amazon basin, and the color of the stigma and detailed description of the superior appendages agree with our specimens. There is no reason to doubt that the female (or females) described by De Selys belonged to the same species as his male.

2. *Perilestes guianensis*, new species

Abdomen male 44-46, female 39-42; hind wing male 21.5-23, female 24-25; stigma front wing male 1.13-1.20, female 1.24-1.35; stigma hind wing male 1.30-1.33, female 1.40-1.50; abdominal appendage male 1.30, female .40; male anterior lamina from apex of sternum of segment 1 to apex of the posterior process 1.6-1.7; female valve 2.3.

Male.—Labium as in *remotus*; labrum, clypeus and frons brown, the labrum sometimes narrowly darker along its base, anteclypeus largely darker with some greenish, postclypeus darker medianally and anteriorly, and frons darker at the extreme lateral margins.

Prothorax obscure, sides pale, dorsum darker, especially on the hind lobe; the proepimeron largely and the proepisternum to a lesser extent, dark; hind border semicircular.

Thorax similar to that of *remotus* but reddish brown largely or entirely replacing the black of the latter species, except in the second lateral suture, and with the following differences: the pale color on the metepisternum above and anteriorly nearly or quite reaching the wing base; the metepimeron is entirely pale, the black stripe on the second lateral suture confined to the metepisternum and continued below across the upper edge of the metinfraepisternum, thus resembling *magdalenae* but more reduced even than in that species; no black on the latero-ventral carina and the merest trace of dark on the metepimeron. Beneath pale, the sterna black.

Mesostigmal lamina low, very slightly elevated at the point where the angle occurs in that of *cornutus*.

Coxae pale, unmarked. Femora pale, each slightly darker at apex and with a more or less distinct postbasal dark ring and a very slightly more extensive anteapical one, the two rings more or less joined along the anterior row of spines. Tibiae pale.

Venation similar to that of *remotus*.

Abdomen seen from above: 1 pale, brown ringed apically; 2-6 similar to those of *remotus*, the brown on 2 paler, duller and reduced; 7 with an ill or well defined, dull and pale postbasal area following the slightly darker and more reduced basal brown, the median brown area into which the postbasal pale area darkens is followed or not by an ill defined, scarcely

distinguishable anteapical pale area, the apex is darker brown to black; 8 shading from brown at base to nearly black at the apex or largely brown throughout; 9 similar to 8 but darker; 10 black, or 9 and 10 brown. Seen from the side 1-6 similar to those of *remotus* but the basal inferior spot on 2 wanting or very small; 7-9 largely pale, each more or less darker at apex and along the ventral border; 10 black or brown. Sternum of 1 pale; anterior lamina pale, the posterior processes darkening to brown with the ventral edge of the plate black; 3-6 each with the lateral color pattern carried across the sternum; sternum of 7 largely dark to black; 8 black with a median pale area nearer base than apex; 9 and 10 pale (blue? in life), the latter discolored by postmortem changes. Appendages pale dull yellow to brownish horn color, slightly darker at base.

Length of the wing or lobe on the expanded postero-ventral margin of the tergum of 2 about .6, and the distance from the apex of this lobe to the antero-ventral angle of the tergum about 1.8.

Female.—Head similar to that of the male.

Prothorax, thorax, mesostigmal lamina, coxae, legs, venation and stigma similar to those of the male.

Abdominal segments 1-7 similar to those of the male; seen from above 8 and 10 are black or nearly so, and 9 is about as in *remotus* with the dark bar slightly narrower in the basal two-thirds; seen from the side 8 and 10 are brown, and 9 is largely blue, shading apically into the brown of the apically widened dorsal band, with the blue and brown shading below into black along the entire ventral border. Sternum of 1 and 2 pale, the latter with or without a trace of dark at midlength; 3-6 with the lateral color pattern of each carried across the sternum; sternum of 7 largely dark, pale for a short distance at the base; of 8 largely pale (blue? in life), an irregular dark median area beginning before the middle and extending to the apex. Appendages brown, shaped as in *magdalenae*. The valvular styles with points of attachment under the appendages.

Venational characters based on three males and four females

Postnodals front wing, 13 (12.5% female), 14 (50% males, 50% females), or 15 (50% males, 37.5% females); hind wing, 11 (33.3% males), 12 (33.3% males, 62.5% females), or 13 (33.3% males, 37.5% females).

M₃ in front wing arising between the first and second postnodals (100% males, 100% females); in the hind wing at the first postnodal (66.7% males, 62.5% females), or between the first and second postnodals (33.3% males, 37.5% females).

Rs in front wing arising at the sixth postnodal (12.5% females), at the seventh postnodal (50% males, 50% females), or at the eighth postnodal (50% males, 37.5% females); in the hind wing at the sixth postnodal (66.7% males, 62.5% females), or at the seventh postnodal (33.3% males, 37.5% females).

M₂ in front wing arising at or near the seventh postnodal (12.5% females), at or near the eighth postnodal (33.3% males, 37.5% females), or

at or near the ninth postnodal (66.7% males, 50% females); in the hind wing at or near the sixth postnodal (16.7% males), at or near the seventh postnodal (16.7% males, 75% females), or at or near the eighth postnodal (66.7% males, 25% females).

M_{1a} in front wing arising three cells before the stigma (83.3% males, 75% females), four cells before the stigma (16.7% males, 12.5% females), or five cells before the stigma (12.5% females); in the hind wing two cells before the stigma (50% males), three cells before the stigma (50% males, 62.5% females), or four cells before the stigma (37.5% females).

Number of cells posterior to Cu_2 in front wing, 13 (16.7% males), 14 (33.3% males, 12.5% females), 15 (50% males, 75% females), or 16 (12.5% males); in hind wing, 11 (16.7% males), 12 (50% males, 12.5% females), 13 (16.7% males, 37.5% females), 14 (25% females), 15 (16.7% males), or 16 (25% females).

Material examined: *French Guiana*, Pied Saut, Oyapok River, November, 1917, S. M. Klages, Carn. Mus. Acc. 6111, 1 male, 3 females, the male the type and one female the allotype; Tamanoir, Mana River, June, 1917, S. M. Klages, Carn. Mus., 1 male; St. Laurent du Maroni, coll. K. J. Morton, 1 male, 1 female.

None of the above material is perfect and all appear somewhat teneral or discolored. It is therefore probable that the color description will be found to be inaccurate for mature and well preserved or freshly killed specimens. At the same time the structures are well enough preserved in the material available for this paper and there should be no trouble in the future in recognizing the species.

Hagen describes *fragilis* from two females, a larger from Congonhas, Brazil, and a smaller from the Essequibo, British Guiana. The larger Brazilian specimen evidently served largely, if not entirely, as the basis of both the generic and specific descriptions. His generic description will apply probably only to Group II, as defined in the synoptic key in this paper. Our material from the Guianas is very incomplete, but there is no reason to think Hagen's two females are conspecific and it seems better to retain the name *fragilis* for the southern Brazilian species to which Hagen's description better applies, and which is therefore the type of the genus, and to give a new name to the only species certainly known from the Guianas. This species, *guianensis*, belongs to our Group I, and its nearest relative is probably *magdalenae* from the lower Magdalena in Colombia.

3. *Perilestes remotus*, new species

Abdomen male 50–54, female 41.5–43.5; hind wing male 23.5–25.5, female 25–26; stigma front wing male 1.05–1.10, female 1.10–1.30; stigma hind wing male 1.20–1.30, female 1.27–1.40; abdominal appendage male 1.40, female .40–.46; male anterior lamina from apex of sternum of segment 1 to apex of the posterior process 1.8–2.0; female valve 3.0.

Male.—Labium pale, apices of median lobe, end hook and movable hook

shaded darker; labrum and postclypeus black, the anteclypeus paler, dull greenish or brown, the labrum sometimes with more or less brown.

Prothorax brown above, narrowly on the front lobe, the sides pale, propimeron largely brown; hind border shallowly trilobed.

Thorax above black, middorsal carina very narrowly brown, a narrow pale greenish or yellowish antehumeral stripe, not reaching the antealar sinus above, and projected across the prothorax below, about .3 wide at the widest part; mesepimeron largely black, the same broad band of color carried across the mesinfraepisternum; metepisternum largely pale yellowish or flesh colored except above where a broad black band on the second lateral suture crosses it to join the black on the mesepimeron; metepimeron pale colored like the metepisternum except where the pale area is encroached on by the broad black band on the second lateral suture, a limited area of dark to black above and below, and a narrow edge of black on the latero-ventral carina posterior to its angle; the black stripe on the second lateral suture is carried across the metinfraepisternum leaving only its lower angle pale. Metasternum black.

