

The Systematist's Muse – two new damselfly species from 'Elisabetha' in the Congo Basin (Odonata: Chlorocyphidae, Platycnemididae)

Klaas-Douwe B. Dijkstra

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K.-D.B. Dijkstra, National Zoological Collection of Suriname, Anton de Kom University of Suriname, P.O. Box 9212, Paramaribo, Suriname. National Museum of Natural History Naturalis, P.O. Box 9517, 2300 RA, Leiden, The Netherlands (dijkstra@nmm.nl).

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Platycypha eliseva spec. nov. and *Mesocnemis saralisa* spec. nov. are described from Lokutu (formerly Elisabetha) in the Democratic Republic of Congo. The taxonomy and distribution of *Platycypha* and *Mesocnemis* are discussed and keys are provided for the males.

Introduction

In the words of the Swedish author August Strindberg "Linnaeus was in reality a poet who happened to become a naturalist". Indeed, there are similarities between taxonomy and poetry, which has been described by Samuel Taylor Coleridge as "the best words in the best order". One of the great themes of poetry is love, and love clearly lies behind the use of feminine themes in many of the names of Linnaeus and those of his countless followers. This paper introduces two new damselflies found during Conservation International's rapid biological assessment (RAP) at Lokutu (DRC) in November 2004 (Dijkstra, 2007b). Lokutu was formerly known as Elisabetha, probably in honour of the wife of Albert I, King of the Belgians from 1909 to 1934. Appropriately, the (full) second name of Linnaeus's wife Sara Lisa Morea was also Elisabeth, as was the first name of his mother-in-law and eldest daughter. The anecdote of Linnaeus changing the name of the iris genus *Morea*, originally coined by Philip Miller to honour Robert More, into *Moraea* is seen as a token of love for his wife and her family. In order not to jeopardise his return to his fiancée, Linnaeus declined an offer from Herman Boerhaave to travel to South Africa (coincidentally the centre of *Moraea* diversity) to work for the botanical garden in Leiden. The name Elisabeth has connotations such as 'God is my oath' and 'God's promise', but also 'God is bountiful', 'God of plenty' and 'the fullness of God'. This sentiment must have spoken to Linnaeus, a deeply religious man who was fascinated by what we now call biodiversity. Linnaeus believed that everything in nature was created for human benefit, sometimes simply for the admiration of its beauty. It was his duty to study and catalogue these riches. "God created, Linnaeus ordered" is a famous adage attributed to him. Not everyone sees biodiversity as being so purposeful, but naming nature's wonders is inherently utilitarian, as without systematics, humanity cannot understand diversity. To honour Linnaeus's systematic zeal and motivation, rooted in his love for nature and family,

two species are here named 'Elisabeth'. It is said that insects and birds were Linnaeus's favourite animals. Odonata are known as 'the birdwatcher's insects' for their liveliness and colour, and may have been particular favourites.

Abbreviations

Ax: antenodal cross-veins, DRC: Democratic Republic of Congo, Fw: forewing(s), Hw: hindwing(s), MRAC: Musée Royal de l'Afrique Centrale (Tervuren), Pt: pterostigma, Px: postnodal cross-veins, RMNH: Nationaal Natuurhistorisch Museum Naturalis (Leiden), S1: first abdominal segment, S2-3: second and third abdominal segments etc.

Chlorocyphidae

Platycypha eliseva spec. nov. (figs 1, 4e)

Material.— Holotype: 1 ♂, DRC, Province Orientale, Territoire de Basoko, 20 km NW of Lokutu, Letissé River, large shallow, sandy, clear stream (3-5 m) within disturbed forest (1°16.34'N 23°27.23'E), 410 m a.s.l., 1 November 2004, leg. K.-D.B. Dijkstra, RMNH. Paratypes: 4 ♂, 1 ♀, site and date as holotype; 4 ♂ (2 in alcohol) site as holotype, 6 November 2004. Other material: 1 ♂ (in alcohol), DRC, 20 km NW of Lokutu, stream near Lukomete, shallow, sandy, clear stream (2-4 m) with gallery vegetation in plantation (1°15.07'N 23°28.16'E), 375 m a.s.l., 1 November 2004, leg. K.-D.B. Dijkstra, RMNH; 1 ♂, DRC, 25 km NW of Lokutu, Lingungu Stream, large shallow, sandy, clear stream (2-4 m) within forest (1°17.6'N 23°25.9'E), 375 m a.s.l., 2 November 2004, leg. K.-D.B. Dijkstra, RMNH.

