

THE GENUS *OXYSTIGMA* SELYS, 1862 (ZYGOPTERA:  
*MEGAPODAGRIONIDAE*) \*

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Received February 11, 1976

A revision is given of the genus *Oxystigma*, with the type species *Heteragrion petiolatum* Selys, 1862 from Santarem on the Amazon River. Two other species of *Oxystigma* are described from the Guyanas, one of which was misidentified by WILLIAMSON (1919, Occ. Pap. Mus. Zool. Univ. Mich. 68: 1-88), who considered it identical with the type species Santarem, and which is redescribed here under the name of *O. williamsoni* sp. n., ♂ holotype and ♀ allotype taken in tandem during oviposition at Zanderij, Pontji Creek, Surinam (Jan. 8, 1947), and are deposited in the Leiden Museum. Of the same species the oviposition is described and figured for the first time. Of the third species, *O. cyanofrons* Wls. (type locality British Guiana, now Guyana), additional data are presented with notes on its larval stage.

INTRODUCTION

In the legion Podagrion of SELYS (1862), the genus *Heteragrion* Selys was divided in four groups of species, the last group including one species: *H. petiolatum* Selys. Because of its aberrant characters, Selys proposed to place this species in a new subgenus under the name of *Oxystigma*. In the wing venation its distinction enclosed: (1) the long quadrangle, extending to the level of the nodus; – (2) the long petiolate wing base, reaching far beyond the cubito-anal cross vein to a level midway the quadrangle; – (3) the oblique proximal side of pterostigma.

Furthermore, SELYS (1886) in his revision of *Podagrion*, remarks under *Heteragrion petiolatum* that there is but one cell between the quadrangle and the cross vein descending from the nodus (postquadrangular cell), and that the

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cubito-anal cross vein is situated at a level just between the two antenodal cross veins.

The description of *H. petiolatum* was based on three males and one female, all from Santarem at the Amazon, collected by M. Bates, in the collection Selys, in the Brussels Museum.

Apart from descriptions of new species of *Heteragrion* by CALVERT (1901, 1909) and RIS (1918), the classification of the genus remained unchanged. WILLIAMSON (1919), in his attempt to identify specimens of *Heteragrion* collected by himself and his co-workers during the Williamson Expedition to Colombia and British Guiana, was forced to revise this genus. He also added descriptions of new species, following the original scheme of Selys in four groups, but promoted the subgenus *Oxystigma* Selys, 1862 to generic rank. A second species of that genus, *O. cyanofrons*, found in British Guiana, was described and figured at the same time.

When describing the remaining *Oxystigma* specimens derived from British and French Guiana and from the State of Para in Brazil, Williamson interpreted these as belonging to the type species *O. petiolatum* Selys. This was done because Williamson, through the help of Dr. F. Ris, received drawings of the appendices of a male of *O. petiolatum* made by the artist Menger from one of the type series in the Selys collection. These are printed on Plate X, fig. 115 and 116 in WILLIAMSON's paper of 1919. At the end of the description (on page 57) the remark is given: "The above notes are intended to supplement de Selys' description of both sexes from Santarem, Brazil. As might be expected some differences in color between the British Guianan and Brazilian specimens are indicated".

About twenty years later when studying my specimens of *Oxystigma*, collected in Surinam, it became clear that this material did agree well with the descriptions and figures of Williamson after his material from the neighbouring countries. On the other hand, some doubt arose about the identity of *O. petiolatum*. It was in 1947 that I got an opportunity to examine the types of *O. petiolatum*. My impression was that these were not the same as my Surinam species of *Oxystigma*. However, circumstances did not permit to examine the type specimens more carefully, which proved necessary. Again more than twenty years passed before this question could be solved.

In 1972, Dr. G. Demoulin of the Brussels Museum kindly permitted me to examine the type series of *O. petiolatum* for which I am very grateful. A careful study was then made of the type specimens and comparisons with the available material of *Oxystigma* from Surinam and the other Guyanas, as well as from some places in Northern Brazil. It brought to light that three species of *Oxystigma* could be recognized, viz. *petiolatum* Selys from Santarem, *cyanofrons* Wills. from British Guiana and Surinam and a new species here introduced as *williamsoni* sp. n., known to occur in the three Guyanas and in Northern Brazil.

THE GENUS *OXYSTIGMA* SELYS, 1862

*Heteragrion*, subgenus *Oxystigma*, SELYS, 1862, Bull. Acad. r. Belg. (2) 14:

31. — *Oxystigma* genus, WILLIAMSON, 1919. Occ. Pap. Mus. Zool. Univ.

Mich. 68. — *Oxystigma* genus, COWLEY, 1934. Ent. Mo. Mag. 3, 5: 240-247.

**Diagnosis.** — 2 antenodal cross veins; 2 additional sectors between M1a-M2; discoidal field short, one postquadrangular cell; cubito-anal cross vein about midway between antenodals; petiolation of wing base surpassing level of arculus as far as below basal third of quadrangle; pterostigma squared proximally to nearly halfway its length. Frons low, rounded. Male appendices inferiores small, spine-like. Female genital valves denticulated ventrally, denticles in three irregular rows.

**Colour:** dark brown with light yellow or light blue stripes and dots.

**Penis:** distal end of last segment on either side equipped with a long curved or crewed lobe, of a type which differs little among the known species.

**Distribution.** — Tropical South America, Guyanas and Northern Brazil.

**Type species** — *O. petiolatum* Selys, 1862. — Number of species described: three.

**The larva** has been described from one species: abdominal caudal gills short, stout, thick, swollen in the basal part, triquetral in cross section, ribs armed with a row of strong curved spines; distal part of gills prolonged in a fine soft end. Mouthparts: no setae on mentum and its lateral lobes; mandibles biramous.

**Habitat.** — Stream dwellers, larvae on stones and pieces of wood in shaded creeks, imagines settling on tips of dead twigs in the bush near a creek, the wings half spread. Oviposition observed in dead leaves on the water surface of creeks, by many couples together and active during heavy rainfall in the early morning time.

