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Dragonfly and Damselfly (Insects: Odonata) inventory of the Réserve Naturelle des Gorilles de Lésio-Louna (RNGLL) on the Batéké Plateau in the Republic of Congo

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Abstract

We present records of 99 Odonata species from the Réserve Naturelle des Gorilles de Lésio-Louna (RNGLL) in the Republic of Congo (Congo-Brazzaville) collected during a short survey from 14 January to 01 February 2017. It is the first systematic Odonata inventory for the RNGLL and for the Congolese part of the species-rich Batéké Plateau. A short introduction is given about the existing knowledge of dragonflies and damselflies from the country. Amongst the recorded species eight are new for the country list, raising it to at least 208 species. Some of the recorded species are endemic and characteristic for sandy streams and rivers of the Batéké Plateau. The potential diversity of the plateau in comparison to other regions of the country is discussed.

Résumé

Au cours d'une courte mission d'inventaire, réalisée du 14 janvier au 01 février 2017, dans la Réserve Naturelle des Gorilles de Lésio-Louna (RNGLL) (République du Congo) 99 espèces d'Odonates ont été récoltées. Il s'agit du premier inventaire systématique des Odonates de la RNGLL et de la partie congolaise du plateau Batéké connu pour sa grande richesse spécifique. Une courte introduction est donnée sur les connaissances actuelles concernant les libellules et demoiselles du pays. Parmi les espèces récoltées lors de notre mission, huit sont nouvelles pour la faune de la R. du Congo qui atteint dès lors un total de 208 espèces. Quelques-unes des espèces récoltées sont endémiques et caractéristiques des cours d'eaux et rivières au lit de sable du plateau Batéké. La diversité spécifique potentielle du plateau est discuté pa rapport à d'autres régions du pays.

Key words: Odonata, *Lestes pinheyi* Fraser, 1955, *Lestes uncifer* Karsch, 1899, *Elatoneura odzala* (Aguesse, 1966), *Pseudagrion aureolum* Dijkstra, Mézière & Kipping, 2015, *Phyllo-macromia contumax* Selys, 1879, *Aethiothemis mediofasciata* Ris, 1931, *Crocothemis*

divisa Baumann, 1898, *Porpax sentipes* Dijkstra, 2006, *Trithemis apicalis* (Fraser, 1954), *Trithetrum navasi* (Lacroix, 1921), *Urothemis venata* Dijkstra, Mézière & Kipping, 2015.

Introduction

The Odonata fauna of Congo-Brazzaville is very little known but it is estimated to contain a minimum of about 260 species. Only few publications deal with Odonata from

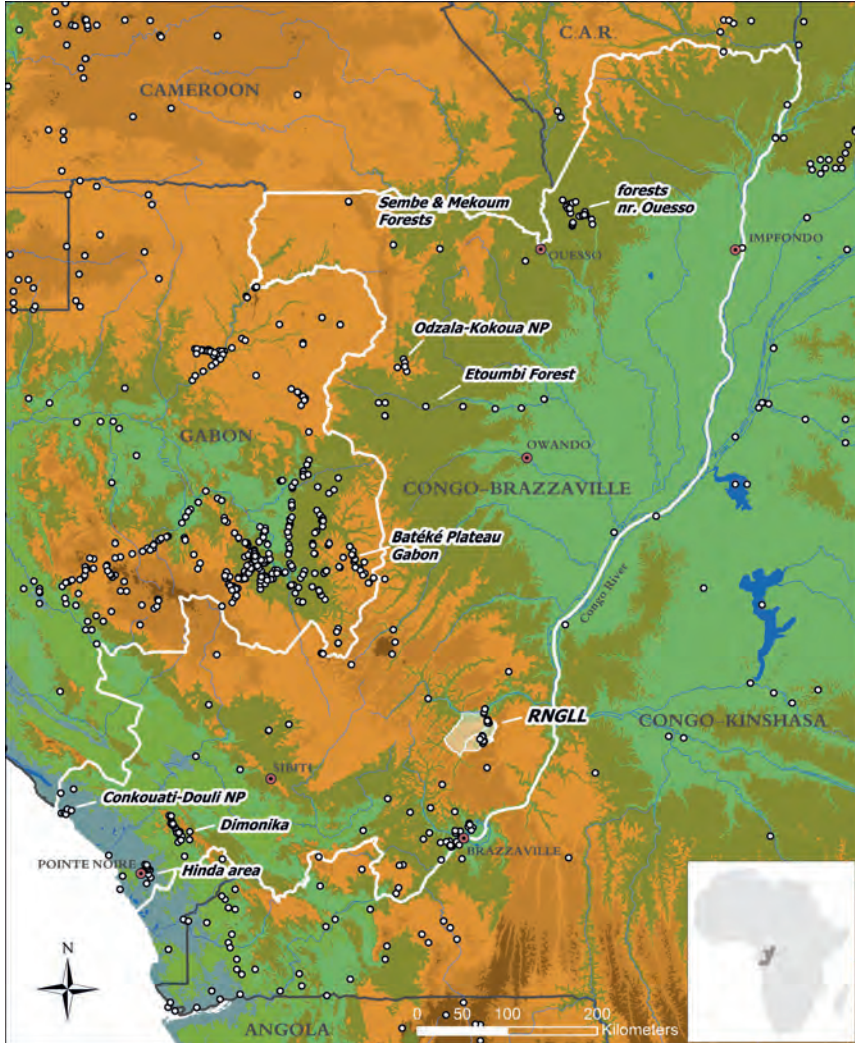


Figure 1: Map of Congo-Brazzaville (Republic of Congo) and adjacent countries. With available records in ODA (white dots) the location of RNGLL and place names mentioned in the text.