Mesostigmal lamina elevated into a low lobe just external to the end of the fork of the middorsal carina; below (external to) this lobe the lamina is low and nearly symmetrically convex.

Coxae pale, marked with dark to black; on the anterior face the first coxa has a mere trace of dark, the second nearly the inner half dark, and the third all dark but a narrow outer border; the posterior face of each coxa darker than the anterior face, and again the first is the palest and the third the darkest. Femora black, the last two and rarely the first each with an anteapical anterior pale spot. Tibiae black with the anterior surface pale.

Venation black, main veins shading out, especially on the ventral surface, to nearly white at base; stigma black, brown (but not reddish brown) in teneralis.

Abdomen seen from above: segment 1 pale, a more or less distinct narrow longitudinal middorsal stripe and an apical ring, brown; 2 dark brown except at base and a longitudinal middorsal pale stripe, not reaching the apex; 3 with base pale, followed by a slightly darker area, followed by a slightly more extensive pale area, which darkens posteriorly into a dark area nearly or quite black at its middle, which occupies about one-third or slightly less of the segment, and which fades out posteriorly into a pale area about equal in extent to the pale area which bounds it anteriorly; this pale area darkens posteriorly into a more extensive black area which reaches to the apex; 4-6 similar to 3 but the pale basal area (a smooth area lacking minute transverse striae) is scarcely paler than the dark area which follows it, the large median dark area is relatively more extensive and the anteapical pale area which separates it from the apical black is progressively reduced from 4 until it has quite disappeared on 6; the postbasal pale area is about the same extent on each of segments 3-6; 7-10 black. Seen from the side: 1 pale except at apex; 2 pale below except a basal spot at the inferior border; 3-6 as in dorsal view, except the post-

basal pale area on each is more extensive along the ventral border than in the middorsal line, and it is a conspicuous lateral spot on 7 on which segment it is not visible in dorsal view; 8-10 black, the apical ventral angle of 10 pale. Sternum of 1 largely or entirely dark; anterior lamina and posterior processes of 2 largely dark; lateral color pattern of 3-7 carried across the sterna; sternum of 8 largely dark, pale basally and apically; sterna of 9 and 10 bright pale colored, yellow (?) or more probably blue (?) in life. Appendages nearly white to pale reddish horn color.

Length of the wing on lobe on the expanded postero-ventral margin of the tergum of 2 about .6, and the distance from the apex of this lobe to the antero-ventral angle of the tergum about 2.0.

Female.—Head similar to that of the male.

Prothorax dull pale color without definite or extensive markings, the dorsum of the two posterior lobes dusky, proepimeron largely dusky to brown; hind lobe as in the male.

Thorax patterned similarly to that of the male, but the black is replaced by dark reddish brown except a narrow black border to the pale middorsal stripe, part of the extreme lower end of the broad stripe which covers the mesepimeron, and the broad stripe on and just anterior to the second lateral suture which remains distinctly and conspicuously black; there is a mere line of black above on the metepimeron and none at all on the latero-ventral carina. Metasternum pale, an indefinite trace of brown basally in the median line.

Mesostigmal lamina similar to that of the male.

Coxae pale, a small dark area on the anterior face of the third. Femora largely pale, obscurely darker above, black beneath and at the apex. Tibiae pale, a narrow dark streak beneath, and the first tibia narrowly dark streaked above.

Venation and stigma similar to those of the male.

Abdominal segments 1-5 colored about as in the male; in 6 the dark median area is not black in its darkest portion and it fades out posteriorly into a light reddish brown area which passes into darker apical brown, but not black; similarly 7 and 8 are reddish brown, instead of black as in the male, though there is an indefinite trace of black in the middorsal line of 8; 9 with a dorsal longitudinal ill defined dark bar about .8 wide at base, bounded on either side basally with blue for about two-thirds its length, widening apically and becoming paler below in its apical third till it fades out with the lateral basal blue spot in a general loss of color pattern along the ventral border, 10 black or nearly so. Sternum of 1 pale, of 2 largely dark, of 8 largely blue, apparently the same color in life as the large lateral basal spot on 9. Appendages dark brown, black at apex, flattened cone-shaped, acute. Valves long, the valvular styles at their point of attachment distal to the apices of the appendages.

Venational characters based on four males and four females

Postnodals front wing, 13 (12.5% males), 14 (25% males, 25% females),

15 (50% males, 12.5% females), 16 (12.5% males, 50% females), or 17 (12.5% females); hind wing, 12 (25% males, 25% females), 13 (50% males, 12.5% females), or 14 (25% males, 62.5% females).

M_3 in front wing arising at the first postnodal (12.5% males), or between the first and second postnodals (87.5% males, 100% females); in the hind wing at the first postnodal (37.5% males) or between the first and second postnodals (62.5% males, 100% females).

R_s in front wing arising at the seventh postnodal (50% males, 62.5% females), or at the eighth postnodal (50% males, 37.5% females); in the hind wing at the sixth postnodal (25% males, 12.5% females), at the seventh postnodal (62.5% males, 87.5% females), or at the eighth postnodal (12.5% males).

M_2 in front wing arising at or near the seventh postnodal, (12.5% males), at or near the eighth postnodal (50% males, 37.5% females), at or near the ninth postnodal (25% males, 62.5% females), or at or near the tenth postnodal (12.5% males); in the hind wing at or near the seventh postnodal (50% males, 25% females) or at or near the eighth postnodal (50% males, 75% females).

M_{1a} in front wing arising three cells before the stigma (62.5% males, 37.5% females), four cells before the stigma (25% males, 62.5% females), or five cells before the stigma (12.5% males); in the hind wing two cells before the stigma (25% males), three cells before the stigma (62.5% males, 50% females), or four cells before the stigma (12.5% males, 50% females).

Number of cells posterior to Cu_2 in front wing, 14 (25% females), 15 (12.5% males), 16 (50% males, 25% females), or 17 (37.5% males, 50% females); in hind wing, 12 (12.5% males, 12.5% females), 13 (50% females), 14 (75% males, 37.5% females), or 15 (12.5% males).

The following brief color note was made on a male taken at Cristalina: eyes above dark green, lighter below, light thoracic markings very pale greenish yellow, almost white. Teneral specimens are entirely without black, being dull brown with obscure paler markings. Probably all degrees of color between this dull brown and the clear bright black of the fully adult specimens are passed in the life period. Specimens otherwise apparently mature have been noted with traces of brown in the labrum and with the black of the mesepimeron duller above, shading out into brown.

Material examined: *Canal Zone*, Panama, Rio Sardanilla, December 5, 1916, 1 male, 1 female, both tenerals; Rio Mazamba, December 6, 1916, four males, all tenerals; *Colombia*, Cristalina, Dept. Antioquia, Quebradas Cristalina (73 specimens), Sabaleticus (44 specimens), and La Camelia (6 specimens), February 12-19, 1917, 116 males, 7 females, type male Quebrada Cristalina, February 12, allotype female Quebrada Sabaleticus, February 14, all in coll. E. B. W.

This is the only species of *Perilestes* which has reached Central America. At Cristalina, Colombia, it was associated with the much rarer *magdalенаe*.

4. *Perilestes magdalенаe*, new species

Abdomen male 49-52.5, female 46; hind wing male 23.5-25, female 26-27;

stigma front wing male 1.07–1.20, female 1.27–1.40; stigma hind wing male 1.27–1.40, female 1.47–1.50; abdominal appendage male 1.5–1.6, female .35–.40; male anterior lamina from apex of sternum of segment 1 to apex of the posterior process 1.55–1.60; female valve 2.14–2.26.

Male.—Head similar to that of *remotus*.

Prothorax similar to that of *remotus*, but slightly paler, the hind border straighter, the median and lateral lobes less evident.

Thorax similar to that of *remotus* but duller; mesepimeron largely brown instead of black; the black stripe on the second lateral suture is slightly narrower and at the metinfraepisternum it is not joined across the metepimeron with the ventral black as it is in *remotus*. Metasternum black as in *remotus*, but with a pale median longitudinal area of variable width from the level of the angle of the latero-ventral carinae to near the apex of the metasternum.