KEY TO THE GENERA *HETERAGRION* AND *OXYSTIGMA*

- Quadrangle short, followed by two or more postquadrangular cells; cubito-anal cross vein near level of second antenodal cross vein. Pterostigma well developed, proximal side moderately oblique, reaching to 1/3 length of stigma at the wing margin, the latter covering approximately 2 underlying cells or some more. Frons acutely or obtusely angled in both sexes. Male inferior appendages rudimentary, or spine-like. Lower margin of female genital valves denticulated in one or several rows. . . . . *Heteragrion*, Selys 1862
- Quadrangle long, followed by one or about one postquadrangular cell; cubito-anal cross vein at level of about midway between the antenodal cross veins, or nearer to first than second antenodal. Pterostigma large, proximal side very oblique, reaching at margin to nearly midlength of stigma, covering 2 1/2 - 3 cells or more. Frons low, rounded, similar in the sexes. Male inferior appendages small, spine-like. Lower margin of female genital valves denticulated in three irregular rows. . . . . *Oxystigma*, Selys 1862

THE SPECIES OF *OXYSTIGMA*

## KEY TO THE SPECIES

1. Quadrangle long, reaching level of nodus or nearly so; cubito-anal cross vein about midway between antenodals. Face spotted or black, synthorax with dorsal and humeral pale stripes, similar in the sexes ..... 2
  - Quadrangle shorter, not reaching level of the nodus; cubito-anal cross vein nearer level of first antenodal than mid-length of antenodals. Face pale coloured or slightly darkened in middle part; markings of synthorax dissimilar in the sexes, adult male without, female with pale dorsal and humeral stripes ..... 3
2. Labrum, clypeus and frons mottled with black spots on a pale blue or yellow underground. Male app. sup. short, curved inward for their full length, ventral tooth large, triangular, tips pointed. App. inf. short, spine-like projections not reaching ventral tooth of superiores. Female hindlobe of prothorax rectangular, median part light brown, rounded corners at the sides dark brown. Valves finely denticulated along the ventral edge. Length abd. ♂ 30-32 mm, ♀ 26 mm, hind wing ♂ 20-21 mm, ♀ 21 mm. .... *petiolatum*
  - Labrum, clypeus and frons dark brown to pitch black, shining. Male app. sup. long, slightly curved inward at end, ventral tooth of moderate size, tip rounded. App. inf. larger, spine-like projection reaching ventral tooth of superiores or at least its base. Female hindlobe of prothorax triangular, a dark spot in middle, a smaller one on each side at base of corners. Valves roughly toothed along ventral edge. Length abd. ♂ 31-32 1/2 mm, ♀ 28 mm, hind wing ♂ 20 1/2-21 1/2 mm, ♀ 22-23 mm. .... *williamsoni*
3. Face in male light blue, in female light brown with labrum and clypeus darker. Synthorax in mature male black or dark brown above, without pale dorsal or humeral stripes, in female with dorsal and humeral pale stripes. Male app. sup. forcipate as in *williamsoni*, a little more stoutly builded, ventral tooth smaller, more sharply pointed. App. inf. larger, especially the swollen part of it, spine-like ends reaching backward to at least base of ventral tooth of superiores. Female hindlobe of prothorax rounded, hind margin slightly incised medially, middle of lobe at base and the side corners dark blackish. Valves roughly toothed along ventral edge. Length abd. male 33-36 mm, female 26-28 mm, hind wing male 22-24 mm, female 22-23 mm. .... *cyanofrons*

*OXYSTIGMA PETIOLATUM* SELYS, 1862

Figures 1-3, 10-13, 22-23, 28, 31, 34, 38-39, 44-45

**Material.** – One male (lectotype), two males (paratype), one female (allotype), all pinned specimens. The types bear the pin labels: white "116", green "Santarem", brown "Heteragrion petiolatum D5 Amazone", the last one probably written by Selys. The types are now indicated by an orange red label, on which is printed "lectotype", "Paratype" and "allotype", D.C.G. 1975, respectively. Locality: Amazon River, Santarem, M. Bates leg., in coll. Selys, Brussels Museum.

**M a l e** (lectotype). — Face pale bluish, border of labrum in front yellow, clypeus black, vertex from between base of antennae to occipital hind margin black, a small pale spot behind each of the antennae, narrowly prolonged to each of the side ocelli. Rear of head pale yellowish. Antennae dark brown.

Prothorax on dorsum greyish, in the middle of the broad hind lobe a large rounded black spot.

Synthorax in front dark brown, divided by a narrow black median line dilated downward, connected at the sides with the small black mesostigmal lamina, which has the form of a rectangular triangle. Along each side of the black median line, a narrow pale (blue) mesepisternal stripe runs down to mesostigmal lamina. A broad pale (blue) humeral line runs down over the mesinfraepisternum. At the pale sides one brown band covers the mesepimeron, a dull gray one the metepisternum, including stigma. Other parts and sternum pale yellowish.