the country. Pinhey (1962) lists several selected records made by B.K. Watuliki in Ketta and Mambili Forests, Ouessou District, Etoumbi Forest, Makoua District and Mekoum and Sembé Forests in Souanké District. The material consists of 49 species and Pinhey described five new species out of it. Most collected material is held in the National Museum Bulawayo, Zimbabwe (NMBZ) and has been examined by K.-D.B. Dijkstra (Dijkstra 2007a, 2007b), but a few specimens were deposited in the National Museum of Kenya (NMK), Nairobi. Aguesse (1966) analysed the material of the scientific mission of A. Villiers and A. Descarpentries (1963-64) including 43 species and described two new species. This material was restudied after its return to the Museum National d'Histoire Naturelle (MNHN), Paris by Legrand & Lachaise (1980). Carletti (1997) provided in her thesis an overview about the Odonata fauna of the country containing many records collected by G. Onore at various locations in the Pool and Plateaux Departments. The material of this collection is stored either at the Museo Civico di Storia di Milano (MBNM) or Museo Zoologico 'La Specola' Firenze (MSNM), Italy. Terzani & Marconi (2008) reported about a small inventory of the Réserve Naturelle de Tchimpounga in the coastal region of the country. Several new species were described based on material from the Biosphere Reserve of Dimonika, Odzala-Kokoua National Park and around Brazzaville (Aguesse 1966, Legrand 1985, Legrand 1987, Carletti & Terzani 1997).

Unpublished records after 2000 originate from very few places like a forest area north of Ouessou (sampled in September 2014 by G.J. Diedericks), the Conkouati-Douli National Park (sampled in February 2010 by P.H. Lambret) and Hinda area, Pointe Noire surrounding (sampled in April-June 2014 by L. Niemand & C. Ngoulou). The Odonata Database of Africa (ODA) (Kipping et al. 2009, Clausnitzer et al. 2012) currently contains about 135,000 datasets from the whole African continent. Until 2016 only 1,752 records originate from Congo-Brazzaville and about 80% of these country records are older than 30 years. Hence huge parts of the country are completely unknown in terms of occurrence of Odonata species (see map in Figure 1). From recent and very intense research activities in Gabon by N. Mézière and colleagues from 2007 till 2015 it is known that especially the Batéké Plateau is home to many Odonata species, among them numerous endemics. The description of 60 new Odonata species from the African continent by Dijkstra et al. (2015) revealed the importance of that plateau and its surrounding rainforest as about one third of the new species derived from there. The sandy Batéké Plateau stretches from south-east Gabon deep into Congo-Brazzaville. Whereas the Gabonese part is relatively well surveyed only very few scattered Odonata records are known from the much larger part in the latter country.

The Réserve Naturelle des Gorilles de Lésio-Louna (RNGLL) is a protected area covering about 1,730 km². It is situated on the Batéké Plateau in Pool Department, 115 km NNE of Brazzaville west of the main road to Ouessou. The eastern border of the reserve runs parallel to this road, to the north the Lésio-Louna borders another protected area, the Lefini Reserve. The Lefini River forms the border between the two reserves, with the other main drainages of the Lésio-Louna Reserve are the Louna, Lésio and Loubilika Rivers. These three rivers flow northwards to the Lefini River that

is a tributary of the Congo River about 70 km to the east. The Louna River separates the reserve into a large Western and smaller Eastern sector.

Lésio-Louna Reserve was established on 28 December 1993 through an agreement between The Aspinall Foundation (TAF) of the UK and the Ministère de l'Economie Forestière, du Développement Durable et de l'Environnement (MEFDDEE) of the government of Congo-Brazzaville, as a sanctuary for the reintroduction of Western Lowland Gorillas (*Gorilla g. gorilla*) orphaned by the illegal bush-meat trade (King 2008, King et al. 2012). Later in 1999 it was upgraded to a Natural Reserve by Presidential Decree and increased in size by another Decree in 2009.

The landscape of Lésio-Louna is an extended wide valley, cutting into the surrounding Batéké Plateau. The valley is characterized by gently rolling hills, covered by grassland and dense gallery forest along the many river and stream courses (Figure 2). To the east, the park boundary follows mainly the escarpment up to the plateau, forming an up to 400 m high steep escarpment, partly forested and with rocky cliffs and outcrops. The geological underground consists mainly of poor sandy soils, forming the northernmost extend of fossil Kalahari sand shifted northwards during the Pleistocene (Walters et al. 2006). The altitude ranges from about 700 m on the plateau to 300 m in the river valleys.