Mesostigmal lamina low, nearly straight, a short shallow concavity just before its lower end.

Coxae pale, a triangular dark area on the anterior face of the third, and the posterior face of the second and third largely dark. Femora black but with the anteapical pale spot of *remotus* enlarged to an anterior pale stripe on each femur from the coxa quite to or near the apex. Tibiae as in *remotus*.

Venation and stigma as in *remotus*.

Abdomen seen from above: 1 with a large squarish median basal brown spot reaching about two-thirds the length of the segment, narrowly separated from an apical brown area which joins the apical ring of dark brown or black; 2–6 about like 2–6 in *remotus*, but the paler area on each segment, except the postbasal, is slightly more extensive on 3–6 in *magdalenae*; the postbasal pale areas on 7 are more nearly joined in the median line in *magdalenae* so that 7 is about the same pattern in *magdalenae* as 6 is in *remotus*; 8–10 black. Seen from the side: 1–7 as in *remotus*, but the basal ventral spot on 2 is reduced to an inconspicuous small brown area in *magdalenae* and the pale areas, except the postbasal pale areas, are more extensive in *magdalenae*; 8–10 as in *remotus*. Sternum of 1 pale, brown at base, shading out into the pale color about midlength of the sternum; anterior lamina as in *remotus*; lateral pattern of 3–7 carried across the sternum; 8–10 and color of appendages as in *remotus*.

Length of the wing or lobe on the expanded postero-ventral margin of the tergum of 2 about .7 and the distance from the apex of this lobe to the antero-ventral angle of the tergum about 1.9.

Female.—Head similar to that of the male.

Prothorax largely pale, a longitudinal median pale brown stripe and proepimeron largely brown; dorsum of hind lobe, against the posterior border, elevated into an erect, acute, median spine about .5 long; lateral margin of hind border rather prominent, the supero-lateral angle about 90°.

Thorax similar in color pattern to that of the male, but the black is replaced by dark reddish brown except a narrow black border to the pale middorsal stripe, and the stripe on the second lateral suture which re-

mains distinctly and conspicuously black; ventro-lateral carina and metasternum entirely pale except for the merest trace of a brown line on the median suture from the third coxae to the level of the angle of the latero-ventral carinae.

Mesostigmal lamina low, the edge nearly uniformly curved.

Coxae pale, a small dark area on the anterior face of the third. Femora largely pale, obscurely darker above, black beneath and at the apex. Tibiae pale, the first tibia narrowly dark streaked above and all dark streaked beneath.

Venation and stigma similar to those of the male.

Abdominal segments 1-6 patterned about as in the male but with the median dark area of 4-6 paler, darkest immediately following the postbasal pale area, on 6 scarcely darker than the antepical pale area; the postbasal pale area on 4-7 is slightly reduced in area in its dorsal but not in its lower ventral part as compared with the male and the apical dark area grows progressively paler posteriorly so it is brown instead of black on 6; 7 reddish brown, the postbasal pale areas widely separated in the median line; 8-10 black above, on 9 reduced to a well-defined median longitudinal bar about .8 wide basally which widens laterally, at about two-thirds the length of the segment, and passes into brown on the sides, terminating at the apex at about midheight of the segment; this black bar is bounded basally on either side by a large blue sharply defined lateral spot; sides of 9 largely blue, the ventral border at midlength narrowly black, from which point the ventral black widens in both directions to base and apex giving a circular form to the lower edge of the lateral blue spot. Sternum of 1 largely pale, of 2 largely black, of 8 largely pale (blue? in life). Appendages pale brown, black at extreme apex, flattened cone-shaped, acute; as compared with those of *remotus* they are less tapering in the apical two-thirds or three-fourths and less acute,—evident differences when direct comparisons are made but difficult to describe. Valvular styles at their point of attachment about at the level of the apex of 10.

Venational characters based on four males and two females

Postnodals front wing, 13 (50% males, 25% females), 14 (50% males, 25% females), 15 (25% females), or 16 (25% females); hind wing, 10 (12.5% males), 11 (37.5% males), 12 (37.5% males), 13 (12.5% males, 75% females), or 14 (25% females).

M₃ in both front and hind wings arising between the first and second postnodals (100% males, 100% females).

Rs in front wing arising at the seventh postnodal (75% males, 25% females), or at the eighth postnodal (25% males, 75% females); in the hind wing at the sixth postnodal (37.5% males), at the seventh postnodal (62.5% males, 75% females), or at the eighth postnodal (25% females).

M₂ in front wing arising at or near the seventh postnodal (12.5% males), at or near the eighth postnodal (62.5% males), at or near the ninth postnodal (25% males, 75% females), or at or near the tenth postnodal (25% females); in the hind wing at or near the seventh postnodal (75% males),

at or near the eighth postnodal (25% males, 75% females), or at or near the ninth postnodal (25% females).

M_{1a} in front wing arising at the proximal end of the stigma (12.5% males), two cells before the stigma (62.5% males, 100% females), or three cells before the stigma (25% males); in the hind wing one cell before the stigma (37.5% males), two cells before the stigma (62.5% males, 75% females), or three cells before the stigma (25% females).

Number of cells posterior to Cu_2 in front wing, 11 (25% males), 13 (50% males), 14 (12.5% males, 50% females), or 15 (12.5% males, 50% females); in hind wing, 9 (12.5% males), 10 (75% males, 25% females), 11 (12.5% males, 50% females), or 12 (25% females).

At the time of capture *magdalenae* and *remotus* were not recognized as two species, and all our notes are on envelopes containing the much commoner species, *remotus*.

Material examined: *Colombia*, Cristalina, Dept. Antioquia, Quebradas Cristalina (3 specimens), Sabaleticus (3 specimens) and La Camelia (4 specimens), February 12–18, 1917, 8 males, 2 females, type male Quebrada La Camelia, February 18, allotype female Quebrada Cristalina, February 12; all in coll. E. B. W.

This species is known only from the streams about Cristalina, Colombia, in the Magdalena Valley, where it was associated with the commoner *remotus*.

5. *Perilestes attenuatus* Selys

Abdomen male 43.5–48, female 37–37.5; hind wing male 20–21.5, female 20.5–22; stigma front wing male 1.05–1.10, female 1.10–1.20; stigma hind wing male 1.15–1.20, female 1.20–1.27; abdominal appendage male 1.40–1.60, female .30–.35; male anterior lamina from apex of sternum of segment 1 to apex of the posterior process 1.30–1.40; female valve 1.95–2.20.

Male.—Labium pale, apices of parts very slightly darker, except the movable hook which has the apical half or more black as in *kahli*; labrum and clypeus in front light blue, almost white, the former in front with a straight black border, occupying scarcely one-fourth the length of the labrum, clypeus above black, the line between the black and pale areas smooth.

Prothorax pale, slightly darker above, especially posteriorly where it is pale reddish or rusty brown; hind border straightened above, very slightly trilobed, the lateral extremities almost vertical.

Thorax above like that of *kahli* except that the antehumeral pale stripe reaches the upper end of the mesepisternum; side of thorax similar to that of *fragilis* except that the dark stripe on the second lateral suture is slightly wider throughout and widens below on the metepimeron into a more or less bilobed expansion; metinfraepisternum dark reddish brown above, shading into black below, the lower angle pale. Metasternum pale, a black longitudinal median line from the coxae to about two-thirds the length of the metasternum where it ends in a fork or this black line may reach nearly the apex of the metasternum, widened into a circular area at about two-thirds

its length, and again widened or not at its apical end; on either side a longitudinal black bar just inside the latero-ventral carina, reaching posteriorly nearly to the apex of the metasternum, anteriorly it reaches a greater length, measured from the level of the angle of the latero-ventral carina, than its length posterior to that point, sometimes with a greater or lesser interruption nearly reaching the anterior suture which bounds the metasternum. Mesostigmal lamina low and of nearly uniform height throughout.

Coxae pale, the second and third each with the anterior face broadly black. Legs pale, of all the species the most distinctly marked with darker though the general pattern is similar to that of *kahli*; second and third femora dark at base and all femora dark at apex, between base and apex each femur with two encircling bands of brown to black, these dark areas more extensive than the pale areas adjoining them; tibiae paler and clearer than femora, each dark at base, a narrow line of black on the ventral surface, widest on the first tibia.

Venation like that of *solutus*; stigma dark brown or black.