**Legs:** all absent.

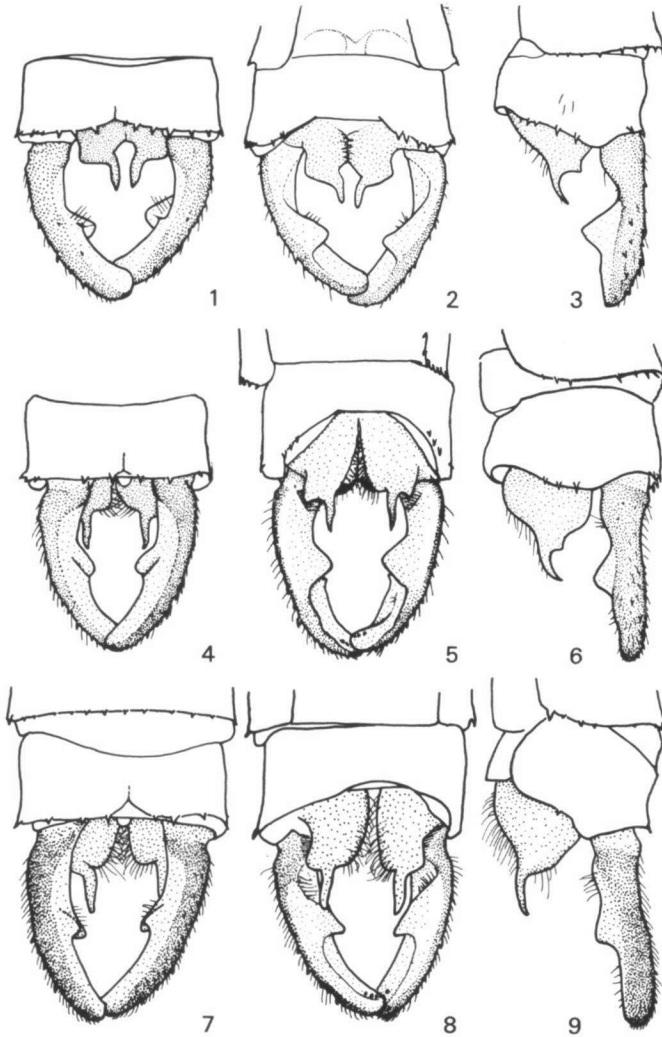
**Abdomen:** at dorsum dark brown to black, with a basal pale ring on segm. 3-8, which is connected with a large side spot on segm. 3-6; segm. 2 has a narrow median pale line in 3/4 of its length, the sides yellow; segm. 10 dark brown above, but yellow at sides and ventrum inclusive anal lobes and appendices inferiores. Appendices superiores upper side dark brown, under side light brown, about twice as long as segm. 10, semicircular, truncate, with a large triangular tooth at half way the under side, pointed downward, innerside flattened and keeled; outer margin of appendix armed with several short dents. Appendices inferiores short, with a rectangular swollen base of which the inner margins are prolonged in a spine-like short point, about as long as base of appendix is wide.

Wing membrane a little smoky brown, veins dark brown to black. Pterostigma brown, large, proximal side very oblique with the upper point reaching to near the half of stigma length, margins thickened; underside covering two and a half and three and a half cell of the underlying cell row.

Venation: arculus just behind second antenodal cross vein, quadrangle very long, reaching from arculus to nearly the level of the nodus, in hind wing longer than in fore wing. One postquadrangular (discoidal) cell, these in hind wing shorter than in front wing. Cubito-anal cross vein situated in the middle between the two antenodals, in fore wing a little more proximad, in hind wing more distad. Petiolation of wing base reaching to underneath the middle of quadrangle, in hind wing a little more proximad. Number of postnodal cross veins in fore wing 18-19, in hind wing 15-16, first supplementary sector (between M1a and M2) 12 cells long, second sector 9-10 cells in both wing pairs.

Length abdomen incl. app. 30 mm; hind wing 20 mm; pterostigma 2 mm.

**F e m a l e** (allotype). — Face (labrum, clypeus and frons) mottled with black spots on a pale (blue) underground. Genae blue, side of face up to base of antennae pale yellowish. Vertex black, the pale spots behind the antennae and



Figs. 1-9. Male abdominal appendages as seen from dorsal, ventral and left side: (1-3) *Oxystigma petiolatum* Selys, Brazil, Santarem, (lectotype); – (4-6) *O. williamsoni* n. sp., Surinam, Zanderij, (holotype); – (7-9) *O. cyanofrons* Wlls., Surinam, Sipaliwini River.

their connection with the lateral ocellus larger than in the male. Rear of head yellowish.

Prothorax pale yellow, dorsal side greyish, hind lobe rectangular, corners rounded, middle part light brown, side parts dark brown.

Synthorax dark brown at dorsum, pale bluish to yellow on the sides and at

ventrum. The black median stripe and the first and second pale blue stripes of the brown mesepisternum as in male. Mesostigmal lamina triangular with sharp side corners. Side of synthorax with a brown streak on mesepimeron and a narrow grey line crossing stigma on metepisternum, but a short grey spot on upper half of metepimeron.

Legs yellow, innerside of all tibiae black, outside of fore tibia dark brown; tarsus dark brown; spines on tibiae black, very long about three times their mutual distance.

Wings as in male, stigma still more oblique. Number of postnodal cross veins 17 and 16 in fore wings, 15 and 14 in hind wings.

Abdomen dark brown on dorsum, lighter brown on the sides and underside. Light basal rings and darker apical rings on segm. 3-7; segm. 2 with a proximal yellow side spot not fully reaching mid length of segment. Sides of segm. 9 and valves yellowish. Segm. 10 and appendices dark brown. Venter with a black line on segm. 2-8. Genital valves toothed along the ventral edge, the teeth flattened, three rowed; stylus black.

Length abd. 26 mm; hind wing 21 mm; stigma over 2 mm.

Selys mentions in his description of this female: "une bande dorsale livide au 8e segment", but it was not discernible any more.

Notes on paratypes. — One of the male paratypes bears beside the number 116 on a small piece of white paper, a large blue green label with the handwriting: "116 *Oxystigma musarum* B., *Leptopteryx intermediatus* Ol." what may have been written by Bates.