Diagnosis.— The only *Platycypha* in the central Congo Basin, the male's contrasting yellow abdomen tip is unique (fig. 1). The only other species without any blue is *P. auripes*. Otherwise it has a unique combination of characters: the dark, contrastingly marked thorax recalls the lowland species *P. auripes*, *P. picta* and *P. rufitibia*; the broad



Fig. 1. *Platycypha eliseva* spec. nov. male near Lokutu, DRC. Photograph: K.-D.B. Dijkstra.

red-and-white tibiae *P. caligata* and *P. lacustris*; and the rather broad abdomen sub-montane species such as *P. amboniensis* and *P. fitsimensi* (see discussion and key).

Holotype.— Entire length: 30.0 mm, abdomen length (excluding appendages): 18.9 mm, Fw length: 21.2 mm, Hw length: 20.9 mm, Fw Pt: 2.0 mm. Base of labium pale brown, apical half black. Head black marked with pale yellow: two small postocular spots and a large rectangular spot covering occiput that extends in two triangular arms beside vertex halfway to level of anterior and lateral ocelli. Eyes in life blackish. Prothorax black, hindlobe of pronotum pale yellow narrowly edged with black; middle lobe with small paired spots lying against hindlobe and a larger spot on each side. Synthorax black marked with pale yellow as follows: triangular spots on antealar sinus, entire middorsal carina, 'fish-hook' on each mesepisternum composed of thin and irregular



Fig. 2. Letissé River near Lokutu, DRC, the type locality of *Platycypha eliseva* spec. nov. Photo: K.-D.B. Dijkstra.

(but complete) antehumeral stripe that is broadly fused to a slightly wider postdorsal stripe, irregular band on metepisternum invaded by a short black interpleural line, and posterior half of metepimeron. The black areas are about as wide as the yellow areas between them. Underside and coxae brown, marked with black. Trochanters and femora black, hind femora with inconspicuous pale streak on anterior face. Tibiae of all legs greatly expanded (outer dilation almost four times as wide as shaft on hind leg) with posterior face bright red and anterior face white, extreme apex of tibiae and entire tarsi black. Fw and Hw clear, yellow at base fading distally but reaching almost to node, venation and Pt black. 11 Ax in both Fw, 9-10 in Hw; 14-16 Px in Fw, 13-15 in Hw. Abdomen (fig. 4e) fairly broad, S3 about 1.2 × as long as wide. S1 black, with broadly pale yellow sides. Dorsum S2 black with two large roundly triangular yellow spots, sides pale yellow, separated by blackish band from pale brown underside. Dorsum S3-7 orange-red, on each segment darker on dorsal carina, laterally and especially apically where a black cross-bar is formed; base narrowly yellow, contrasting with apical bar of preceding segment. Darkness of segments increases terminally, S7 being largely dark. Dorsum S8-10 warm yellow, S8 with distinct apical black bar. Tergites of S3-8 ventrally orange-red. Ventral carinae, all sternites and ventral part of S9-10 tergites black. Appendages black, paraprocts about 0.4 × as long as cerci. Penis not examined.

Paratype female.— Associated with the holotype by locality and by the black lines along the dorsal carina of the abdomen, which are typical of *Platycypha* females (Pinhey, 1967). Entire length: approximately 28 mm (abdomen curved), abdomen length (excluding appendages): 17.3 mm, Fw length: 24.1 mm, Hw length: 23.7 mm. More robust than holotype, black marked contrastingly with pale brown. Head as holotype but with many additional pale brown markings: pale markings on genae extend narrowly along eyes to level of lateral ocelli, two small spots on labrum, anteclypeus narrowly pale at sides and tiny spot at its base, entire postclypeus pale except narrow black perimeter, two pale swellings on frons between antennae and postclypeus separated narrowly by black, basal antennal segments pale, pair of small spots anterior to vertex, pair of smaller spots on vertex anterior to lateral ocelli. Occipital and postocular markings as holotype but more extensive. Prothorax and synthorax black marked with pale brown as holotype, although more extensively: prothorax with additional pair of lateral spots, antehumeral and postdorsal branches of 'fish-hook' wider and about equally wide,

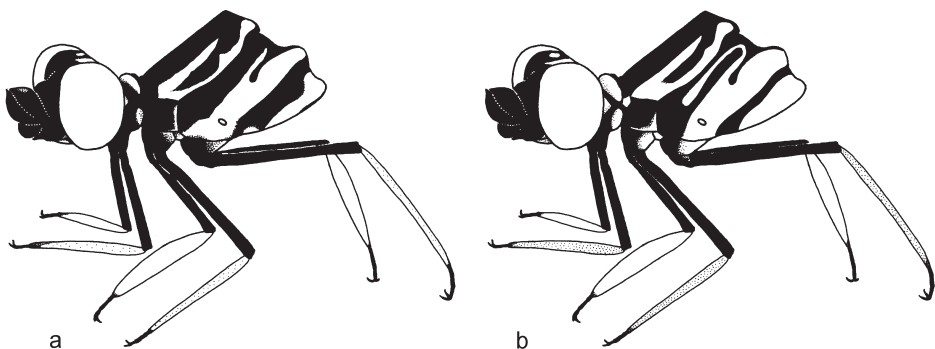


Fig. 3. *Platycypha* male head, thorax and legs in lateral view. – (a) *P. auripes*; (b) *P. caligata*.