Abdomen seen from above: similar to that of *kahli*, 7 brown rather than black, and the dark colors on the preceding segments are slightly paler in *attenuatus*; 8-10 brown, darker to black on the base of 9 and the apex of 10, a pale ring occupying the basal fifth of 8. Seen from the side similar to that of *kahli*, except that the dark color, adjoining the pale ventral margin of each of segments 3-6 is paler and duller, so the ventral margin is less contrastingly colored but the dark color is more extensively extended from the dorsum to the ventral margin so the pale basal and pale anteapical areas of each segment are more widely separated in *attenuatus* than in *kahli*; on 8 only the extreme ventral margin is pale, this widened slightly and briefly just before it passes into the pale basal ring. Sternum of 1 pale; 3 pale at base, passing insensibly into very pale brown which fades quickly into pale at the anteapical pale area, then passing posteriorly into more or less distinct blue and then brown; 4-6 similar to 3, the dark (brown) progressively darker from the anterior to the posterior segments, and the faint blue, sometimes following the anteapical pale area on 3, growing fainter and disappearing on 5 or 6; 7 dark brown or black, restricted pale (blue?) at base and apex; 8-10 bright light blue. Appendages black.

Length of the wing or lobe on the expanded postero-ventral margin of the tergum of 2 about .8, and the distance from the apex of this lobe to the antero-ventral angle of the tergum about 1.7.

Female.—Labium as in the male; labrum black, a large dull yellowish rounded basal spot on either side, these spots very narrowly or scarcely separated in the median line; clypeus patterned as in *kahli* but the pale color on the front is a dull leaden blue or obscure.

Prothorax similar in color and shape to that of the male.

Thorax above like that of the male except that the black adjoining the middorsal carina is only about half as wide as in the male; side of thorax similar to that of the male except that the dark colors are slightly paler; the dark stripe on the second lateral suture is not or very slightly widened

below, and the dark color (brown) of the metinfraepisternum does not shade into black below. Metasternum pale, a black longitudinal median line from between the coxae posteriorly to about the level of the angle of the latero-ventral carinae; likewise the lateral dark area at the latero-ventral carina is less developed in the female than in the male, fading cut into brown anteriorly and posteriorly, this brown fading imperceptibly into the general pale color.

Mesostigmal lamina as in the male.

Coxae pale, the third coxa with or without a brown area on the anterior face. Legs similar to those of the male, possibly slightly duller.

Venation and stigma similar to those of the male.

Abdomen seen from above: 1-4 similar to those of the male; 5 is narrowly pale at base, then very briefly black which fades into brown, which is continuous to just before the apical black where it fades into the restricted paler antepical area (in the male the dark area which occupies the larger part of the segment darkens posteriorly from brown, just following the postbasal black to very dark brown or black just anterior to the antepical pale area); 6 is largely pale or dark brown, the area adjoining the pale basal area being scarcely or not at all darker, the antepical pale area poorly defined, and the apical area being only dark brown, not black; 7 brown, pale at base, scarcely if any darker at apex; 8 brown; 9 dark brown to black with a lateral basal blue spot on either side, patterned as in *kahli* but with the dark median longitudinal bar about .6 wide at base and 1.0 wide where it joins the dark apex; 10 dark brown, almost black. Seen from the side: 1-4 similar to those of the male; 5-7 paler than in the male, same as in dorsal view; 8-10 patterned as in *kahli*, 8 brown, shading to black at the extreme postero-ventral angle; dark colors on 9 black or nearly so, 10 black or nearly so. Sternum of 1 and 2 pale, 2 with a postbasal dark stretch occupying about one third the length of the segment; 3-6 similar to those of the male but without traces, or very faint ones, of antepical blue; 7 dark to black, broadly pale at base and less definitely antepically; 8 blue with a median black area as in *kahli*. Appendages dark brown to black, shaped like those of *magdalenae*. Valvular styles at their point of attachment at about the level of the middle of the appendages.

Venational characters based on four males and three females

Postnodals front wing, 11 (25% males), 12 (37.5% males, 33.3% females), 13 (25% males, 66.7% females), or 14 (12.5% males); hind wing, 10 (37.5% males), 11 (50% males, 33.3% females), 12 (12.5% males, 50% females), or 13 (16.7% females).

M₃ in front wing arising at the first postnodal (50% males, 16.7% females), or between the first and second postnodals (50% males, 83.3% females); in the hind wing at the first postnodal (62.5% males, 16.7% females), or between the first and second postnodals (37.5% males, 83.3% females).

Rs in front wing arising at the seventh postnodal (62.5% males, 16.7% females), or at the eighth postnodal (37.5% males, 83.3% females); in the

hind wing at the sixth postnodal (37.5% males), at the seventh postnodal (62.5% males, 83.3% females), or at the eighth postnodal (16.7% females).

M_2 in front wing arising at or near the eighth postnodal (62.5% males, 16.7% females), or at or near the ninth postnodal (37.5% males, 83.3% females); in the hind wing at or near the seventh postnodal (37.5% males), at or near the eighth postnodal (50% males, 83.3% females), or at or near the ninth postnodal (12.5% males, 16.7% females).

M_{1a} in front wing arising at the distal end of the stigma (100% males, 83.3% females), or at the proximal end of the stigma (16.7% females); in the hind wing at the distal end of the stigma (100% males, 100% females).

Number of cells posterior to Cu_2 in the front wing, 7 (12.5% males, 16.7% females), 8 (16.7% females), 9 (37.5% males), 10 (25% males), 11 (25% males, 16.7% females), or 12 (50% females); in hind wing, 3 (16.7% females), 4 (37.5% males, 16.7% females), 5 (62.5% males, 33.3% females), or 6 (33.3% females).

The following color notes were made from a male and female taken at Abuná, March 20. Male.—Eyes dull green above, slightly lighter below. Top of head metallic green with purplish reflections. Back of head metallic grays and browns. Prothorax brown and transparent light color. Narrow middorsal stripe light gray, bordered with black, in turn bordered with brown with metallic green reflections; a pearl colored antehumeral stripe; mesepimeron brown; posteriorly almost white with a brown stripe on the second lateral suture; very light below. Legs white with black markings. Abdomen black, brown and white, 7 and 8 with areas of pale blue. Female.—Similar, thoracic colors the same but paler; blue areas on abdominal segments 7 and 8 paler.

Material examined: *Bolivia*, Cashuela Esperanza, April 13, 1922, 1 male; *Brazil*, Abuná, Matto Grosso, March 16, 20 and 21, 1922, 4 males, 1 female; Porto Velho, Amazonas, May 2, 7, 18, 19, 23, and 24, 1922, 17 males, 2 females; Manáos, Amazonas, June 18, 1922, 2 males.

The reasons for assigning De Selys' name to the above species are as follows: 1. His description agrees well, except that the female described by him has the abdomen longer than any of the few females we have seen. (It must not be overlooked that De Selys' description is largely comparative with *cornutus*, though he speaks of it as *fragilis*.) 2. Our specimens are from widely scattered localities and there is no reason why the species should not be expected to occur at Santarem, the type locality. 3. Moreover, *attenuatus* seems to be rather adaptable for a *Perilestes* as it occurs on sandy bottom creeks and on creeks with mud bottoms and banks, so there is this further reason for expecting to find it at Santarem.

Attenuatus was the only species of *Perilestes* taken at Abuná, where it was found in woods along the creek at Km. 216. The first male seen was hanging with folded wings from the tip of a leaf eight feet above the ground; the second was flying in the woods a few inches from the ground. Likewise it was the only species taken at Cashuela Esperanza, where a single male was taken on a creek where two species of *Heteragrion* were common. At Porto Velho while *cornutus* was found only on the charcoal

burners' creek, two and one-half miles east of town, *attenuatus* was found not only on the same creek, but also on a creek crossed by the Rondon Telegraph Trail, and on a creek two feet deep and three to eight feet wide, with mud bottom and banks, flowing in a gully in the forest east of town. It was taken on this mud bed stream on May 19; on the same date *minor* was taken in the nearby jungle. At Manáos *attenuatus*, the only species found there, was taken on a mixed gravel and clay bedded stream in heavy forest beyond Flores.

6. *Perilestes kahli*, new species

Abdomen male 47–50, female 43; hind wing male 22–24, female 25; stigma front wing male 1.10–1.15, female 1.20; stigma hind wing male 1.20, female 1.30; abdominal appendage male 1.30–1.40, female .35; male anterior lamina from apex of sternum of segment 1 to apex of the posterior process 1.15–1.20; female valve 1.90.