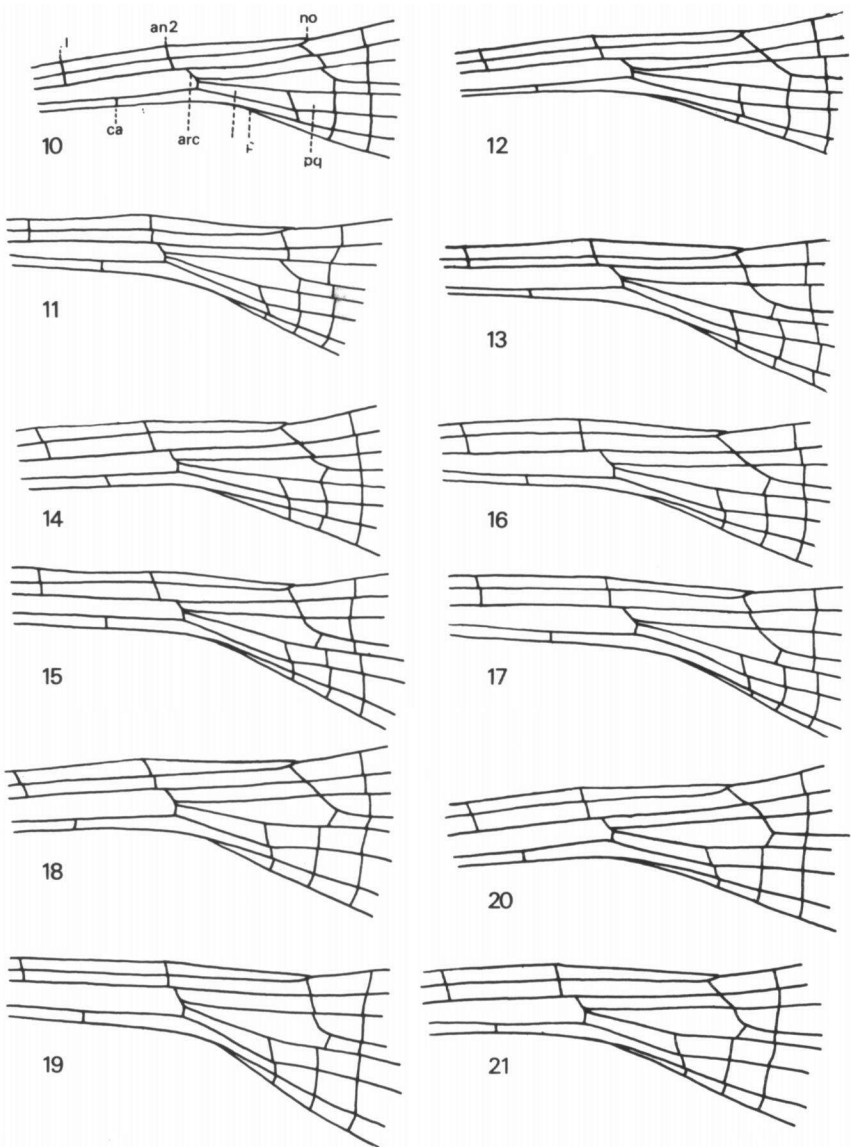
The specimen seems to be more adult than the lectotype, has the labrum dark blue at the sides and yellow at the end margin and over the median upper part. The black spot on the hind lobe of prothorax large, partly overlapping the middle lobes of pronotum. Legs all present. There is a faint indication of a dark ring in the proximal part and in the distal half of the three femora, the inner side of the femora at their distal end and the whole innerside of the tibiae black. Outer side of tibiae in middle and hind legs yellow, except for a black tip at the end, in for legs the tibiae dark brown with a yellow side stripe in the proximal half. Tarsus all dark brown, claws long with a small tooth at the underside near apex.

Abdomen with first segm. dull grey above, pale yellow below. A yellow basal ring visible on segm. 3-9; sides and underside of segment 10 attractively yellow, probably used as a sexual sign.

Wing venation: 17 postnodal cross veins in fore wing, 15-16 in hind wing.

Length abd. incl. app. 32 mm; hind wing 21 mm; pterostigma 2 mm.

The second paratype bears a green pin label marked with H. petiolatum (probably in Selys handwriting) and a label of transparent paper on which "Pass Williamson". This must be the specimen from which the appendices are sketched by Menger for Williamson, recognizable by the crossed appendices inferiores.



Figs. 10-21. Wing venation at base of fore and hind wing in male and female: (10) *Oxystigma petiolatum* Selys, Brazil, Santarem, (lectotype), male fore wing (*an*<sub>1</sub> and *an*<sub>2</sub> first and second antenodal cross vein, *no* nodus, *ca* cubito-anal cross vein, *arc* arcus, *q* quadrangle, *p* petiolation, *pq* postquadrangular cell); - (11) same, hind wing; - (12) idem, female, (allotype), fore wing; - (13) same, hind wing; - (14) *O. williamsoni* n. sp., Surinam, Kabelstation, male, fore wing; - (15) same, hind wing; - (16) idem, female, fore wing; - (17) same, hind wing; - (18) *O. cyanofrons* Wlls., Surinam, Sipaliwini River, male, fore wing; - (19) same, hind wing; - (20) idem, Surinam, Litani River, female, fore wing; - (21) same, hind wing.



The male is full grown, the pale colours on head and upper side of thorax sky-to dull blue, sides of synthorax greyish flesh, under side of head, thorax and abdomen pale yellow.

Face dull grey, labrum dark blue at the side parts, in the median part pale blue. Clypeus and vertex black.

Dorsum of prothorax for the most part bluish, hind lobe with a large black spot in the middle, the sides pale bluish.

Synthorax with the narrow pale lines along the black median rim and the wider humeral stripes blue. A brown stripe on mesepimeron but metepisternum greyish and metepimeron darkened only in the upper part.

Legs as described for the foregoing paratype, the tibiae of the middle legs showing a brown stripe over their proximal half on the outer side.

In the wing venation: 18 postnodal cross veins in fore wing, 14-17 in hind wing.

Length abd. incl. app. 32 mm; hind wing 21 mm (tip broken); pterostigma 2 mm.

*OXYSTIGMA WILLIAMSONI* SPEC. NOV.