Figure 2: Typical landscape of RNGLL south of Iboubikro Camp, Lésio River is meandering in the dense gallery forest at the valley floor, 31.i.2017. Photo by Hannes Krahnstöver.

The major habitats of the reserve are open *Loudetia* grassland and lightly wooded *Loudetia* or *Hyparrhenia* grassland, with gallery and swamp forests along the various watercourses, plus some patches of dry forest on higher ground (King & Chamberlain 2007). The savanna within and outside the reserve is burned regularly by the people living just outside it. Frequency and extent of fire are major drivers forming the present forest-savanna mosaic.

The climate of the reserve is similar to elsewhere on the plateau, with a dry season from late May to September, the heaviest rains in October-November and March-April, with a drier period around January-February (King 2011). Annual rainfall varies from 1,600 to 2,100 mm, the annual mean temperature is between 23°C and 25°C with an annual variation of only about 1.5°C. During our visit the day temperatures exceeded about 35°C with a high humidity. The days except two were mostly sunny, rainfall mainly occurred at night in form of a few thunderstorms.

Not a single dragonfly species has been recorded from the RNGLL in the past. As the RNGLL is part of the species-rich Batéké Plateau that lies right in the forest-savanna mosaic belt the number of Odonata species there might exceed well over 150 species.

We were asked by the Aspinall Foundation to conduct an inventory project on the Congolese side of this landscape in order to have an objective and global view of the species richness of the Odonata throughout the Batéké Plateau. The obtained results should also serve as a base for further research in the region.

Material & Methods

From 14 January to 01 February 2017 we surveyed various localities within the Réserve Naturelle des Gorilles de Lésio Louna (RNGLL) on the Batéké Plateau (18 field days).

Dragonflies were collected with the use of a hand-net. All accessible and different freshwater habitats were sampled, in order to collect a wide variety of species and considering many habitats.

The collected specimens were treated with acetone to achieve the best stage of preservation and specimen quality. Of a selection of species, a DNA tissue sample from some individuals were taken for later barcoding analyses.

The collection localities were georeferenced with a Garmin Map64st handheld-GPS. A photographic documentation of the collection sites and habitats has been taken. Important habitat parameters (vegetation, shading, bank structure, etc.) and water parameters (pH, conductivity, temperature) have been documented for most of the sampling site. Water parameters were measured with a handheld Hanna Instruments device, regularly calibrated. Of selected taxa photographs in life were obtained using modern digital camera techniques (SRL camera, macro-tele lens, flash).

Terms and abbreviations used: for the two Congos we use Congo-Brazzaville for the Republic of Congo and Congo-Kinshasa for the Democratic Republic of the Congo. Abdominal segments of odonates are abbreviated with S1-10. Acronyms used for collections are: CUMZ – University Museum of Zoology, Cambridge, UK; MBNM – Museo Civico di Storia di Milano, Italy; MRAC – Musée royal de l'Afrique Centrale, Tervuren, Belgium; MSNM – Museo Zoologico 'La Specola' Firenze, Italy.



Figure 3: Left: location of the main collecting sites in RNGLL (delineated in yellow). Right: sampling sites around Ibooukikro Camp. Base image by Google Earth.

Sampling locations

During the survey we visited five main collecting sites (see left map in Figure 2), mostly camps of the park staff with accommodation and some basic infrastructure. Our survey was constricted to the eastern sector of the reserve as no infrastructure is available in the western part. Movement between the camps was possible mainly by boat and vehicle. From the camps we spread out mostly on foot.

The following codes are used for all sampling locations in RNGLL where sampling was carried out. All coordinates given in decimal degree and WGS 84 format.

Iboubikro Main Camp (Figure 4)

The permanently used main camp of park staff and visitors in the valley of the Lésio River (about 360 m a.s.l.). The site is accessible by car from the main road via the village of Mâh on top of the surrounding plateau (710 m a.s.l.). The camp consists of staff houses and gorilla orphanage on the western side of the Lésio River. The camp is surrounded by dense gallery and swamp forest that holds a wide variety of different lentic and lotic habitats. Transition to grass savanna provide various ecotones and open freshwater habitats (see right map in Figure 3).

Collection periods from 14.01. - 21.01.2017 and from 29.01. - 01.02.2017.

Loc 1: Marsh area near the park entrance on the surrounding plateau, 1,2 km north-west of the village Mâh. Extended swamp and marsh with several shallow pools and dense reed vegetation (3.338S, 15.477 E).



Figure 4: C. Ngoulou and J. Kipping working on the catch of the day in Iboubikro Camp, 18.i.2017, Photo by Hannes Krahnstöver.