Male.—Labium similar to that of *solutus*, the apical half or more of the movable hook black; face similar to that of *fragilis*, but the black on the apical part of the labrum is slightly produced basally in the median line and on the lateral margins.

Prothorax pale, only slightly darker above; hind border flattened, above straightened, slightly rising from either side to a little higher at the center, the lateral extremities almost vertical.

Thorax similar to that of *fragilis* with the black adjacent to the narrowly brown middorsal carina from about as wide as the antehumeral yellow stripe, (about two-fifths as wide as the reddish brown of the middle area of the mesepisternum) to fully occupying the area from the pale carina to the pale antehumeral stripe; mes- and metinfraepisternum extensively pale below and darker to black above to largely black with only the lower triangular area pale. Metasternum as in *fragilis* but the lateral dark areas may be the same or may be reduced and brown. Mesostigmal lamina low and straight above, the lower third elevated into a low symmetrical triangle.

Coxae pale, the third with or without the anterior face largely dark to black. Femora pale, marked more extensively with dark than in *fragilis* to such an extent in the case of the Bolivian male that the color pattern of the first and second femora is obscured by the extensive black; first femur pale at base, the apical two-fifths to four-fifths of the dorsum brown or black with or without a trace of a pale anteapical spot on the antero-dorsal surface, black continued on the antero-ventral edge to near the base, dorsal surface with trace of a brown postbasal area; ventral surface pale, shading to brown apically or the entire surface black; second femur pale at base and black at apex with two brown areas between, each of which is more extensive than the pale areas adjacent to it and nearly or quite encircles the femur, the anteapical pale color, on the antero-dorsal surface, is pale blue or green; or the second femur is black with only a small pale postbasal and a small pale anteapical area on the antero-dorsal surface; third femur similar to the pale form of the second described above, but the basal pale

area is wanting, being occupied by the brown area which is postbasal on the second femur. Tibiae distinctly paler than the femora, very light yellow, dark brown at base, marked as in *fragilis*.

Venation and stigma as in *solutus*.

Abdomen seen from above: 1 pale, only slightly darker above, the extreme apex brown, passing to black below; 2 black or brown, in the latter case pale at the base and passing into black at the extreme apex, in which case the brown is so pale basally that the median longitudinal pale area is ill defined in the dried specimen; 3-7 similar to those of *fragilis*, but slightly darker in the dark areas on the anterior segments and progressively more so on the posterior segments, so 7 is black with a pale basal ring; 8 black with the basal fourth or third pale (blue?), in the type specimen the black encroaching on the pale area in the median line with a triangular projection; 9 and 10 black. Seen from the side: 1-7 similar to those of *fragilis*, but differing as follows: on 2 the dorsal dark does not extend quite so far on the side on *kahli* and the line of separation of the dark and pale is a straight line, not a dorsally convex line as in *fragilis*; segments 3-7 have the dark areas darker in color in *kahli*, on the posterior segments becoming black rather than brown, and they differ strikingly from *fragilis* in having the ventral margins more extensively pale, due to a complete or more nearly complete joining along the ventral margin of the pale basal area and the antepical pale area, on 3 this joining is complete, on 4 there is a slight brief shading of brown just before the antepical pale area, on 5 this brown is darker and more extensive, on 6 the dorsal black reaches the ventral margin along about the middle half of the segment and is thus nearly as extensive as in *fragilis*; 7 entirely black, excepting the lateral extension of the pale basal ring; 8 with the pale basal spot narrowing posteriorly but reaching the apex along the ventral margin; 9 all black with the merest streak of pale on the ventral margin; 10 with the ventral half pale. Sternum of 1 pale; 3 dark, narrowed at the base, and interrupted at the antepical pale area; 4 dark to black, pale at base and at the antepical pale area; 5 black, pale at base with a brown spot, and pale at the antepical pale area; 6 similar to that of 5 but the basal brown spot larger and darker; 7 black, very briefly pale at base and apex; 8-10 bright light blue. Appendages black.

Length of wing or lobe on the expanded postero-ventral margin of the tergum of 2 about .8, and the distance from the apex of this lobe to the antero-ventral angle of the tergum about 1.7.

Female.—Labium as in the male; labrum black, a large dull yellow median geminate spot at the base; clypeus in front dull yellow, a vertical brown bar on either side equally distant from the median line and the lateral margin; clypeus above black.

Prothorax similar to that of the male but darker above, a round dark brown median spot on the front lobe, and the dorsum of the middle and hind lobes, excepting the elevated hind border of the latter, dark brown to black; hind border similar to that of the male but slightly more elevated.

Thorax above with the dorsal black occupying one-half to two-thirds of

the mesepisternum, narrowly bordered along its outer edge with brown which fades into the pale but ill-defined antehumeral stripe; side of thorax as in the male, but the metinfraepisternum is entirely black except the lower nearly equilaterally triangular part. Metasternum as in the male but the lateral dark areas are larger and are black.

Mesostigmal lamina as in the male.

Coxae and legs similar to those of the male.

Venation similar to that of the male, the stigma slightly duller, less reddish, brown.

Abdomen seen from above: 1-5 similar to those of the male, but darker, the pale basal rings are as distinct as in the male but the antepical pale area on each segment is less distinct, especially on the posterior segments, though the apical black, as distinguished from the color basal to it, is distinct in all; 6 and 7 brown, pale ringed at base, and very slightly darker at apex; 8 and 10 black; 9 distinctly patterned, slightly more than the basal half pale (blue?) with a black median longitudinal bar from the base passing into the black which occupies the apical part of the segment; this black bar is about .4 wide at the base and about .7 wide where it passes into the apical black. Seen from the side 1-5 are similar to those of the male; 6 brown, pale basally and thence along the ventral margin for a short distance, and with ill defined traces of pale on the ventral margin at the region of the antepical pale area; 7 brown, darker at the postero-ventral angle; 8 and 10 black, the ventral margin of 8 pale, widest at the base and tapering apically, not quite reaching the apex; 9 pale (blue?) with a triangular black area in the antero-ventral angle and with apical black, narrowing from the dorsum to the extreme postero-ventral angle, the black at base and the black at apex with their opposing lines parallel, that is, the pale area cuts diagonally across the segment. Sternum of 1 pale; 2-5 dark to black, pale at base and antepically; 6 similar to the preceding segments but apparently lacking the antepical interruption; 7 black, pale at base and extreme apex; 8 blue with a small median longitudinal dark area which reaches neither base nor apex, and is widest at mid-length. Appendages black, shaped like those of *magdalenae*. Valvular styles at their point of attachment slightly distal to the level of the apex of 10.

Venational characters based on two males and one female

Postnodals front wing, 12 (25% males), 13 (50% males), or 14 (25% males, 100% females); hind wing, 11 (50% males), 12 (25% males), or 13 (25% males, 100% females).

M₃ in front wing arising between the first and second postnodals (100% males, 100% females); in the hind wing at the first postnodal (25% males, 100% females), or between the first and second postnodals (75% males).

Rs in front wing arising at the seventh postnodal (50% males), at the eighth postnodal (25% males, 100% females), or at the ninth postnodal (25% males); in the hind wing at the seventh postnodal (100% males, 100% females).

M_2 in front wing arising at or near the eighth postnodal (25% males), at or near the ninth postnodal (50% males, 100% females), or at or near the tenth postnodal (25% males); in the hind wing at or near the eighth postnodal (100% males, 100% females).

M_{1a} in front wing arising at the distal end of the stigma (100% males, 100% females); in the hind wing at the distal end of the stigma (100% males, 100% females).

Number of cells posterior to Cu_2 in front wing, 9 (25% males), 11 (25% males), 12 (50% males, 50% females), or 13 (50% females); in hind wing, 7 (50% males, 50% females), 8 (50% males), or 9 (50% females).

Material examined: *Brazil*, Villa Murinho, Matto Grosso, April 1, 1922, 1 male; *Bolivia*, Rio Japacani, East Bolivia, J. Steinbach, Carnegie Museum, Acc. 5574, 1 male, 1 female. The Brazilian male, coll. E. B. W., the type, and the Bolivian female, coll. Carn. Mus., the allotype. Named for Mr. Hugo Kahl of the Carnegie Museum, to whom we are indebted for many kindnesses, the last of which was the loan of all the specimens of *Perilestes* in the collections in his charge. Moreover, before this material was sent us, Mr. Kahl had studied the two Bolivian specimens and was unable to refer them to any described species.