Figures 4-6, 14-17, 24-25, 29, 32, 36-37, 40-41, 46-47

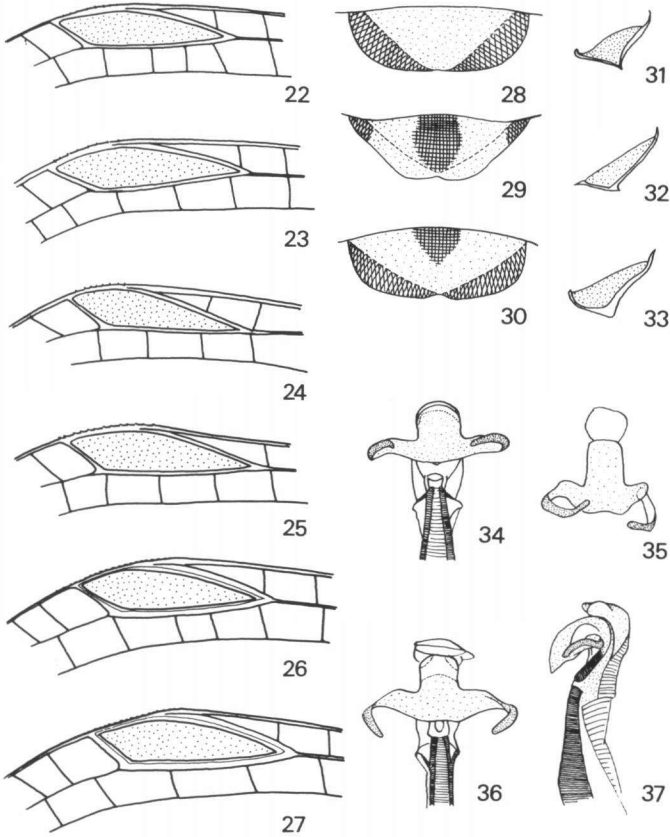
**M a t e r i a l.** – Male holotype and female allotype from Surinam, Zanderij, Pontji Creek, in tandem during oviposition 8.I.1947, D.C. Geijskes leg. (Two pinned specimens, end of abdomen stored in small vial with glycerine, Leiden Museum). Paratypes one couple from the same locality, collected at the same date. Furthermore examined 64 males and 42 females all from Surinam found at 21 localities spread over the country, D.C.G. leg. (Leiden Museum).

Brazil: State of Para, Rio Gurupi in a forest trail near Aldeia, 3.XII.1964, one male, B. Malkin leg.; same near village of Canindé, 7.II.1966, one female; idem, 27/28.II.1966, two males, B. Malkin leg. (Leiden Museum). State of Amazonas, Manáos, June 28, 1922, J.H.W. & J.W.S. leg. one male (Brussels Museum, identified by Williamson as *O. petiolatum*). State of Para, Igarapi Assei, nr, Belem, Dec. 1911, two males, Parrish leg. (Cornell University, Ithaca N.Y.). Recorded by WILLIAMSON (1919) without further comment and listed under the material from British and French Guyana, the specimens may also belong to *O. williamsoni*.

**M a l e** (holotype). – Upper side of head dark brown to black, under side pale yellowish. Labrum black, clypeus and frons dark brown, vertex (satin) black. Genae yellow, antennae dark brown, between base of antenna and lateral ocellus a crescent-shaped pale stripe.

Prothorax dark brown spotted at dorsum, paler below. Propleuron light yellow, bluish in front, darker behind. The broad hind lobe is rounded with a small incision in the median of the margin, in front of it a diffuse black spot, sides of hind lobe dark brown.

Synthorax upper part dark brown, middorsal carina embedded in a black



Figs. 22-37. Pterostigma of fore and hind wing in male specimens: (22) *Oxystigma petiolatum* Selys, Brazil, Santarem, (lectotype), fore wing; - (23) same, hind wing; - (24) *O. williamsoni* n. sp., Surinam Zanderij, (holotype), fore wing; - (25) same, hind wing; - (26) *O. cyanofrons* Wills., Surinam, Sipaliwini River, fore wing; - (27) same, hind wing. - Hind lobe of prothorax in female specimens: (28) *O. petiolatum*, Brazil, Santarem, (allotype); - (29) *O. williamsoni*, Surinam, Zanderij, (allotype); - (30) *O. cyanofrons*, Surinam, Makambi Creek nr. Kabelstation. - Left mesostigmal lamina in female: (31) *O. petiolatum*, Brazil Santarem, (allotype); - (32) *O. williamsoni*, Surinam, Moengotapoe, ridges N. km 15; - (33) *O. cyanofrons*, Surinam, Makambi Creek nr. Kabelstation. - Penis, ventral view (after treatment with caustic potassium and glycerine): (34) *O. petiolatum*, Brazil, Santarem, (paratype); - (35) *O. cyanofrons*, Surinam, Sipaliwini River; - (36) *O. williamsoni*, Surinam, Zanderij, (paratype); - (37) same, left side view.

stripe marked on either side by a narrow yellowish line. Otherwise mesepisternum and mesepimeron dark brown, except for a narrow blue stripe along the humeral suture. Upper half of metepisternum bluish, lower half brown; mesepimeron and under side of synthorax pale yellow, in the upper part of mesepimeron a small dark spot.

Legs light brown, femora of fore legs at the outer side bluish, but dark brown on the upper and under side, with a more or less complete dark ring at the apical end. Tibia and tarsus dark brown. Middle and hind legs paler, femora with a well marked apical ring; inner side of tibia and tarsus dark brown. On the hind tibia two rows of six very long spines, in maximum more than two times as long as the distance between them. Claws very long, with a small tooth near apex.

Abdomen dark brown to black on dorsum, segm. 1 paler; sides lighter brown with a yellow side spot on segm. 1 and 2, a small diffuse yellowish brown basal ring on segm. 3 to 7. Segm. 10 black on dorsum, light brown at the lateral and ventral side. Appendices superiores in the basal half light brown, in the apical half dark brown. Shape of appendices: superiores stout, tapering to the end, slightly bent inward, at midway a dilation of a ventral tooth which is rounded at tip. Outer side on superiores beset with a few short dents. Upper hind margin of abd. segm. 10 showing two pairs of strong dents. Appendices inferiores swollen at base, prolonged at the end in a sharp upcurved point, reaching to nearby the ventral tooth of the superiores.

Wing membrane slightly smoky brown, tips darker at the margin, stigma red brown, very oblique, about four times as long as wide, covering 3 cells of the second postnodal row.

Venation: arculus slightly distal to the second antenodal cross vein. Quadrange very long, reaching from arculus to the level of the nodus, in hind wing longer than in fore wing. One postquadrangular (discoidal) cell, these in hind wing shorter than in fore wing. Cubito-anal cross vein situated in the middle between the two antenodal cross veins. Anal vein separating from the posterior margin underneath the basal third of the quadrangle. Number of postnodal cross veins 19 in fore wings and 15 in hind wings. Supplementary sectors between M1a and M2 11 and 10-8 cells long in fore wing, 11 and 9 cells long in hind wing.