- Loc 2:** Lésio River up and downstream the wooden bridge east of the camp. Sandy, clear blackwater river with sunny and shaded sections and diverse currents. 6-8 m wide, up to 2 m deep, fine sand. Water parameters: pH 3.8, conductivity 0.0 μS , temperature 25.6°C. Surrounded by dense gallery forest, only limited sections touching open savanna (3.270S, 15.471E).
- Loc 3:** Lésio River, 4 km southwest of the camp. Open blackwater river meander with shallow water, 10 m wide, up to 1 m deep, fine sand (3.297S, 15.447E).
- Loc 4:** Sandy blackwater stream in dense swamp forest south of the camp, right hand side tributary to Lésio River. 1-2 m wide, 60 cm deep, sand, partly mud and coarse detritus. Water parameters: pH 3.9, conductivity 0.0 μS , temperature 24.4°C (3.272S, 15.470E).
- Loc 5:** Marantaceae swamp in forest east of the camp. Extended forest swamp in old river course, only partly accessible. Standing and flowing water. Water parameters: pH 4.0, conductivity 0.0 μS , temperature 26.5°C (3.270S, 15.472E).
- Loc 6:** Swamp forest south of the camp. Extended forest swamp, accessible by various paths (3.271S, 15.470E).
- Loc 7:** Forest edge in transition from swamp forest to grass savanna east of the camp (representative coordinate 3.272S, 15.472E).
- Loc 8:** Temporary shallow pool northwest of the camp, called Etang de Antelope. Standing clear water with grassy bank at forest edge in open situation, partly shaded by forest. Water parameters: pH 5.0, conductivity 100.0 μS , temperature 28.0°C (3.269S, 15.470E).
- Loc 9:** Temporary muddy pool northwest of the camp. Standing muddy water with grassy bank in open savanna, completely sunny. Watering place of various forest animals (3.261S, 15.471E).
- Loc 10:** Old oxbow of Lésio River northeast of camp. Boggy marsh with few temporary shallow pools in open situation. Water parameters: pH 5.5, conductivity 120.0 μS , temperature 27.5°C (3.269S, 15.475E).

Lac Bleu

A single collecting day on 19.01.2017. The lake lies isolated in a valley of the surrounding grassy hills on about 400 m a.s.l. Fringed by dense gallery forest (see right map in Figure 3).

- Loc 11:** Lac Bleu, about 5.3 km southeast of Iboubikro Main Camp. Large lake, about 5 m deep, 12 ha in extend. Clear water, sandy ground. Surrounded by dense gallery forest. Water parameters: pH 3.3, conductivity 0.0 μS , temperature 25.5°C (3.317S, 15.479E) (Figure 5).
- Loc 12:** Lac Bleu, dense gallery forest surrounding the lake. With forest swamp, small seepages, sources and streamlets draining to the lake (3.318S, 15.478E).
- Loc 13:** Lac Bleu, temporary small pools and boggy marsh in savanna near the lake (3.3137S, 15.482E).
- Loc 14:** Lac Bleu, sandy forest stream with gallery forest, 1.2 km east of Lac Bleu. Sandy stream with some coarse detritus, 1 m wide, 30 cm deep (3.314S, 15.489E).



Figure 5: Lac Bleu, fringed by dense gallery forest (Loc 11-Loc 14) with surrounding eastern plateau escarpment and bushfire in the background, 19.i.2017. Photo by Hannes Krahnstöver.

Abio II Camp

A permanently used satellite camp on the bank of the Louna River, 16.5 km north of Iboubikro Main Camp on about 330 m a.s.l. Accessible by car from the main road and by boat on the Louna River. A variety of freshwater habitats in the close surroundings, a large open river, some savanna pools and swamps. Forest habitats not as extensive as around Iboubikro and less accessible (see left map in Figure 6). Collection period from 22.01. - 26.01.2017 and 29.01.2017.

Loc 15: Louna River 500 m up and downstream the camp boat station. Sandy, slightly turbid blackwater river with large sunny sections and partly shaded by gallery forest. Meandering and forming islands and oxbows. About 40 m wide, up to 2 m deep, fine sand. Banks covered by grassy vegetation and swamps in shallow sections or forest. Water parameters: pH 5.1, conductivity 0.0 μS , temperature 24.0°C. Surrounded by one third grass savanna and two thirds dense gallery forest (3.131S, 15.525E).

Loc 16: Louna River 2 km north of Abio II, halfway to Abio I Camp by boat. Structure like Loc 13. Shallow bank with tall grassy vegetation (*Vossia cuspidata*) and extended swamp and forest behind (3.112S, 15.521E).

Loc 17: Temporary shallow pool north of the camp. Standing water with grassy bank in completely open situation. Water parameters: pH 5.0, conductivity 40.0 μS , temperature 28.3°C, soft, muddy ground (3.129S, 15.526E) (Figure 7).