mesepimeral black enclosing a trace of a pale posthumeral marking. Overall the pale areas are about 1.5 × more extensive than the black areas. Legs not expanded, all blackish becoming browner towards femoral bases; posterior face of tibiae with contrasting pale brown streak extending almost over their entire length. Wings as holotype, but yellow base less distinct, Pt dark brown with pale central third. 10-12 Ax in Fw, 10-11 in Hw; 15-16 Px in Fw, 13-14 in Hw. S1 black, with broadly pale sides. S2 black with two small pale brown roundly triangular dorsal spots, broadly pale sides and indistinct pale marking along ventral carina. S3-7 black with pale brown markings diminishing towards S7: a pair of subdorsal streaks is connected basally to a pale lateral marking, which is a complete stripe on S3 but reduced to a pale basal dash and apical spot on S7; each segment is broadly pale along the ventral carina. The pale dorsal and lateral markings on S3-7 enclose a black "W" or trident on each segment, which consists of a black line along the entire dorsal carina, two thick sublateral streaks interrupted basally and an apical bar that is about as broad as the sublateral streaks. S8 black with a pair of small lateral drop-shaped markings. S9 black with three small subapical spots: one dorsal and two sublateral. S10, elongate fine-pointed cerci, ovipositor and all sternites entirely black.

Habitat.— Found on three clear sandy streams (2-5 m broad) within 5 km from the Congo River. Two streams were in dense forest and largely shaded, the other ran along

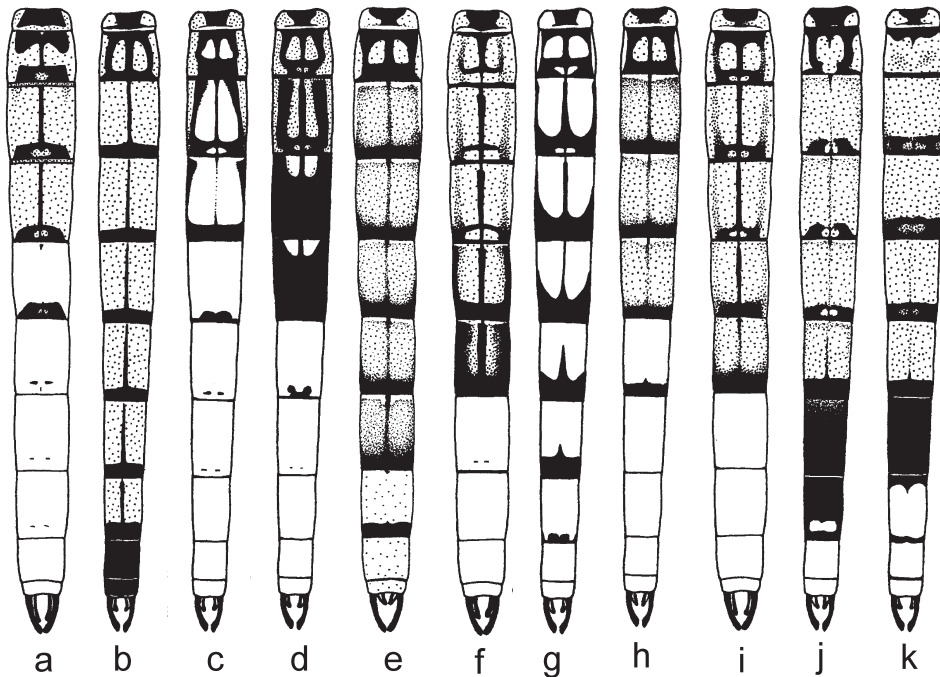


Fig. 4. *Platycypha* male abdomens in dorsal view. Dotted areas are yellow to brown or red, undotted blue. – (a) *P. amboniensis*; (b) *P. auripes*; (c) *P. caligata* typical; (d) *P. caligata* f. 'lacus'; (e) *P. eliseva* spec. nov.; (f) *P. fitzsimonsi* (*P. inyangae* similar); (g) *P. lacustris*; (h) *P. picta*; (i) *P. pinheyi*; (j) *P. rufitibia* dark; (k) *P. rufitibia* pale.

an oil palm plantation and was largely sunny. The species may be localised: despite being conspicuous, it is absent from the substantial collections in MRAC. Well-sampled sites nearest to Lokutu are >350 km away (Dijkstra, 2007b).

