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NEW STATUS FOR *ORTHEMIS MACROSTIGMA* (RAMBUR, 1842) FROM THE LESSER ANTILLES (ANISOPTERA: LIBELLULIDAE)

F. MEURGEY[1] and J. J. DAIGLE[2]

[1] Museum d'Histoire Naturelle, 12, rue Voltaire, F-44000 Nantes, France
Francois.Meurgey@mairie-nantes.fr

[2] 2067 Little River Lane, Tallahassee, Florida 32311, United States
jdaigle@nettally.com

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Orthemis macrostigma (Ramb.) is elevated to full species status and the Selys ♀ type specimen housed in the IRSNB in Brussels, Belgium, is designated as the lectotype. Additional descriptions of the mature ♂, mature ♀, immature ♂ adult, and the larval exuviae are provided. Diagnoses with *O. ferruginea* (Fabr.) and other related *Orthemis* spp. are included. Notes on behavior, habitat, and range distribution are provided.

INTRODUCTION

RAMBUR (1842) described *Libellula macrostigma* from Caribbean specimens in the Robert collection in France. He noted that this species was widespread, inhabiting Guadeloupe, Martinique, Cayenne (French Guyana), and Cuba. RIS (1910) synonymized *Orthemis discolor* (Burmeister) and *Libellula macrostigma* under *Orthemis ferruginea* (Fabricius). He also cited the Rambur's female type specimen of *L. macrostigma* from Martinique in the Selys collection. DEMARMELS (1988) showed *O. discolor* to be distinct, restoring it to full species status. He indicated that both *O. discolor* and *O. ferruginea* do not occur in the Caribbean and that the Caribbean or Antillean form is a different species. DONNELLY (1995) suggested that the Caribbean *Orthemis* might be one or more species, possibly a red non-pruinose form and an all-purple pruinose form. Since then, workers have suggested that *Orthemis macrostigma* (Rambur) could be the all-purple pruinose form, but no recent work has been done on this matter until now.

We have examined an extensive series of an all-purple pruinose *Orthemis* spe-

cies from the Lesser Antilles and we have concluded that all specimens are *O. macrostigma* (Ramb.). The females compared favorably with a Martinique female from the Robert collection in the Paris Museum and with photos of Ris's cited type female from the Selys collection in the Institute Royal des Sciences Naturelles de Belgique in Brussels. We designate the female Martinique type specimen cited by RIS (1910) as the lectotype. There are 3 written labels plus the gold label. They read as follows: (1) (Martinique), (2) L. macrostigma, and (3) "Collection Selys, Libellula discolor Burm., Revision Ris 1906, Orthemis ferruginea Fabr.", all on white labels. We submit additional descriptions of adult *O. macrostigma* found in the Lesser Antilles, particularly from Guadeloupe and Martinique. Internet photos used in this paper can be found at the following website: http://www.museum.nantes.fr/pages/21-activitesscientifiques/odonates/images/antilles_2005.htm.

Orthemis larvae are very similar and they are difficult to separate to species. Pertinent criteria seem to be the number and organization of palpal and premental setae (FLECK, 2003). Needham (1904) described *O. ferruginea* larvae from Shovel Mount, Texas, USA. However, CALVERT (1927) described *O. ferruginea* from Antigua in the British West Indies based on seven larvae specimens. Since Antigua is just north of Guadeloupe, his description is undoubtedly that of *O. macrostigma*. We include additional analyses of reared *O. macrostigma* exuviae from Guadeloupe and Martinique.

DESCRIPTIONS

Figures 1-5

MATURE MALE – H e a d: Eyes in life deep reddish-purple dorsally, purple ventrally with two yellow spots on the rear margin. Mandibles and labium light brown, yellowish towards eye; labium dark brown ventrally. Labrum reddish-brown; anteclypeus and postclypeus dark brown. Antennae black. Frons, vertex, and occiput a deep metallic purple. Vertex forked into a pair of pointed humps. Occiput fringed with long yellow hairs.

T h o r a x. – Prothorax uniformly pruinose purple without hairs. Synthorax uniformly pruinose purple, darker dorsally and covered by short pale hairs. Venter powdered purple-gray. Faint whitish-yellow stripes may be seen on mature males.

Legs: Femur, tibia brown, but tarsus darker.