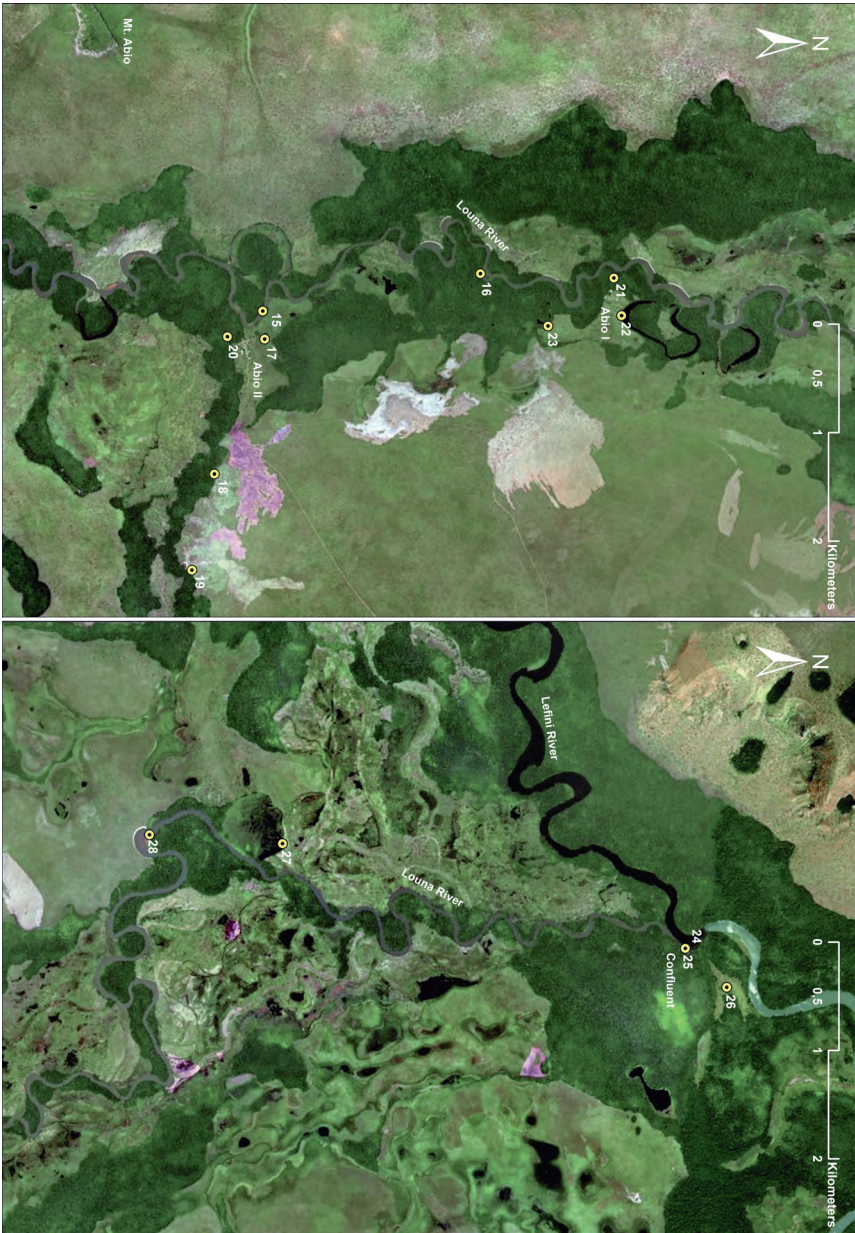


Figure 6: Left: sampling sites around both Abio Camps. Right: sampling sites around Confluent Camp. Base image by Google Earth.



Figure 7: Savanna pool at Abio II Camp (Loc 17), 22.i.2017. Photo by JK.



Figure 8: Rather inaccessible swamp forest near Abio II Camp (Loc 18), 24.i.2017. Photo by JK.

Loc 18: Forest edge in transition from swamp forest (Figure 8) to grass savanna east of camp (representative coordinate 3.134S, 15.537E).

Loc 19: Forest river 2 km east of the camp, smaller tributary of Louna River. Meander of shallow sandy river, flowing for short time in open situation before disappearing in forest again. 8-10 m wide, up to 1.5 m deep. Water parameters: pH 4.9, conductivity 20.0 μS , temperature 25.0°C, sandy ground with riffles (3.136S, 15.545E) (Figure 9).

Loc 20: Forest river as of Loc 19 but close to camp and surrounded by dense gallery forest, 4 m wide, up to 2 m deep, sandy ground with deep muddy bank and much organic detritus (3.132S, 15.526E).



Figure 9: A nameless tributary of the Louna River near Abio II Camp (Loc 19), with Mt. Abio in the background, 26.i.2017. Photo by Hannes Krahnstöver.

Abio I Camp

A temporarily used satellite camp next to the Louna River approximately 3.4 km north of Abio II Camp on about 330 m a.s.l. Normally accessible by boat from Abio II. Surrounding habitats similar as at Abio II Camp but with a large oxbow lake (see left map in Figure 6).

A single collecting day on 24.01.2017.

Loc 21: Gallery forest between Louna River and camp. Swamp forest, deeply shaded with few small water bodies (3.101S, 15.521E).

Loc 22: Large oxbow lake just north of the camp. Large, clear lake with grassy vegetation at the bank, mostly in open, sunny situation (3.100S, 15.524E).

Loc 23: Forest edge south of the camp. Transition from swamp forest to grass savanna (3.106S, 15.525E).