Etymology.— The name Elisabeth, borne by Linnaeus's wife and some other family members, can be linked to his fascination with the abundance of creation. Biodiversity is still the muse of systematists. Elisabeth is also the root of both given names of Ellis Bettina Grootveld, my companion and inspiration for fourteen years. The name 'eliseva' (noun in apposition) is derived from the original Hebrew name Elisheba or Elisheva, in reference to her beloved Levant.

Discussion

Platycypha Fraser, 1949 can roughly be separated into three groups by coloration, paraproct length and distribution (fig. 5). *P. caligata* (Selys, 1853) and *P. lacustris* (Förster, 1914) have large ranges, inhabiting open and forested rivers respectively. They are probably sister species, sharing a largely blue abdominal dorsum. The Lake Malawi

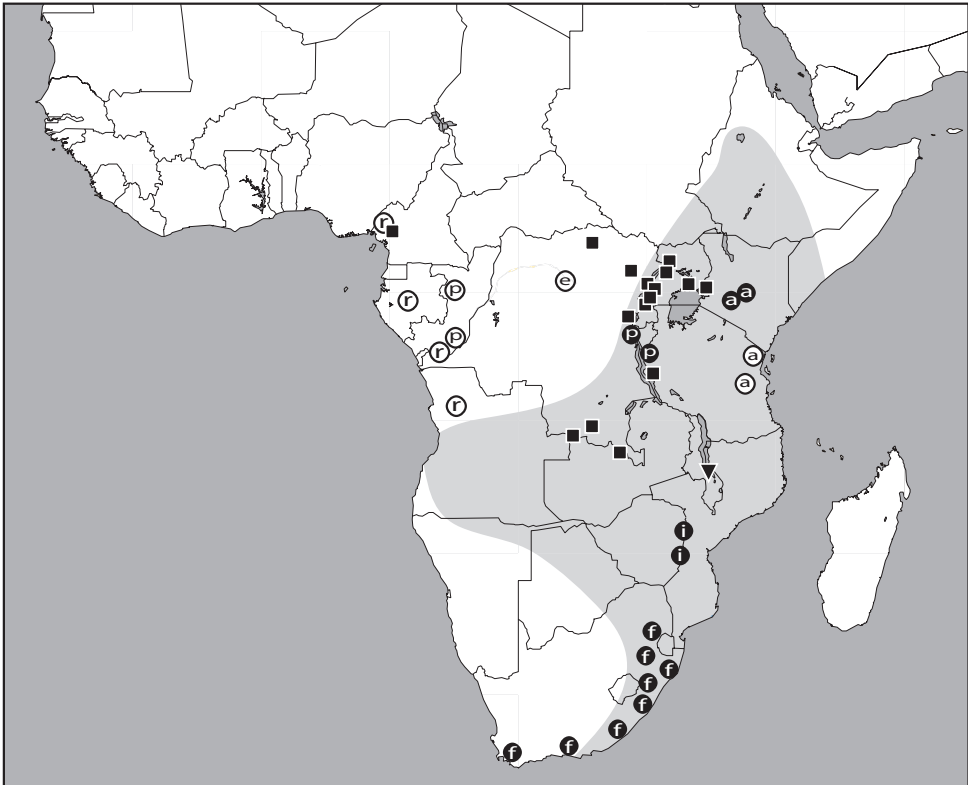


Fig. 5. Distribution of *Platycypha* species. Legend – open circles: lowland relict species (a: *P. auripes*; e: *P. eliseva* spec. nov.; p: *P. picta*; r: *P. rufitibia*); filled circles: sub-montane relict species (a: *P. amboniensis*; f: *P. fitzsimonsi*; i: *P. inyangae*; p: *P. pinheyi*); squares: *P. lacustris*; shading: *P. caligata*; triangle: *P. caligata* f. 'lacus'. Adapted from: Dijkstra (2007a, b).

form 'lacus' of *P. caligata* may constitute a separate species (Dijkstra, 2005, 2007c). Four taxa have small ranges around highlands in eastern and southern Africa. Their paraprocts are notably long and the abdomen is approximately half blue. *P. amboniensis* (Martin, 1915) is distinctive, but the taxa *fitzsimonsi* (Pinhey, 1950), *inyangae* Pinhey, 1958 and *pinheyi* (Fraser, 1950) are very similar. They differ only in size and mature coloration (see key), but *inyangae* and *pinheyi* are very poorly known. It seems best to treat the three taxa, isolated geographically, as separate species for now. The remaining species - *P. picta* (Pinhey, 1962), *P. rufitibia* (Pinhey, 1961) and the new species - have small ranges in lowland rainforest in central Africa, with *P. auripes* (Förster, 1906) endemic to the Eastern Arc Mountains in Tanzania. They are rather heterogeneous as a group, but all species have no or little abdominal blue (except *P. picta*) and a dark thorax with contrasting pale markings.

Key to *Platycypha* males

Only suitable for fully mature individuals.