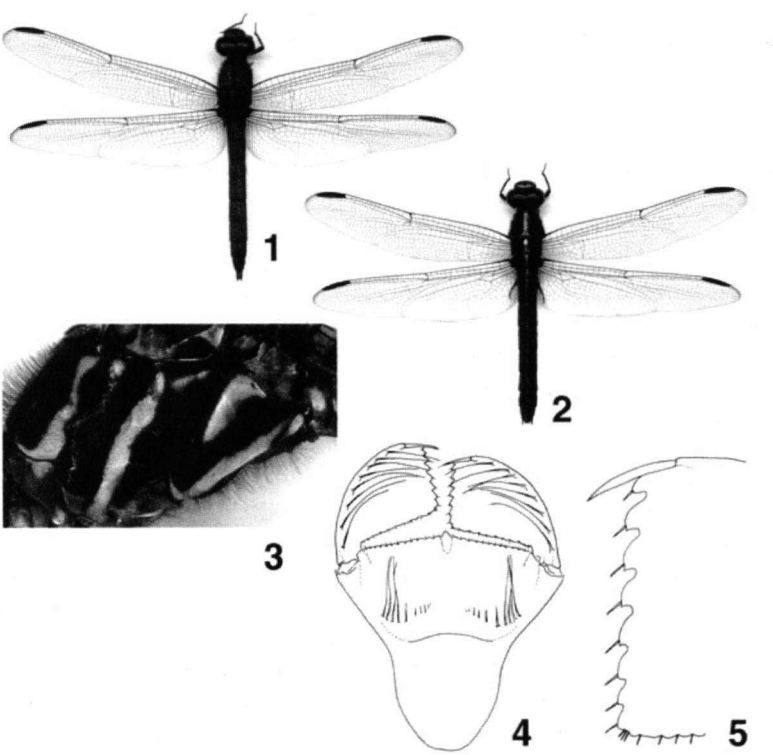
Wings hyaline, sometimes a tinge of brown at the apex of forewing and hindwing. Venation black. Deep brown pterostigma overlies 5-7 cells, its proximal side oblique.

A b d o m e n. – Triquetral in sectional view, flattened dorso-ventrally and entirely pruinose purple (Fig. 1). Ventral side of abdominal segments red with black spots at the apex of each of segment. Caudal appendages purple. In dorsal view,

cercus parallel sided, slightly divergent at the apex. Epiproct bifid at the apex.

IMMATURE MALE. – H e a d: Eyes in life deep red dorsally, blue ventrally with two yellow spots on the rear margin. Orange pointed mandibles and labium yellowish-brown becoming white towards eye. Labrum yellowish-orange. Anteclypeus and postclypeus brown. Frons light pearly purple. Antennae black. Vertex pearly purple forked in a pair of pointed humps. Purple occiput margined with orange and fringed with long yellow hairs.

T h o r a x. – Prothorax brownish-red without hairs. Synthorax brownish-red, darker dorsally and covered with short pale hairs. Middorsal carina yellow. Sides of synthorax with 3 whitish or yellowish stripes. Thin humeral stripe on the upper part of the synthorax, becoming larger on the lower part. Interpleural stripe broad, free at its upper end and underlined with black on its lower half. Metapleural stripe free at its upper end, underlined with black on the outer portion of the venter. Yellow triangle shaped spot on the superior portion of the metepimeron, often not visible.



Figs 1-5. *Orthemis macrostigma* from Martinique: (1) mature male, dorsal view; – (2) mature female, dorsal view; – (3) mature female thorax, lateral view; – (4) labium, dorsal view; – (5) right palpal lobe margin, dorsal view.

Legs: Femur, tibia brown, but tarsus darker.

Wings: Same as mature male, pterostigma slightly paler.

A b d o m e n. – Triquetral in section, flattened dorsoventrally. Entirely brownish-red, with black lateral carina. Ventral side of abdominal segments red with black spots at the apex of each of them. A white or yellow stripe extends from the thorax between the wings and onto the top of abdominal segments 1-3. Caudal appendages paler than in mature male. In dorsal view, cercus pale-red and black apically, parallel and slightly divergent at the apex. Epiproct large and bifid at the apex.

R e m a r k. – The purple pruinosity appears first on the thorax in immature male with the abdomen remaining reddish longer. This intermediate coloration between a "typical" immature and entirely pruinose purple mature male gave place to the old possibility of two color morphs of *O. macrostigma* in the Lesser Antilles.

MATURE FEMALE. – H e a d: Eyes in life reddish-blue dorsally, bluish-gray ventrally with two yellow spots on the rear margin. Mandibles and labium yellowish-white with brown central area. Labrum light brown with a yellowish-white spot on each side. Anteclypeus and postclypeus pearly yellow. Frons brown, margined with pale yellow. Antennae black. Vertex light purple, forked into a pair of pointed humps. Brown occiput fringed with long yellow hairs.