Confluent Camp

The northernmost of the visited camps lies on the right-hand bank of the Lefini River just 200 m downstream from confluence with Louna River on about 320 m a.s.l. Next to the river a dense gallery forest, not well accessible and few boggy swamps in patches of savanna. Sampling along Louna River by boat also took place on the way back to Abio II Camp (see right map in Figure 6).

Collection period from 27.01. - 28.01.2017.

Loc 24: Lefini River at Confluent Camp. Large sandy whitewater river, 90-120 m wide with partly strong current. Fringed by dense gallery forest on both sides, in places narrow grassy vegetation (2.993S, 15.496E).

Loc 25: Dense swamp forest around Confluent Camp. Not well accessible with limited pathways and some clearings (2.992S, 15.497E).

Loc 26: Open, boggy marsh area northeast of Confluent Camp. Large grassy savanna patch with a central large marsh area. Extended shallow and muddy pools with boggy marsh around, surrounded by forest and savanna (2.990S, 15.499E).

Loc 27: Oxbow lake west of Louna River, 3.8 km S of Confluent Camp, on the way to Abio II Camp by boat. Small open water section of a large lake mostly covered by dense reeds and sedges (3.027S, 15.487E).

Loc 28: Louna River 5 km south of Confluent Camp, on the way to Abio II Camp by boat. Wide river with a shallow sandbank and grassy vegetation (*Vossia cuspidata*), with extended swamp and gallery forest behind (3.038S, 15.486E) (Figure 10).



Figure 10: In search for Odonata along a sandbank of the Louna River (Loc 28), 28.i.2017. Photo by Hannes Krahnstöver.

Results

During 18 days in the field we recorded a total number of 99 species of Odonata with 31 belonging to the suborder Zygoptera (Damselflies) and 68 to Anisoptera (Dragonflies). Altogether we obtained 1,064 single records both of collected specimens and observations.

Eight of the recorded species are new to the country list of Congo-Brazzaville. This increases the number of known taxa of this country from at least 200 to 208.

By far the richest sampling site within RNgLL was Iboubikro and surroundings with 86 recorded species, followed by Abio II with 62 species, Lac Bleu with 52 species. At Abio I and Confluent Camp we recorded 38 species.

The number of recorded taxa at the sites were affected by the variety of different habitats but also of the available collecting time and the accessibility of habitats.

Weather conditions during our survey were generally good with many sunny hours, only one day at Abio II has been lost due to rainy weather.

List of species

All authors contributed equally to collection of specimens, so collectors are not mentioned separately. The term (obs) indicates that exclusively or additionally a reliable observation of individuals is available. The term "♂, 10 ♂♀ (obs)" means that a male has been collected and 10 more individuals of both sexes were observed.

Zygoptera

Lestidae

Lestes pinheyi Fraser, 1955 – Pinhey's Spreadwing

A new species for the country. Common on the Batéké Plateau in neighbouring Gabon but not recorded yet in Congo-Brazzaville.

Loc 11: 2 ♂♂, 19.i.2017. **Loc 18:** ♂, 23.i.2017; ♀, 25.i.2017.

Lestes tridens McLachlan, 1895 – Spotted Spreadwing

Represents only the second record for the country.

Loc 8: ♂, 31.i.2017.

Lestes uncifer Karsch, 1899 – Sickle Spreadwing

The first records of this species for Congo-Brazzaville.

Loc 6: ♂, ♀, 21.i.2017. **Loc 7:** ♂, 21.i.2017.

Calopterygidae

Phaon camerunensis Sjöstedt, 1900 – Emerald Demoiselle

The most forest-dependent of the two *Phaon* species, absent from open larger rivers. At some forest streams both species coexist.

Loc 4: ♂, 16.i.2017; ♀, 18.i.2017; ♂, ♀, 20.i.2017; 2 ♂♂, 30.i.2017. **Loc 5:** 2 ♀♀, 17.i.2017.

Loc 6: ♂♀ (obs), 16.i.2017; 2 ♂♂, 18.i.2017.

Phaon iridipennis (Burmeister, 1839) – Glistening Demoiselle

Could also occur at forest streams in half-shade. The only *Phaon* species at larger rivers in open sunny conditions.

Loc 3: 2 ♀♀, 30.i.2017. **Loc 4:** 2 ♂♂, 31.i.2017. **Loc 5:** ♂, 15.i.2017. **Loc 16:** ♂, 24.i.2017. **Loc 24:** ♂, 10 ♂♀ (obs), 27.i.2017. **Loc 28:** 20 ♂♀ (obs), 28.i.2017.

Chlorocyphidae

Surprisingly only two species of this family were found at the streams and rivers of RNGLL. They occurred together at some small forest streams and medium-sized rivers. The common *P. picta* preferred more open and sunny conditions, and *C. aphrodite* smaller streams in the shade.