- 1 Humeral and metapleural black stripes broad, wider than thickness of hind femur, obscuring pale posthumeral stripe (fig. 3a). Abdomen at most blue on S6-10 2
 - Humeral and metapleural stripes narrow, about as wide as hind femur is thick, pale posthumeral stripe in black of mesepimeron usually clear (fig. 3b). Abdomen at least blue on S7-10 5
- 2 (1) Tibiae not dilated. At least dorsum of S9-10 blue (figs 4h, j-k) 3
 - Tibiae strongly dilated. Abdomen without blue, dorsum S9-10 all yellow or black (figs 4b, e) 4
- 3 (2) Femora and tibiae yellow, black around joints, resulting in 'ringed knee' pattern. S6-10 blue (fig. 4h). Hw 15-16 mm. Congo-Brazzaville *picta*
 - Femora dark, contrasting with white and reddish tibiae. At most S8-10 blue, S7 and sometimes S8 largely black (figs 4j-k). Hw 18-21 mm. Cameroon to Angola ... *rufitibia*
- 4 (2) Dorsum S8 reddish and black, S9-10 all black (fig. 4b). Posterior side of tibiae yellow. Eastern Tanzania *auripes*
 - Dorsum S8 yellow and black, S9-10 all yellow (fig. 4e). Posterior side of tibiae red. Central DRC *eliseva* sp. nov.
- 5 (1) Paraprocts less than half as long as cerci (lateral view). Dorsum S2-10 blue (figs 4c, g). Tibiae wide, outer dilation of hind tibia 3-5 × wider than shaft [Note: on Lake Malawi specimens blue of S2-5 darkens (fig. 4d) and hind tibiae only dilated 1-2 ×] 6
 - Paraprocts at least half as long as cerci. At least dorsum S2-4 brown to yellow or red, terminal segments blue (figs 4a, f, i). Tibiae narrow, outer dilation of hind tibia 0.5-2 × as wide as shaft 8
- 6 (5) Sides of S1-3 and thorax greenish. S2-7 and sometimes S8 with apical black bar (fig. 4g) *lacustris*
 - Sides of S1-3 and thorax reddish. At most S2-5 with apical black bar (figs 4c-d) 7
- 7 (6) Tibiae wide, outer dilation of hind tibia 2-4 × as wide as shaft. Dorsal markings S2-3 always blue, S4-5 always largely blue (fig. 4c). Hw 20-24 mm. Widespread on streams *caligata*
 - Tibiae narrow, outer dilation of hind tibia 1-2 × as wide as shaft. With age, dorsal

- markings S2-3 become rufous, S4-5 become largely black (fig. 4d). Hw 18-19 mm. Rocky shores of Lake Malawi *caligata* f. 'lacus'
- 8 (5) Dorsum S2-4 rufous with black dorsal carina, S5-10 blue (fig. 4a). Tibiae narrower, outer dilation of hind tibia 0.5-1 × as wide as shaft, with orange posterior sides. Hw 21-26 mm. Kenya *amboniensis*
- Dorsum S2-6 rufous with black dorsal carina, S7-10 blue (figs 4f, i). Tibiae wider, outer dilation of hind tibia 1-2 × as wide as shaft, with red posterior sides. Hw 18-24 mm. Tanzania to South Africa 9
- 9 (8) Hw 18-20 mm. Around north end of Lake Tanganyika *pinheyi*
- Hw 21-24 mm. Zimbabwe to South Africa 10
- 10 (9) Thorax and S2-6 reddish. South Africa *fitsimoni*
- Thorax bright yellow and S2-6 orange. Zimbabwe-Mozambique border region *inyangae*

Platycnemididae

Mesocnemis saralisa spec. nov.

(figs 6b, 7a)

Material.— Holotype: 1 ♂, DRC, Province Orientale, Territoire de Basoko, Lokutu, Congo River, huge river (> 1 km broad) with mostly forested banks, others sandy, grassy or dominated by *Eichhornia* (1°10'N 23°37'E), 370 m a.s.l., 7 November 2004, leg. K.-D.B. Dijkstra, RMNH. Paratypes: 1 ♀ (in copula with holotype), 1 ♂, data as holotype, RMNH.

Diagnosis.— Recalls a large *M. singularis*, but differs in structural details (figs 6-7). The general shape of the male appendages is only subtly different; the shape and relative position of the basal processes of the cerci are most distinctive (see key and description). The central portion of the female's pronotal hindlobe has two elongate lateral lobes and a broad central lobe, which all extend over the rather unmodified mesostigmal region of the synthorax.