Length abdomen incl. app. 32.5 mm; hind wing 21 mm; pterostigma 2 mm.

**F e m a l e** (allotype). — Head: labium and genae yellow, labrum, clypeus and frons inclusive antennae dark brown. Vertex black with a pale spot on each side behind base of antenna, connected with a lighter spot towards each lateral ocellus. Hind margin of occiput black, lateral part against eye margin, light brown. Rear of head pale yellowish.

Prothorax dark brown spotted on dorsum, pale yellow at the sides and at ventrum, the last one with a median black stripe over the distal half. Hind lobe large, triangular in shape, top rounded and finely incised, median field dark brown, lateral margins blackened at their lower ends.

Synthorax: a black stripe over the dorso- median carina dilated at the lower end against the mesostigmal laminae, which have a triangular form. On each side of the median black stripe, a narrow yellow line is present against the dark brown remaining part of mesepisternum. Humeral suture marked with a bluish stripe. Mesepimeron in the upper half brown, otherwise pale yellowish. Metepisternum lower half inclusive stigma dark brown, upper half pale. Mesepimeron pale yellow with a brown spot in the upper part. Ventrums pale yellow.

Legs light brown with an indistinct darker ring at distal end of femora, inner side of tibiae dark brown to black, outer side light brown, tarsus dark brown, claws finely toothed at the end. Spines on tibiae very long, in maximum about three times as long as their interspace.

Abdomen dark brown at dorsum, yellow basal rings present on segm. 1-7; sides yellowish with a distinct black apical ring on segm. 2-7, a basal black ring on ventral side of segm. 3-7. Last three segments of abdomen swollen, dark brown, sides lighter brown, appendices dark brown, short, flattened, triangular in shape, tips pointed. Genital valves reaching to the end of abdomen, lower margin denticulated with short triangular dents, irregularly arranged in three rows. Styli dark brown, long, sharply pointed, reaching to the end of app. superiores.

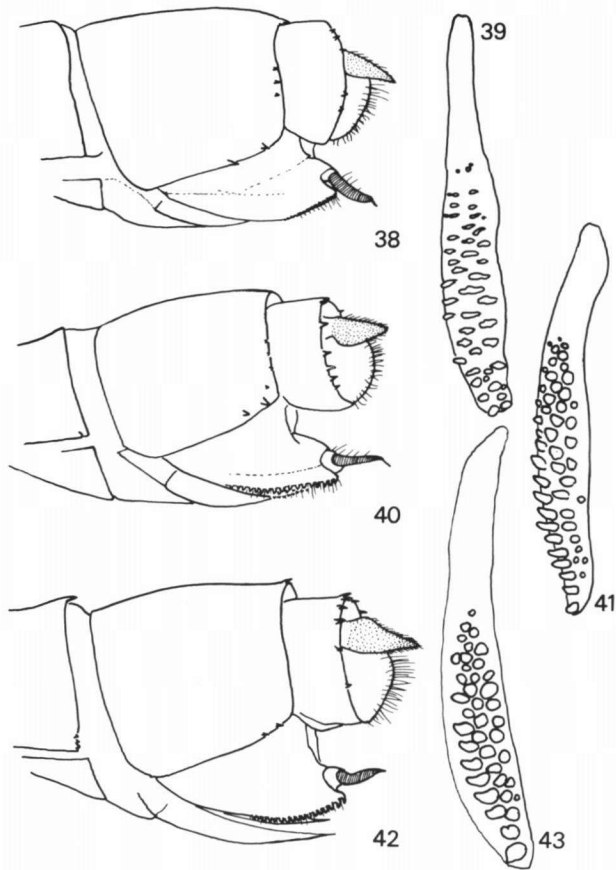
Wings: membrane slightly smoky brown, a little darker at tips. Veins black, stigma dark brown, inner side very oblique and as long as under side, covering 2-3 1/2 cells of the cell row below.

Venation: number of postnodal cross veins 18-19 in fore wing, 16 in hind wing. Supplementary sectors between M1a-M2 first sector 11-12 cells long, second sector 9 cells. Arculus just behind second antenodal cross vein. Quadrangle long, extending to the level of the nodus in both the wing pairs, followed by one postquadrangular (discoidal) cell, these in front wing a little longer than in hind wing. Cubito-anal cross vein at the level half way the interspace of the antenodal cross veins. Point of separation of the anal vein from the hind wing margin at about 1/3 the length of quadrangle in fore wing and some more in hind wing.

Length abdomen 28 mm; hind wing 22 mm; pterostigma 2 mm.

Other Surinam specimens show a change in their colours during maturity. In juveniles the labrum is light brown as is mostly also the frons, but the clypeus is always darker. On the synthorax the dorsal stripes are yellow, the humeral ones bluish. In adults the face is shining black, the humeral stripes light blue. In the juveniles the wing membrane is hyaline, in full mature specimens often smoky brown.

Distribution. — Guyana (Tumatumari and Wismar); Surinam all over the country, but not in the Corantine valley; French Guyana (Tamanoir, Mana River, Cayenne); Brazil, Amazonas (Manáos), Para (Rio Gurupi, Igarapi nr. Belem).



Figs. 38-43. Last abdominal segments of female as seen from left side, right valve ventral: (38) *Oxystigma petiolatum* Selys, Brazil, Santarem, (allotype); - (39) same, valve; - (40) *O. williamsoni* n. sp., Surinam, Zanderij, (allotype); - (41) same, valve; - (42) *O. cyanofrons* Wils., Surinam, Makambi Creek; - (43) same, valve.

**Field Notes.** - *O. williamsoni* is a common species in Surinam, where it occurs on lowland creeks in the savannah area and on slowly running creeks in the interior. It was also found in the coastal belt at the sandy ridges near Lelydorp about 25 km south of the capital town Paramaribo and at the ridges bordering the savannah area north of the village Moengotapoe in the Marowijne District. It is noteworthy that the species has not been found so far in the basin of the Corantine River in the western part of the country, except for a record on the upper Sipaliwini River, a tributary of the Corantine in the far south near the Brazilian border.