The single Brazilian specimen was taken at the creek at Km. 315 south of town. Associated with it on the same creek were the rare *cornutus* and the relatively abundant *solutus*.

7. *Perilestes fragilis* Hagen

Abdomen male 50–52, female 50; hind wing male 25–26, female 27.5; stigma front wing male 1.35–1.60, female 1.50; stigma hind wing male 1.40–1.60, female 1.60; abdominal appendage male 1.50, female .40; male anterior lamina from apex of sternum of segment 1 to apex of the posterior process 1.30–1.40; female valve 1.85.

Male.—Labium similar to that of *solutus*, apical parts not quite as dark; labrum light blue, almost white, a straight black bar on the anterior border, occupying about one-third the labrum; anterior surface of the clypeus same color as basal two-thirds of labrum, dorsal surface black, the line separating the two colors smooth.

Prothorax similar to that of *solutus* in color and shape.

Thorax brown above with greenish reflections, shading to black along the middorsal carina which is very narrowly light brown; a pale yellow antehumeral stripe about .2 wide not reaching the upper end of the mesepisternum; mesepimeron reddish brown; metepisternum yellow or yellowish, with a dark brown stripe along the second lateral suture which widens above to extend across the sclerite while below it is carried across the metinfraepisternum by a broad area which includes all but the inferior angle of that sclerite; metepimeron yellow or yellowish, the same color as the metepisternum. Metasternum pale, with a median black line as in *solutus* and, in addition, with a black area on either side in the angle of the latero-ventral carina.

Mesostigmal lamina above low, gradually rising to near the lower end where it is rounded off so the lower third is symmetrically convex.

Coxae pale, the third pair with a small black area on the anterior face. Femora pale yellowish, slightly tinged brownish at the base, and distinctly black at the apex with two intermediate brownish rings or areas, about equally spaced, and each about the same extent as each of the three pale areas thus formed, the basal of these two darker areas the paler and less distinct; ventral surface black in the median line except at the base of the first femur and the apices of all. Tibiae pale like the femora, the first tibia with a narrow black line beneath, widening and more distinct at the comb, this line a mere trace on the second and third tibiae; a basal streak of brown on the dorso-anterior surface of all the tibiae, most distinct on the first, scarcely evident on the third.

Venation like that of *solutus*; stigma black.

Abdomen seen from above: 1 and 2 similar to those of *solutus*, but the median longitudinal pale bar on 2 shorter, only about two-thirds the length of the segment; 3-7 each with an obscure pale basal ring, darkest and least evident on 3, followed by brown which darkens posteriorly, becoming black on 4-6; 3-6 with this dark on each segment fading posteriorly into pale which in turn darkens into an apical black area about twice as extensive as the pale area which precedes it; 3-8 each with or without a median longitudinal thread line of pale which disappears before the apex of 8; 7 uniformly dark brown after the obscure pale basal ring, tending toward black along the middorsum; 8-10 dark brown, 8 the palest of the three, and 10 nearly or quite black. Seen from the side: 1 and 2 are similar to those of *solutus*; 3-6 each pale at base and subapically along the ventral margin, these pale areas extending toward each other along the extreme ventral margin, and obscurely joined on 3, but progressively more widely separated from 4 to 6 by the lateral extension of the large median dark area; 7 pale at base, then brown, the extreme apex usually darker; 8 with the entire side fading out to light bluish along the extreme ventral margin; 9-10 black, 9 with the merest line of pale on the ventral border. Sternum of 1 pale; of 3 pale with a longitudinal streak, narrow and darkest at the base, then widening and fading out before the middle of the segment, darkening again to black in the apical black of the tergum; 4-6 each with the sternum pale at base, then darkening through brown to black which fades out to pale at or before the subapical pale area of the tergum, the apex as in segment 3; in life the pale areas on the sterna of 3-6 doubtless show more or less blue; 7 black, extreme base and apex apparently blue; 8-10 heavily pigmented, bright blue (or possibly yellow) in life. Appendages white to brown, the external edge brown to black.

Length of wing or lobe on the expanded postero-ventral margin of the tergum of 2 about .8 and the distance from the apex of this lobe to the antero-ventral angle of the tergum about 1.7.

Female.—Labium as in the male; labrum yellowish brown, the apical half and the lateral margins black; clypeus in front greenish, a large brown area in the middle of each side, above dark brown to black.

Prothorax as in the male.

Thorax similar to that of the male, the antehumeral yellow stripe very slightly wider.

Mesosstigmatal lamina similar to that of the male.

Legs similar to those of the male, the basal streak of brown on the dorso-anterior surface of the tibiae scarcely evident in the female.

Venation similar to that of the male.

Abdomen seen from above: 1 and 2 similar to those of the male but 1 paler at base; 3 black following the pale basal ring, fading out through brown beyond the midlength of the segment to the antepical pale, the apical 1.5 m.m. black as in the male; 4 and 5 similar to 3; 6 brown rather than black postbasally, and the segment nearly uniformly colored, the apical black and antepical paler areas scarcely distinguishable; 7 and 8 similar to 6, slightly darker, the pale basal ring reduced on 7 and wanting on 8; 9 yellowish brown, narrowly and indefinitely black in the midline and on the apical edge, dark brown to black on either side apically, these lateral dark areas widely separated by the paler dorsal color; 10 black. Seen from the side 1 and 2 are similar to those of the male; on 3 and 4 the basal and subapical pale areas are joined along the ventral border but on 5 the median dark of the tergum separates them and on 6 the subapical pale area is scarcely or not distinguishable and the postbasal pale area is continued very briefly along the ventral margin; 7 and 8 brown, slightly paler toward the ventral margin and basally on 7 and a small ventro-posterior brown area on 8; 9 pale yellowish brown, lightest along the ventral margin, apically dark brown or black for a width of about one-third m.m., this black narrowing ventrally, and with a small ventro-anterior brown area; 10 black. Sternum of 1 pale; 2 pale with a postbasal and an apical black or brown area; 3-6 similar, with the postbasal dark area on each extensive, occupying half the length of the sternum or more; 7 pale at base, then dark, apparently without an antepical pale region; 8 pale (probably blue in life) with a narrow longitudinal median black line scarcely reaching base or apex and widest at about midlength of the sternum. Appendages black, shaped like those of *magdalenae*. Valvular styles at their point of attachment distal to the level of the apex of 10.

Venational characters based on three males and one female

Postnodals front wing, 13 (33.3% males), or 14 (66.7% males, 100% females); hind wing, 10 (16.7% males), 12 (66.7% males, 50% females), 13 (16.7% males), or 14 (50% females).

M_3 in front wing arising at the first postnodal (50% males, 100% females), or between the first and second postnodals (50% males); in the hind wing at the first postnodal (100% males, 100% females).

R_s in front wing arising at the eighth postnodal (50% males, 100% females), or at the ninth postnodal (50% males); in the hind wing at the sixth postnodal (33.3% males), or at the seventh postnodal (66.7% males, 100% females).

M_2 in front wing arising at or near the ninth postnodal (33.3% males, 100% females), or at or near the tenth postnodal (66.7% males); in the

hind wing at or near the seventh postnodal (16.7% males), or at or near the eighth postnodal (83.3% males, 100% females).

M_{1a} in front wing arising at the proximal end of the stigma (83.3% males), or one cell proximal to the stigma (16.7% males, 100% females), in the hind wing at the distal end of the stigma (33.3% males), or at the proximal end of the stigma (66.7% males, 100% females).

Number of cells, posterior to Cu_2 in front wing, 10 (50% females), 11 (16.7% males), 12 (33.3% males), 14 (50% females), 15 (33.3% males), or 16 (16.7% males); in hind wing, 6 (16.7% males), 8 (16.7% males, 100% females), 9 (16.7% males), 10 (16.7% males), 11 (16.7% males), or 12 (16.7% males).

Material examined: *Brazil*, Rio de Janeiro, Alto Boa Vista Creek, below Alto Boa Vista, September 6 and 8, 1922, 3 males; Cascatinha Falls Creek, above Alto Boa Vista, September 14, 1922, 1 female.