Holotype.— Entire length: 42.3 mm, abdomen length (excluding appendages): 32.5 mm, Fw length: 25.9 mm, Hw length: 24.3 mm, Fw Pt: 0.8 mm. Labium pale brown, labrum greyish white with small black spot at base. Remainder of face and dorsum of head blackish, although browner on genae, around ocelli and along eyes. Postgenae largely black, broadly pale brown ventrally and narrowly along eyes. Prothorax blackish. Mesepisterna, mesepimera and mesokatepisterna blackish. Synthorax ventral of interpleural suture pale brown, with blackish smears on the metapleural fossa, metakatepisterna and coxae. Thick whitish pruinosity covers most of mesepisterna and venter, rest of synthorax thinly pruinose. Legs black, brown towards bases of femora, with very thin pruinosity. Wings clear, venation and Pt blackish. Pt kite-shaped: anterior and distal sides of equal length and about 1.5 × as long as posterior and proximal sides. Both Fw with 19 Px, Hw with 17-18 Px. Abdomen blackish, segments browner laterally, with thick pruinosity on dorsum of S1-2, base of S3, and S7-10 (largely lost by preservation on S8-10), thinner pruinosity on remainder of S3 and S6 suggests more extensive pruinosity in life. Sternites black. Appendages black and as illustrated (fig. 6b). Each cercus bears two basal processes: that nearest to base roughly triangular and

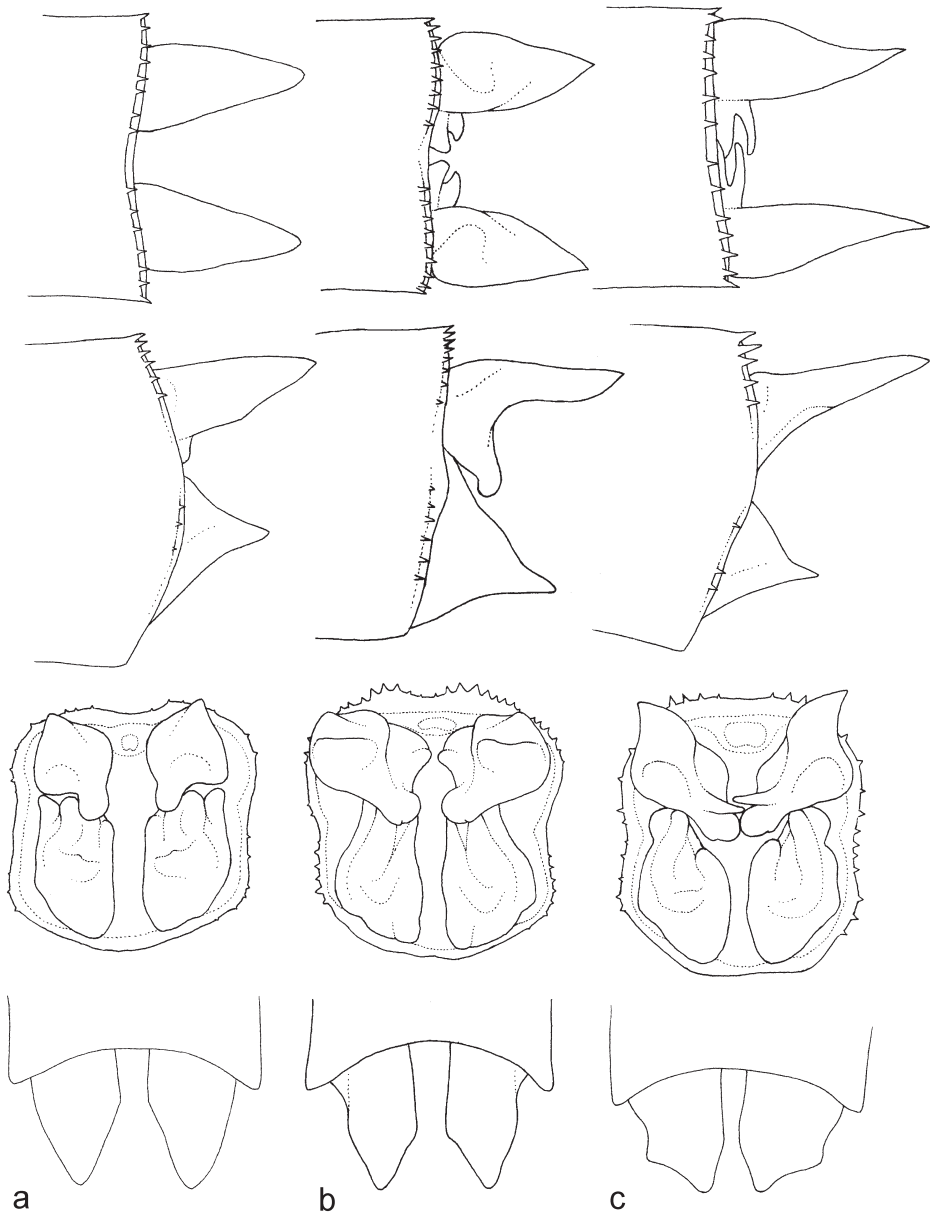


Fig. 6. *Mesocnemis* male appendages (cerci and paraprocts), from top to bottom in dorsal (paraprocts omitted), lateral, caudal and ventral view (cerci omitted). – (a) *M. robusta*; (b) *M. saralisa* spec. nov.; (c) *M. singularis*.

directed internally, the more distal process thumb-like, directed ventrally and internally, and clearly visible in lateral view. Penis typical of genus with membranous hood and two fairly short curved flagella.