T h o r a x. – Prothorax brownish-red without hairs. Sides of synthorax with 3 yellow, sometimes whitish stripes (Fig. 3). Sinuate pale humeral stripe complete. Interpleural stripe broad, free at its upper end underlined with black on the lower half. Metapleural stripe free at its upper end, underlined with black on the outer portion of the venter. On the superior portion of the metepimeron, is a yellow triangle spot, more or less obvious, but always present. Venter pale with dark lateral stripe bordering pale ventral metepimeron stripe.

Legs. – Femur and tibia light brown with ventral side yellowish. Tarsus slightly darker.

Wings. – Same as mature male.

A b d o m e n. – Brownish-red. Lateral black carina underlined by a white line on abdominal segments 1-4. Segment 1 with a white spot above the lateral carina. Yellow spot on segment 2 larger and located above and below the lateral carina. Segment 3 with a large yellow line above and below lateral carina. Segments 4 to 6 with a thin line only above lateral carina. In dorsal view, a white or yellow stripe (Fig. 2) extends from the thorax, between the wings and onto the top of abdominal segments 1 to 5. Ventral side of abdominal segments darker than in the male and reddish with black spots at the apex of each segment. Abdominal side of segment 8 dilated into a large, black edged, semicircular flap. Caudal appendages brownish-red.

V a r i a t i o n among specimens examined (n = 100). – Total length (mm) of male ranges from 48-53, female 47-50; abdomen male 32-36, female 31-35; forewing male 42-45, female 43-45; hindwing male 40-43, female 41-43.

EXUVIAE. – M a t e r i a l. – 21 exuviae (7 reared). GUADELOUPE: Etang du Vieux-Fort, Basse-Terre, Guadeloupe, 29-III-2004, F. Meurgey leg.; MARTINIQUE: Trois-Ilets, 17-III-2005, F. Meurgey leg. Total length, excluding antennae, ranges from 22.0 to 24.0 mm.

H e a d. – Mostly square, about 5.0-5.5 mm in length. The eyes broadly overspreading the sides of the face and rising to an elevated rounded prominence above the head. Mask broad and short, spoon-shaped. The mentum/prementum articulation reaching to the foreleg coxae. In dorsal view, palpal lobe with 8-9 long setae (Fig. 4) and 8-9 angulate teeth on opposed edges, with one (rarely two) short raptorial setae. Distal margin of mentum more or less undulate, depending on the individual (Fig. 5). Median lobe with two rows of 8-10 premental setae, the external 4-5 very long and the internal 4 shorter.

T h o r a x. – Lateral margins of prothorax with long hairs. Legs strong and short, with long hairs located mainly on femur and tibia. Wing cases reaching abdominal segment 5 on exuviae and 6 on last instar larvae. Legs unmarked.

A b d o m e n. – Hemicircular in section, lateral margins of abdominal segments with long setae. No dorsal spines, but protuberances in the form of blunt spines, are visible on segments 2 to 7. Spines on segment 3-6 broad and elevated; spine on segments 2 and 7 short and vestigial. Lateral spines present on segments 8 and 9. Segment 8 spines directed externally. Segment 9 spines parallel with the largest reaching the basal margin of segment 10. Dorsal surface of abdomen unmarked, but often covered with algae and mud. General coloration varying from yellow-brown to black. In ventral view, the surface of abdomen paler. Long setae on the sides of segment 9 reaching midpoint of epiproct. Paraproct minutely longer than the epiproct. Cercus reaches one-third the length of epiproct.

DIAGNOSIS

Orthemis macrostigma males are very similar to *O. ferruginea* males. If it weren't for the respective distinctive thoracic color patterns between *O. macrostigma* and *O. ferruginea* females one would be tempted to retain the original *O. ferruginea* designation for the Lesser Antilles and Caribbean populations. The thorax of the mature female is dark brown with 3 thin bright yellow lateral stripes; it is white with several small brown areas, particularly forming an H or 8 pattern on the mesepimeron in *O. ferruginea*. On the outer portion of the female venter, a black stripe borders the yellow lower metepimeron stripe, which is missing in *O. ferruginea*. In both sexes, the wing venation is black in *O. macrostigma*, not reddish as in *O. ferruginea*. In both sexes, the first pale lateral thoracic stripe is not connected centrally or apically to the second pale thoracic stripe as in *O. ferruginea*. This is best seen in teneral males of *O. ferruginea* because later pruinosity obscures the pattern. The depressed posterior lobe of the penis can separate *O. macrostigma* males from *O. ferruginea* males, which have the posterior lobe inflated and heart-shaped. *O. ferruginea* has only been taken in the Florida Keys. It has not been taken elsewhere in the Caribbean, but this species is common in

North and Central America.