The larger of Hagen's two female types of *fragilis* was taken at Congonhas, Brazil, a town about 250 miles north and a little west of Rio de Janeiro, and on the headwaters of the Rio San Francisco. This larger female type rather than the smaller female from the Essequibo in British Guiana, is the basis for Hagen's generic and specific description. The description agrees well with the Rio female, and unless later collecting should reveal more than one species in the locality, the determination of the Rio specimens as *fragilis* may be considered certainly correct. Because of the wide separation of the locality from the Amazonian basin, it is improbable that more than one species will be found near Rio in the future.

8. *Perilestes solutus*, new species

Abdomen male 42–46, female 38–40; hind wing male 20–21, female 21–24; stigma front wing male 1.13–1.20, female 1.27–1.33; stigma hind wing male 1.12–1.20, female 1.27–1.30; abdominal appendage male 1.20–1.35, female .40; male anterior lamina from apex of sternum of segment 1 to apex of the posterior process 1.35–1.45; female valve 1.85–2.0.

Male.—Labium pale, apices of median lobe, end hook and movable hook shaded darker; labrum, anteclypeus and the postclypeus narrowly in front and with or without a deep median rectangular indentation, bright blue, the labrum narrowly black margined in front.

Prothorax pale, darker shaded above especially on the middle and hind lobes, the proepimeron largely light brown; hind border semicircular.

Thorax black above with greenish reflections, the dark occupying about half or more of the mesepisternum, the middorsal carina narrowly brown; outer half or less of mesepisternum, except the extreme upper part which is black, pale brown or dark flesh with traces of bluish or yellowish; this pale color may fade out to a maximum along the humeral suture or there may be a well-defined narrow pale antehumeral stripe; mesepimeron reddish brown, a long black spot above on the humeral suture and another shorter one above and posterior to it, with a pale (yellow?) area between them; the broad band of color of the mesepimeron carried across the mesin-

fraepisternum; metepisternum pale, flesh colored below and yellowish above and behind where there is a black stripe along the second lateral suture; at midheight this black stripe is about .1 wide, above it leaves the suture and angles obliquely forward and upward about half across the upper end of the metepisternum, below it ends against the metinfraepisternum; metepimeron pale flesh, almost white, bright rust colored below, this color continued across the upper part of the metinfraepisternum where it passes, at the extreme antero-ventral angle, into black. Metasternum pale like the metepimeron, a black longitudinal median line from the hind coxae posteriorly to nearly the level of the angle in the latero-ventral carina.

Mesostigmal lamina very slightly concave above throughout its length, at its outer end produced into a free triangular outwardly directed point.

Coxae pale, the third pair shaded a darker rust color on the anterior face. Femora pale, tinged yellowish or reddish, black at the apex, this black carried basally a third to a half the length of the femur on the anterior face of the first and second femora, the first femora the darker. Tibiae pale reddish like the femora, the anterior face paler and yellowish rather than reddish.

Venation black, veins shading out to light brown at the wing base; stigma reddish brown (Sanford's brown, Ridgway).

Abdomen seen from above: largely dark to black with restricted pale markings; 1 with a narrow median longitudinal black bar, joined at the apex with a narrow black transverse ring; 2 with a corresponding but wide black bar which laterally extends far below the level of the black on 1 and to the level of the black on 3, a narrow median longitudinal pale bar from base to about four-fifths its length; 3-7 black, each with a narrow transverse pale blue or yellowish basal ring and a pale median dorsal stripe extending posteriorly from it, nearly to the apex on 3, and successively narrower and shorter posteriorly till on 7 it is scarcely evident or may occupy as a maximum one-third the length of the segment; 8-10 unmarked, with restricted traces of paler color on the base of 8. Seen from the side: 1 pale except the dark apical ring; 2 with about the ventral half pale, the ventral pale and dorsal black areas meeting in a nearly straight line; 3-7 each with the ventral margin narrowly pale from the base, where it joins the pale basal ring, to near the apex; 8 has a pale ventral border from base to apex but in this case the color is distinctly blue, not merely pale or yellowish as on 3-7, though in life 7 at least may show the same blue color; 9 has the extreme ventral edge blue, 10 is blue below, the dorsum black. Sternum of 1 pale; of 3 pale with a longitudinal black streak, widening into a bar, from the base to near the apex of the lateral pale color of the tergum where it fades out to again reappear in the apical black of the tergum; or the dark color may extend continuously from base to apex without any pale interruption; 4-6 similar, but there may or may not be a short postbasal interruption of the black streak of about the same extent as the anteapical interruption; 7 blue with a median streak corresponding to that on 6, but lacking in the apical part; 8-10 blue, densely pigmented, usually faded to

leaden grey in dried specimens. Appendages black, at thin places dark reddish horn showing through.

Length of the wing or lobe on the expanded postero-ventral margin of the tergum of 2 about .8, and the distance from the apex of this lobe to the antero-ventral angle of the tergum about 1.8.

Female.—Labium as in the male; labrum and clypeus brown, the labrum narrowly black margined in front and the anteclypeus with a median spot and the lateral margin pale (bluish?).

Prothorax as in the male.

Thorax similar to that of the male with the following differences: mid-dorsal black reduced to a median bar about .5 wide, bordered on either side with broader brown, fading out into a pale bar along the suture, the latter probably blue in life; mesepimeron lacking the dorsal posterior black spot of the male; the bright rust less evident on the metepimeron. Mesostigmal lamina similar to that of the male.

Coxae similar to those of the male, the rust color scarcely evident on the third pair. Femora similar to those of the male, slightly paler and less reddish. Tibiae pale yellowish, the first pair dark beneath along the comb.

Venation similar to that of the male; stigma slightly duller.

Abdomen seen from above similar to that of the male with the following differences: dorsal bar on 1 fading out and disappearing at the base; on 3–5 the dark dorsal area on each segment is black only at its base against the basal blue ring, shading at once posteriorly into brown, which brown darkens anteapically into black which is more extensive than the basal black; 6 is brown throughout in the dark area, without black, but the apex darker; 7–10 brown, 9 darker, each side with a large lateral blue spot, the brown between them at base about .8 wide; in dorsal view the blue spot disappears at about two-thirds the length of the segment. In side view 1–5 patterned about as in the male but duller; 6 brown, except the pale base which is carried along the ventral border a short and indefinite distance; 7, 8 and 10 brown; 9 largely blue, the antero-ventral area brown, and apically the brown dorsum is carried onto the side in an obscure ill-defined pattern, but does not reach the ventral margin which is pale throughout except at the base. Sternum of 1 pale; 2–5 each similar to 3 of the male; 6 and 8 each similar to 5 but no anteapical fading out of the black; 7 is like 6 or has the black fading out at the apex. Appendages black, flattened cone-shaped, acute, similar in shape to those of *magdalenae*. Valvular styles at their point of attachment at about the level of the apex of 10 or very slightly more proximal.

Venational characters based on four males and four females

Postnodals front wing, 11 (100% males), 12 (25% females), 13 (62.5% females), or 14 (12.5% females); hind wing, 10 (25% males), 11 (75% males, 12.5% females), or 12 (87.5% females).

M₃ in front wing arising at the first postnodal (75% males, 50% females), or between the first and second postnodals (25% males, 50%

females); in the hind wing at the first postnodal (62.5% males, 87.5% females), or between the first and second postnodals (37.5% males, 12.5% females).

Rs in front wing arising at the sixth postnodal (87.5% males, 25% females), at the seventh postnodal (12.5% males, 62.5% females), or at the eighth postnodal (12.5% females); in the hind wing at the fifth postnodal (12.5% males), at the sixth postnodal (87.5% males, 75% females), or at the seventh postnodal (25% females).

M₂ in front wing arising at or near the seventh postnodal (100% males, 25% females), or at or near the eighth postnodal (75% females); in the hind wing at or near the sixth postnodal (25% males, 12.5% females), at or near the seventh postnodal (75% males, 75% females), or at or near the eighth postnodal (12.5% females).

M_{1a} in front wing arising one cell distal to the stigma (25% males), at the distal end of the stigma (75% males, 50% females), at the proximal end of the stigma (37.5% females), or one cell proximal to the stigma (12.5% females); in the hind wing one cell distal to the stigma (37.5% males), at the distal end of the stigma (62.5% males, 87.5% females), or at the proximal end of the stigma (12.5% females).