The adults are observed in every month of the year, except June (main rainy season), with a small peak in February and a maximum in September/October. They are mostly met with when settling on tips of dry twigs in the shade of the bush near a creek, the wings half spread. They are easily overlooked by their inconspicuous colouring. Oviposition was observed in small creeks in the rain forest where more than ten couples together were in action; the males fixed with the appendages on the prothorax of the females standing upright, while the females were engaged in boring the eggs in a slip of an old palm leaf of *Euterpe oleracea* Martius, fallen down in the creek. Curious enough this happened during heavy rainfall at 8 a.m. at the end of December (31.XII.1943, Coppename River, Langa soela 10 km West on Pinakreek) and also in the first week of January (8.I.1947, Zanderij, Pontjikreek). From both places adults of both sexes were collected to be sure about the species. From the last named locality the male holotype and the female allotype are selected.

One pinna of a palm leaf from the Coppename area in which oviposition took place, was preserved in alcohol. It shows the deposits of the eggs over a distance of 9 cm. The long lanceolate eggs were inserted through 77 punctures. They are arranged in straight or slightly curved rows, varying in number from one to 13 eggs. Deposits with one egg were found 6 times, with 2 eggs 2 times, with 3 eggs 4 times, with 4 eggs 5 times, with 5 eggs 6 times, with 6 eggs 6 times, with 7 eggs 5 times, with 8 eggs 10 times, with 9 eggs 10 times, with 10 eggs 12 times, with 11 eggs 5 times, with 12 eggs 4 times, with 13 eggs 2 times. The punctures were made at the underside of the leaf, the eggs inserted across the leaf, the rows of eggs following the length of the leaf. The question as to whether this oviposition was executed by one female or by more than one, is hard to decide, but it gave the impression that only one female fulfilled her mission here.

*OXYSTIGMA CYANOFRONS* WILLIAMSON, 1919

Figures 7-9, 18-21, 26-27, 30, 33, 35, 42-43

**Material.** — *O. cyanofrons* was described by Williamson after three males and two females found in British Guiana (now Guyana) at Wismar and Tumatumari, Febr. 5-16, 1912 by the Williamson Expedition. Male holotype is from Tumatumari, Febr. 5, 1912; female allotype from Wismar, Febr. 16, 1912 (Zool. Museum, Ann Arbor).

The species has since been found again in Surinam where it was encountered in the woods of the interior along swift running creeks in hilly and mountainous areas. A number of 20 males and 6 females were collected from near Brownsberg and Afobaka in the north, to the Upper Paloemeu River and Upper Sipaliwini River in the far south near the Brazilian frontier. Imagines were taken the year round but so far not in the months February and June, with a small peak in April and a maximum in August. The species is not common although locally well represented. Emerging larvae were observed in a creek at Brownsberg on August 10, 1958 (three males and one female) at about 9 a.m. under clouded weather conditions.

**M a l e.** — Head with face light blue, outer edge of labium black dotted, vertex black, a small pale bluish spot on each side between antenna and lateral ocellus. Rear of head and labium light cream.

Prothorax dorsum dark brown to black, margin of fore and hind lobe finely set off with blue at the margin. Posterior border of middle lobe pale on either side. Propleuron largely dark or black, some indefinite pale markings above.

Synthorax in juveniles with lighter stripes along the black middorsal carina and pale blue humeral stripes, in adults dorsum dark reddish brown to nearly black with no lighter stripes. Mesepimeron light brown, metepisternum light blue, metepimeron greyish blue, sternum inclusive meso- and metinfraepisternum cream coloured. In mature specimens mesepimeron and metepisternum largely dark reddish brown, adjacent parts including coxae and the metepimeron pale, stippled and clouded with brown or black.

Legs dark brown, basal half of femora lighter tinged, tarsus light brown.

Abdomen above black or dark brown, a small subapical spot on either side of segm. 1, traces of a longitudinal middorsal pale stripe on segm. 2, traces of pale basal areas on segm. 3-6. Sides of segm. 1 and 2 with obscure pale markings, segm. 3-7 with a small latero-basal yellow spot, segm. 8-10 inclusive appendages dark brown to black.

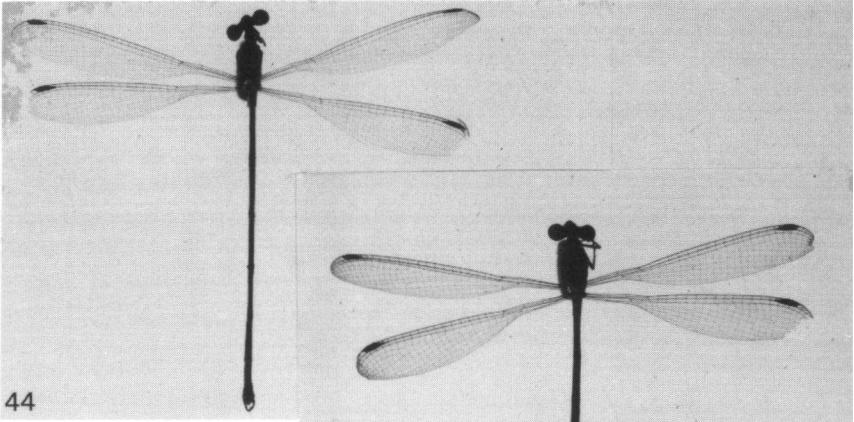
Appendices superiores well developed, forcipate, broadest at base, a strong triangular tooth on ventral side at about midlength, distal part of appendages bent inward, the tips reaching one another or overlapping, outer side armed with several short strong teeth. Appendices inferiores, a broad rectangular base, prolonged at the inner corner in a long spine-like tooth, reaching to about  $\frac{3}{5}$  of the length of the superiores.

Wings hyaline, in mature specimens smoky brown. Stigma dark brown, proximal side sharply pointed, oblique, covering  $2\frac{1}{2}$  or  $3\frac{1}{2}$  cells of the cellrow below.