Chlorocypha aphrodite (Le Roi, 1915) – Blue Jewel

Loc 4: 2 ♂♂, ♀, 18.i.2017; ♂, 10 ♂♀ (obs), 20.i.2017; 3 ♂♂, ♀, 31.i.2017. **Loc 5:** ♀, 15.i.2017. **Loc 14:** 5 ♂♂, 10 ♂♀ (obs), 19.i.2017. **Loc 21:** 5 ♂♀ (obs), 24.i.2017.

Platycypha picta (Pinhey, 1962) – Petite Jewel

Loc 2: ♂, 2 ♀♀, 18.i.2017. **Loc 3:** 5 ♂♂ (obs), 30.i.2017. **Loc 4:** ♂, 18.i.2017; ♀, 20 ♂♀ (obs), 20.i.2017; 5 ♂♂, 31.i.2017. **Loc 5:** 3 ♂♂, 15.i.2017. **Loc 14:** ♂, 10 ♂♀ (obs), 19.i.2017. **Loc 16:** 5 ♂♂ (obs), 24.i.2017. **Loc 19:** 20 ♂♀ (obs), 22.i.2017; 20 ♂♀ (obs), 25.i.2017. **Loc 20:** 20 ♂♀ (obs), 26.i.2017. **Loc 24:** ♂ (obs), 27.i.2017.

Platycnemididae

Allocnemis nigripes (Selys, 1886) – Rainbow Yellowwing

More *Allocnemis* species were expected to occur in the area but only this widespread species was found at a single location. All individuals had blue markings on head and thorax indicating they had recently emerged. Found at tiny streamlets and seeps in forest.

Loc 12: 9 ♂♂, 5 ♀♀, 19.i.2017.



Figure 11: Male of *Elatoneura aurifex* from a forest stream near Iboubikro Camp, 20.i.2017. Photo by JK.

Elattonneura aurifex Dijkstra & Mézière, 2015 – Goldsmith Threadtail

Only the second record for the country, further museum specimens in CUMZ are known from Djoumouna River, 20 km southwest of Brazzaville. When described in 2015 from sandy forest streams and small rivers on the Batéké Plateau in neighbouring Gabon it was already expected to occur more widespread in the region (Dijkstra et al. 2015). At RNGLL the species inhabits a similar habitat as in Gabon, a small sandy stream in forest with few sun spots where the males settled.

Loc 4: 2 ♂♂, 20.i.2017 (see Figure 11).

Elattonneura incerta (Pinhey, 1962) – Swamp Threadtail

Loc 4: ♀, 18.i.2017; 50 ♂♀ (obs), 20.i.2017. **Loc 5:** 5 ♂♂ (obs) 15.i.2017. **Loc 6:** ♂, 14.i.2017; 3 ♂♂, 3 ♀♀, 15.i.2017; 4 ♂♂, ♀, 17.i.2017; ♂, ♀, 18.i.2017; ♂, 20.i.2017; 2 ♂♂, ♀, 31.i.2017. **Loc 7:** ♀, 18.i.2017; 30 ♂♀ (obs), 21.i.2017. **Loc 12:** 13 ♂♂, 3 ♀♀, 19.i.2017. **Loc 18:** 2 ♂♂, ♂♀ in copula (obs) 23.i.2017; ♂, 25.i.2017; 5 ♂♀ (obs) 26.i.2017. **Loc 19:** ♂, 26.i.2017. **Loc 21:** ♂, 10 ♂♀ (obs) 24.i.2017.

Elattonneura odzala (Aguesse, 1966) – Congo Threadtail

A little known species, described from Odzala National Park about 450 km N of RNGLL. So far only known from few specimens collected in Congo-Brazzaville and northern Congo-Kinshasa. Our material and observations help to clarify the taxonomic status and shows the remarkable colour change with maturity of the males for the first time. Freshly emerged and teneral males have white appendages and markings on S9-10 (see Figure 12). The black head bears a distinctive orange stripe (Figure 13) and white labrum. With age the abdomen becomes almost entirely black and the thorax black with broad contrasting yellow ante-humeral stripes and creamish sides. The pale markings on the prothorax and S1 become pale blue pruinose. The head become wholly black, contrasting with a lemon yellow labrum (see Figure 14).

We found the species in all maturity stages exclusively at the transitions from swamp forest to savanna, we assume that larvae live in small forest pools and forest swamp.

Loc 7: 3 ♂♂, 3 ♀♀, 17.i.2017; 3 ♂♂, 2 ♀♀, 15 ♂♀ (obs) 18.i.2017; 6 ♂♂, 25 ♂♀ (obs) 20.i.2017; 4 ♂♂, 50 ♂♀ (obs) 21.i.2017; 2 ♂♂, 31.i.2017. **Loc 12:** 2 ♂♂, 2 ♀♀, 19.i.2017. **Loc 18:** ♂, ♀, 23.i.2017; ♂, 10 ♂♀ (obs), 26.i.2017.

Elattonneura tsiamae Aguesse, 1966 – Rusty Threadtail

Described from Tsiam Forest near Brazzaville, this species has likely most of its known occurrence on the Batéké Plateau of Gabon and Congo-Brazzaville with few more scattered records in northern Congo-Brazzaville and Congo-Kinshasa. We found it mostly immediately near forest streams and rivers and once at a forested lake shore.