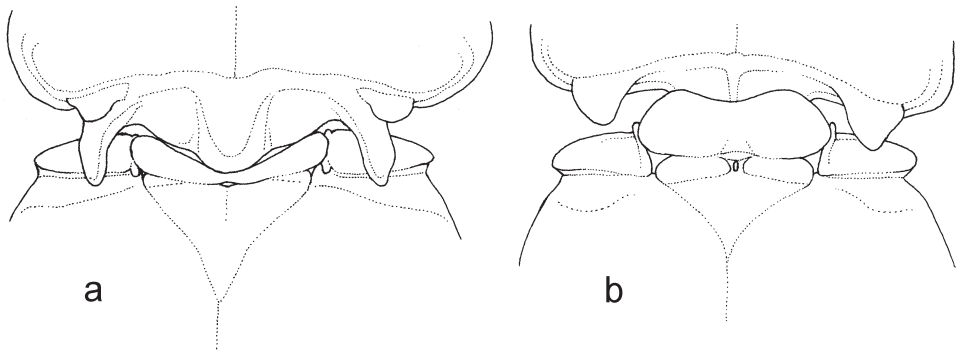


Fig. 7. *Mesocnemis* female hind margin of pronotum and mesostigmal region of synthorax in dorsal view. – (a) *M. saralisa* spec. nov.; (b) *M. singularis*.

Paratype female.— Caught in tandem with holotype. Entire length: 39.2 mm, abdomen length (excluding appendages): 29.5 mm, Fw length: 27.4 mm, Hw length: 26.0 mm. More robust and much paler than holotype, without pruinosity. Entire body pale brown with restricted blackish markings. On the head there are a pair of small spots centrally on the postclypeus, a short stripe in the transverse suture on the frons, entirely black antennae, a small smudge near each eye margin at the level of the antennae, slight smears posterior of the lateral ocelli, and rather extensive black areas on the postocular lobes and postgenae separated narrowly from the eye margin by pale brown. Prothorax pale brown but the hindlobe of the pronotum is black and drawn out on each side into a dark brown lobe; each of these elongate lobes has a small pale brown lobe at its base (fig. 7a). Hindlobe overlaps anterior carina connecting mesostigmal laminae on adjacent synthorax, which unlike that of *M. singularis* is not strongly swollen (compare fig. 7b). Synthorax pale brown but with narrow black line on both sides of middorsal carina and blackish spots in humeral and metapleural fossae. Legs black, but anterior faces of femora largely pale brown. Wings clear, venation blackish, Pt pale brown. 19–20 Px in Fw, 17 Px in both Hw. Abdomen pale brown, but S2–8 with sternites black, intersegmental rings darkened and tergites with some blackish markings: each of these segments with short roughly triangular subapical marking on dorsum and a subapical smear on each side. S9 with pair of elongate subdorsal smears at base and slight lateral smudges medially. S10, ovipositor and cerci uniformly pale brown, the latter broad, flattened and triangular.

Habitat.— Found along a steep bank of the main channel of the Congo River (>1 km broad), where bushes and trees overhung the water. The damselflies were perched on *Eichhornia* and emergent twigs low above the water. The holotype pair was captured while ovipositing in tandem on dead twigs lying in the water, in the shelter of overhanging vegetation. *Mesocnemis* material is scarce in MRAC, probably because catching these damselflies from emergent rocks and vegetation in rivers requires a special effort.

Etymology.— Named after Linnaeus's wife Sara Elisabeth ('Lisa') Moraea (noun in apposition). After the capture of the first male, where the characters are rather subtle (fig. 6), a special effort was required to obtain a mated pair, to see the female's more apparent differences (fig. 7). The holotype is from this pair: one is worth little without its partner.

Key to *Mesocnemis* males expected in the Congo Basin

Mesocnemis dupuyi and *M. tisi* were not available for study, but are known only from extreme western Africa (fig. 8). *M. dupuyi* is somewhat intermediate between *M. robusta* and *M. singularis* (Legrand, 1982), *M. tisi* has unique appendages and lacks pruinosity in the mature male (Lempert, 1992).