Number of cells posterior to Cu₂ in front wing, 9 (12.5% males, 12.5% females), 10 (12.5% males), 11 (37.5% males, 25% females), 12 (37.5% males, 25% females), 13 (12.5% females), or 14 (25% females); in hind wing, 7 (12.5% males), 8 (75% males, 75% females), or 9 (12.5% males, 25% females).

The following living color notes were made from a male taken at Villa Murтинho: Eyes black above, passing into blue which in turn shades out to gray-green below; top of head metallic green. Face markings pale blue. Middorsal carina narrowly light brown, dorsum dark metallic green, bordered on either side with blue; mesepimeron brown with reddish reflections; metepisternum light green; metepimeron very pale blue; below translucent yellow and reddish brown. Legs reddish brown, dark brown at joints. Abdomen above black with white or light blue basal rings; sides brown, with blue on 2 and with blue basal rings; beneath light and dark brown with some bluish on 7 and 8-10 light blue.

Material examined: *Brazil*, Chapada, Matto Grosso, H. H. Smith, 2 males, 2 females (Calvert, Od. Neotropical Region), coll. Carn. Mus.; Villa Murтинho, Matto Grosso, creek at Km. 310 north of town, March 30 and April 3 and 7, 1922, creek at Km. 315 south of town and on a small tributary of it, March 31 and April 1, 4 and 6, 1922, and at the next creek south of the creek at Km. 315, March 31, 1922, a total of 50 males and 13 females, type male and allotype female taken April 4, 1922, on a small tributary, about one foot wide and a few inches deep, of the creek at Km. 315; Belém, Pará, igarpé beyond Souza car line, August 14, 1922, 1 male; all the specimens except those from Chapada in coll. E. B. W.

At the creek at Km. 315 the three species of *Perilestes* taken at Villa Murтинho were found together, but while *solutus* was relatively abundant

only a single male of *kahli* and two males of *cornutus* were taken. Moreover the last two species were not taken elsewhere at Villa Murtinho.

Specimens of both sexes of *solutus* may be specifically recognized at once by the free, outwardly directed inferior end of the mesostigmal lamina, the character to which the specific name refers.

9. *Perilestes minor*, new species

Abdomen male 40–41; hind wing male 20; stigma front wing male 1.10–1.20; stigma hind wing male 1.20–1.30; abdominal appendage male 1.20; male anterior lamina from apex of sternum of segment 1 to apex of the posterior process 1.30.

Male.—Labium as in *solutus*; labrum black, narrowly blue across the base, this blue indented at the middle with a rounded backward projection of the black; anterior surface of the clypeus bright blue, the dorsal surface black, the line separating the two colors smooth.

Prothorax similar to that of *solutus*, but the proepimeron pale like the adjacent parts.

Thorax similar to that of *solutus*, the dorsal black wider, and with the lateral margins convex rather than straight as in *solutus*, above adjacent to the antealar sinus fading out to brown; the pale color on the mesepisternum, adjacent to the humeral suture, is reduced to about half the width or less of the corresponding pale area in *solutus*, and is scarcely .3 wide; side of thorax similar to that of *solutus*, but the black superior spot on the humeral suture is less marked in *minor*, and the spot posterior to this spot in *solutus* is wanting in *minor*. Beneath similar to *solutus* but the dark line on the metasternum reduced to an anterior black spot and a posterior brown spot.

Mesostigmal lamina nearly straight above, the lower end an acute nearly right-angled angle, this angle the homologue of the projecting point which characterizes *solutus*.

Coxae pale. Femora pale, extensively dark marked as follows: largely black beneath, reduced toward the base, apically extending more or less onto the anterior surface, dorsal surface with base and apex dark shaded and with two transverse brown bands, the five bands of light and dark between base and apex thus formed are subequal in extent; this pattern present but not as well marked on the first femur. Tibiae pale yellowish, black beneath on the first tibia along the comb.

Venation similar to that of *solutus*; stigma brown to black, no trace of the reddish brown which is well marked in that of *solutus*.

Abdomen seen from above: 1 pale brown, obscure and scarcely darker than the pale sides, this brown interrupting the apical black ring in the midline; 2 brown, slightly or scarcely darker at base and more distinctly so at apex, the two darker areas and the included paler area about equal in extent; 3–6 each with a narrow transverse basal pale blue ring, followed by brown which passes subapically into a narrow pale ring which is succeeded by the two or three times more extensive apical black; the extensive brown area of each segment is darker, progressively from 3–6, until on

6 it is nearly or quite black and the anteapical pale area is almost obliterated; on 3-6 the pale narrow median longitudinal stripe, present in *solutus*, is entirely wanting in *minor*, except for the merest trace of it on 3; 7 with a transverse basal ring, homologous and similar to that of the preceding segments, followed by brown or by black or almost black which passes into dark brown at the apex; 8-10 similar to those of *solutus*. Seen from the side, 1 and 2 patterned as in *solutus*, dorsum of 2 brown, not black as in *solutus*; 3-6 with the pale basal ring produced posteriorly along the ventral border for only a short distance if at all, thus differing from *solutus*, but in *minor* the subapical pale spot, which in *solutus* is only the slightly more distinct apex of the pale ventral margin, is larger and is produced dorsally, while in *solutus* it is not so produced at all; on 6 the subapical pale area is obscure; 7 has a pale basal area and the ventral margin very narrowly pale, with this pale color widened very slightly subapically but not visible in dorsal view; 8 with a narrower pale basal ring but with the ventral margin broadly and distinctly pale for its entire length; 9 entirely dark to nearly black, the merest line of pale color on the extreme ventral margin; 10 largely blue, only the dorsum dark. Sterna of 1 and 3 similar to those of *solutus*, but brown on 3, rather than black; on 4-5 pale at base, shading into brown which is interrupted at the subapical pale spot of the terga; on 6 pale at base, shading into black which is continuous to the apex or may be narrowly interrupted subapically; on 7 broadly blue at base and more broadly blue at apex, the intermediate region irregularly blotched with black; 8-10 entirely bright blue. Appendages colored as in *solutus*.

Length of the wing or lobe on the expanded postero-ventral margin of the tergum of 2 about .7, and the distance from the apex of the lobe to the antero-ventral angle of the tergum about 1.6.

Venational characters based on two males

Postnodals front wing, 10 (25%), 12 (25%), or 13 (50%); hind wing 10, (50%), 11 (25%), or 12 (25%).

M_3 in front wing and hind wing arising between the first and second postnodals (100%).

R_s in front wing arising at the sixth postnodal (25%), at the seventh postnodal (50%), or at the eighth postnodal (25%); in the hind wing at the sixth postnodal (50%), or at the seventh postnodal (50%).

M_2 in front wing arising at or near the seventh postnodal (25%), at or near the eighth postnodal (50%), or at or near the ninth postnodal (25%); in the hind wing at or near the seventh postnodal (50%), or at or near the eighth postnodal (50%).

M_{1a} in front wing arising at the distal end of the stigma (50%), or at the proximal end of the stigma (50%); in the hind wing at the distal end of the stigma (100%).

Number of cells posterior to Cu_2 in front wing, 11 (75%), or 12 (25%); in hind wing, 9 (100%).

Material examined: *Brazil*, Porto Velho, Amazonas, May 19, 1922, 2 males, one of these the type, coll. E. B. W.

The only two known males of this species were taken east of Porto Velho where the woods trail crossed a low stretch of ground. In January there was running water here but in May this had disappeared though the creek bed was damp and rankly overgrown, and only by stooping and crawling could one still follow it. In this jungle, associated with *Subaeschna francesca*, *minor* was captured.

The male abdominal appendages of *minor* are strikingly like those of *solutus*, from which species it is separated at once by the color of the face and the abdominal pattern, especially of segments 3-5. *Minor* is the smallest known species of the genus.



PLATE I

Supero-internal views of the left superior appendage of the males of the species of *Perilestes*.

1. *P. cornutus*, Porto Velho, May 2, 1922; 2. *P. guianensis*, type male; 3. *P. remotus*, type male; 4. *P. magdalenae*, type male; 5. *P. attenuatus*, Porto Velho, May 7, 1922; 6. *P. kahli*, type male; 7. *P. fragilis*, Rio de Janeiro, September 14, 1922; 8. *P. solutus*, type male; 9. *P. minor*, type male.



1. *P. cornutus*



2. *P. guianensis*



3. *P. remotus*



4. *P. magdalenae*



5. *P. attenuatus*



6. *P. kahli*



7. *P. fragilis*



8. *P. solutus*



9. *P. minor*