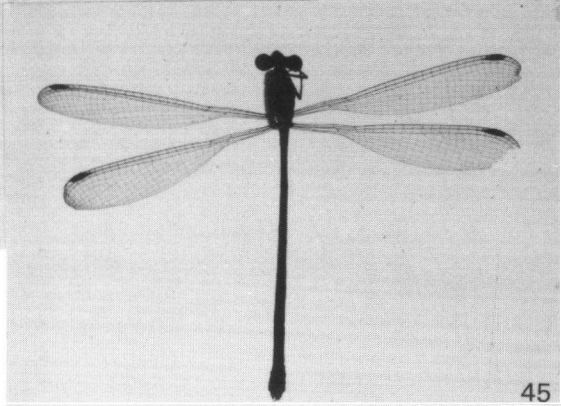
Venation: arculus a little distal to second antenodal cross vein. Quadrangle shorter than in the preceding species, about  $\frac{2}{3}$  the length of the interspace between arculus and nodus; it is followed by one postquadrangular cell. Cubito-anal cross vein nearer to the first than to the second antenodal cross vein. Separation of anal vein from wing margin at about  $\frac{1}{3}$  the length of the quadrangle. Number of postnodal cross veins 20-22 in fore wing and 17 in hind wing. Supplementary sectors between M1a and M2 12-13 cells in the first row, 9-11 cells in the second row.

Length abdomen incl. app. 33-36 mm; hind wing 22-24 mm; pterostigma 2 mm.

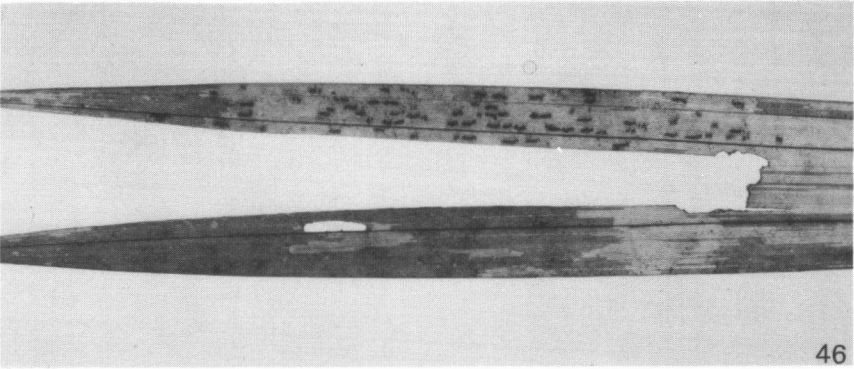
**F e m a l e.** — Can be recognized by the length of quadrangle not reaching level of nodus, the position of anal cross vein nearer to the level of the first than the second antenodal and the shape of the hind lobe of prothorax being more rounded than those in the female of *O. williamsoni*. The details are: face light



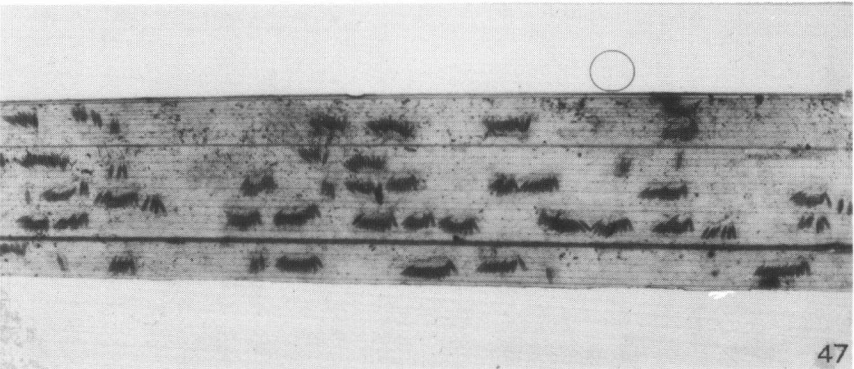
44



45



46



47



brown at the place where it is light blue in the male specimens, labrum and clypeus little darker. Vertex black, pale yellow spots between antenna and lateral ocellus larger than in the male. Rear of head cream coloured, labium light brown.

Prothorax reddish brown above, pale and partly pruinose on the sides and below. Hind lobe rounded, narrowly pale edged on the posterior border, propleuron largely cream, a dark superior area.

Synthorax with dorsum dark brown, the black middorsal carina as normal, followed by a fine yellow stripe on either side, pale bluish humeral stripe about twice as broad. Mesepimeron brown, metepisternum bluish green in the upper part, yellow above stigma. Metepimeron and ventrum yellow, partly pruinose in adults.

Legs light brown mottled with darker spots, the knees darker tinged.

Abdomen light to darker brown above, a median longitudinal pale line on segm. 2, yellow ringed at base on segm. 3-7, apex of segm. 2-6 black. Sides of segm. 1-7 largely pale, darker at apex, on segm. 4-6 a dark brown area just posterior to the dilated basal pale ring, occupying one-fourth to one-third the length of each segment. Segm. 8-10 brown, sides of 9 with a large central yellow area and segm. 10 shading out below to yellow. Valves not surpassing segm. 10, lower margin broad and flat, denticulated by small saw-like teeth, these arranged in three irregular rows. Appendices superiores small, short, triangular, a little longer than segm. 10, brown.

Wings as in male, stigma lighter brown. Postnodals of fore wing 18-21, of hind wing 16-17.

Length abdomen incl. app. 26-28 mm; hind wing 22-23 mm; pterostigma 2 mm.

**Larval stage.** — The larva of *O. cyanofrons* was described (GEIJSKES, 1943) under the name *O. petiolatum*. A re-examination of the specimen on which the description was made, more especially of the wing venation in the wing pads, has now shown that it belongs to *O. cyanofrons*. It also agrees with the exuviae (taken from the emerging larvae) from Brownsberg of which the imagines demonstrated their identity. For peculiarities of the larva see under characters of the genus *Oxystigma* on page 000 and the original description and figures as indicated in the References.

Figs. 44-47. (44) *Oxystigma petiolatum* Selys, Brazil, Santarem, male, (lectotype); — (45) idem, female, (allotype); — (46) *O. williamsoni* n. sp., Surinam, Coppename, deposits of eggs in pinna of palm leaf; — (47) idem, part of deposit with rows of inserted eggs. (Photographs by Ch. Hoorn, Leiden Museum).

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