Orthemis macrostigma can be distinguished from *O. discolor* by several characteristics. The eyes in life are purple in the males, not red as in *O. discolor*. The frons is purple in *O. macrostigma* males, not red as in *O. discolor* males. In both sexes, *O. macrostigma* does not have an extra pale stripe on the mesepimeron and the metepisternum has no pale stripe, unlike *O. discolor*. *O. macrostigma* males have a black area on the venter bordering the pale lateral metepimeron, unlike the uniformly tan venter of *O. discolor* males. In the Caribbean, *O. discolor* has only been taken in Trinidad and in Tobago which are near mainland Venezuela.

Orthemis macrostigma males can be distinguished from *O. schmidti* Buchholz by its pruinose purple abdomen which is bright scarlet and non-pruinose in *O. schmidti*. The females can be separated by the thoracic pattern. *O. macrostigma* females lack the extra pale stripe on the mesepimeron and the pale stripe on the metepisternum found in *O. schmidti* females. In the Caribbean, *O. schmidti* has only been taken in Trinidad. While common in Central and South America (PAULSON, 1998, 2001), both *O. discolor* and *O. schmidti* have not been found elsewhere in the Caribbean.

Orthemis macrostigma males can be distinguished from the red non-pruinose *Orthemis* form found in the Florida Keys and the Greater Antilles by its purple eyes in life and purple frons, which are both reddish-purple in the Florida Keys and Greater Antilles males. *O. macrostigma* males are purple with a pruinose thorax and abdomen, unlike the red non-pruinose body of males found in the Florida Keys and the Greater Antilles. The females are similar, but the pale thoracic stripes in *O. macrostigma* are bright yellow in mature females while the thoracic stripes are pale white in the females from the Florida Keys and the Greater Antilles.

BIONOMICS

Orthemis macrostigma can be found in a great variety of lenthic habitats. It typically breeds in stagnant and temporary ponds. Artificial farm ponds with low inclined, treeless banks in open areas, is the typical habitat in the French West Indies. *O. macrostigma* can also breed in garden basins, gutters, drains, ditches, water tanks, and resurgences. It can tolerate brackish and polluted waters. After a rain event, adults are frequently seen on the roads when the water covers the ground with sheet flow. This species breeds from sea level to about 200 meters high in Guadeloupe, and up to 100 meters in Martinique. Away from the water, wandering males, females and tenerals can be found in many terrestrial habitats. During the maturation period, wide-ranging tenerals can be seen at every type of terrestrial habitat like pasture clearings, beaches, savannas and forest edges up to over 700 meters high.

In Guadeloupe and Martinique, this species is sometimes found in 4-8 meter

wide farm ponds with cattle, goats, pigs, or sheep. Another breeding site consists of muddy cow footprints. We saw females laying eggs in these footprints and found exuviae. They also oviposit on automobile hoods and cattle dung.

At breeding sites in the late morning and afternoon, males perch on low vegetation or small trees along the shoreline. Unattended females oviposit over the water and tapping the surface. Eggs are deposited in mud or aquatic vegetation like *Najas* sp., or *Hydrilla verticillata* near the shoreline. Mature males often patrol along the margins in search of ovipositing females.

In its habitat, *O. macrostigma* dominates all other species since it is usually the only Anisoptera present. We have observed that in small ponds, there are no other companion Anisoptera. However, in larger ponds, *O. macrostigma* and *Tramea abdominalis* Rambur can be seen together. *Ischnura ramburii* Selys, *Lestes forficula* Rambur, *Micrathyria aequalis* Hagen and *Brachymesia herbida* Gundlach are other common companion species.

The range of *O. macrostigma* seems to be restricted to the Lesser Antilles including the French West Indies: Guadeloupe and adjacent islands (Les Saintes, La Désirade, Marie Galante), Martinique, and the British West Indies: Antigua, Barbados, Dominica, and St. Lucia. There are no other species of *Orthemis* present in the Lesser Antilles. Also, we are presently studying specimens of an all-purple pruinose *Orthemis* from the Greater Antilles to determine if it is the same as *O. macrostigma*. This particular *Orthemis* sp. has been taken together with an all-red non-pruinose *Orthemis* form in the Dominican Republic and perhaps, the British Virgin Islands. It is possible that *O. macrostigma* may occur in the Greater Antilles as well. We hope to address that possibility in a future publication after additional research.

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