- 1 Base of cerci with simple, short and knob-like process, directed downwards and thus not visible in dorsal view; paraprocts triangular in ventral view, with rather straight outer border (fig. 6a). Hw 19-21 mm; 13-15 Px in Fw *robusta*
- Base of cerci bears two long finger- and thumb-like processes directed inwards, visible in dorsal view; paraprocts more quadrangular (fig. 6c). Hw 22-27 mm; 16-21 Px in Fw 2
- 2 Proximal cercal process is thumb-like and directed in- and downwards, while thin distal process is finger-like and lies closely against it, neither process is clearly visible in lateral view; paraprocts quadrangular in ventral view, with strongly angled outer border (fig. 6c) *singularis*
- Proximal cercal process is roughly triangular and directed inwards, while well-separated distal process is thumb-like, directed in- and downwards, and visible in lateral view; paraprocts rather triangular, with quite smooth outer border (fig. 6b)
..... *saralisa* sp. nov.

Discussion

Mesocnemis Karsch, 1891 is a highly distinctive genus by penis and appendage shape, venation, robust build, mostly pruinose males and ecology. The South African endemic genus *Metacnemis* Selys, 1863 is the only obvious relative (Pinhey, 1980). All species are associated with rivers. *M. dupuyi* Legrand, 1982 and *M. tisi* Lempert, 1992 are only known from the Gambia (Senegal, The Gambia) and Sinoe (Liberia) basins respectively (fig. 8). *M. robusta* (Selys, 1886) occurs mostly on rivers in the drier regions north of equatorial Africa, such as in the Volta, Ouémé and Nile. It is expected in the extreme north of the Congo basin. Only *M. singularis* occurs throughout most of tropical Africa. It mostly inhabits rivers, but also rocky lakeshores and sunny streams, often with other *Mesocnemis* species: e.g. *M. robusta* (O'Neill & Paulson, 2001; Tchibozo & Dijkstra, 2004), *M. tisi* (Lempert, 1992) and the new species (Dijkstra, 2007b).

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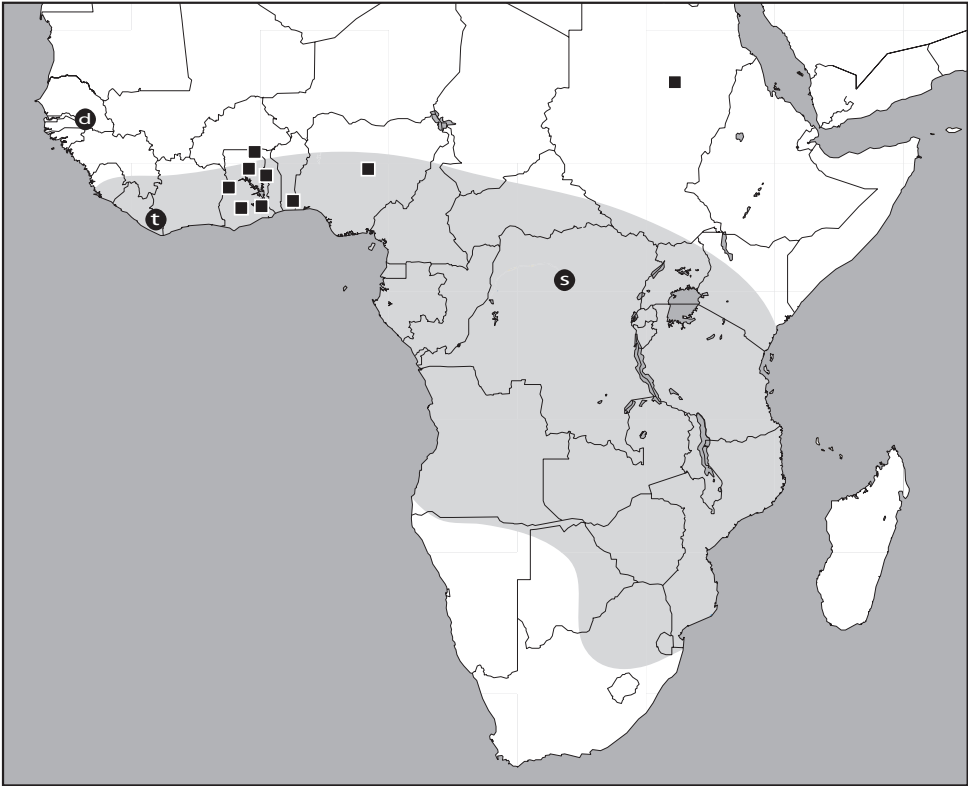


Fig. 8. Distribution of *Mesocnemis* species in tropical Africa. Legend – filled circles: single-basin species (d: *M. dupuyi* Gambia; s: *M. saralisa* Congo; t: *M. tisi* Sinoe); squares: *M. robusta* (exact locality in Nigeria unknown, extends to Nile Delta in Egypt); shading: approximate range *M. singularis*.

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