Loc 3: 7 ♂♂, 25 ♂♀ (obs), 18.i.2017. **Loc 4:** 3 ♂♂, 18.i.2017; 2 ♂♂, 29.i.2017; 6 ♂♂, 2 ♀♀, 31.i.2017. **Loc 6:** ♀, 16.i.2017. **Loc 12:** 7 ♂♂, 20 ♂♀ (obs), 19.i.2017.

Copera nyansana (Förster, 1916) – Eastern Featherleg

The species has been recorded for the first time in Congo-Brazzaville in a forest area near Ouessou in October 2014 by G. Diedericks. In RNGLL it was the only species of the genus but widely distributed and locally abundant in dense forest.



Figure 12: Young male of *Elatoneura odzalai* from a forest edge near Ibouikro Camp, 18.i.2017. Photo by JK.



Figure 13: Semi-adult male of *Elatoneura odzalai* from the same locality, 20.i.2017. Photo by JK.



Figure 14: Very mature male of *Elatoneura odzalai* from the same locality, 31.i.2017. Photo by JK.

Loc 6: ♂, 14.i.2017; ♂, 15.i.2017; 2 ♂♂, 2 ♀♀ (obs), 16.i.2017; ♀, 17.i.2017; 3 ♂♂, 3 ♀♀, 18.i.2017; 2 ♀♀, 29.i.2017. **Loc 18:** ♂, 25.i.2017. **Loc 19:** ♀, 26.i.2017. **Loc 20:** ♂, 26.i.2017. **Loc 21:** ♂, ♀, 3 ♀♀ (obs), 24.i.2017. **Loc 25:** ♂, 2 ♂♂ (obs), 27.i.2017.

Coenagrionidae

Aciagrion africanum Martin, 1908 – Blue Slim

Loc 13: ♂, 5 ♂♂ (obs), 19.i.2017. **Loc 17:** ♂♀ in copula, 22.i.2017. **Loc 27:** 5 ♂♀ (obs), 28.i.2017.

Aciagrion brosseti Legrand, 1982 – Yellow-winged Slim

Loc 1: 2 ♀♀, 14.i.2017. **Loc 8:** ♂♀ in copula, 3 ♂♂, ♀, 14.i.2017; ♂♀ in copula, 2 ♂♂, >20 ♂♀ (obs), 15.i.2017; 2 ♂♂, 18.i.2017; 2 ♂♂, 31.i.2017. **Loc 10:** 20 ♂♀ (obs), 18.i.2017. **Loc 13:** ♀, 19.i.2017. **Loc 17:** 10 ♂♀ (obs), 22.i.2017; 5 ♂♂, ♀, 24.i.2017. **Loc 22:** 10 ♂♀ (obs), 24.i.2017.

Agriocnemis exilis Selys, 1872

Loc 24: ♂, 28.i.2017.

Agriocnemis forcipata Le Roi, 1915 – Greater Pincer-tailed Wisp

Loc 2: 2 ♂♀ (obs), 16.i.2017. **Loc 6:** ♂, 17.i.2017. **Loc 7:** ♂, ♀, 20.i.2017. **Loc 8:** ♂, 3 ♂♂ (obs), 14.i.2017; ♂, ♀, 20 ♂♀ (obs), 15.i.2017; ♂, 16.i.2017; ♀, 21.i.2017; 2 ♂♂, 2 ♀♀, 31.i.2017. **Loc 17:** ♂, 20 ♂♀ (obs), 22.i.2017; ♀, 24.i.2017. **Loc 22:** 10 ♂♀ (obs), 24.i.2017. **Loc 24:** 2 ♀♀, 27.i.2017. **Loc 26:** ♂, 28.i.2017. **Loc 28:** 3 ♂♂ (obs), 28.i.2017.

Agriocnemis maclachlani Selys, 1877 – Forest Wisp

Loc 2: ♂, 14.i.2017; 5 ♂♀ (obs), 16.i.2017. **Loc 6:** 2 ♂♂, 14.i.2017; 11 ♂♂, 20 ♂♀ (obs), 15.i.2017; ♂, 17.i.2017; 7 ♂♂, 20.i.2017; ♂, 29.i.2017; 5 ♂♂, 31.i.2017. **Loc 7:** 3 ♂♂ (obs), 20.i.2017. **Loc 8:** ♂, 15.i.2017. **Loc 18:** >20 ♂♀ (obs), 25.i.2017. **Loc 21:** ♂, 24.i.2017. **Loc 23:** ♂, 24.i.2017.

Agriocnemis stygia Fraser, 1954 – Congo Wisp

Loc 6: ♀, 29.i.2017; ♀, 31.i.2017.

Agriocnemis victoria Fraser, 1928 – Lesser Pincer-tailed Wisp

Loc 8: ♂♀ in copula, 20 ♂♀ (obs), 15.i.2017. **Loc 9:** 15 ♂♀ (obs), 16.i.2017. **Loc 10:** 2 ♂♂, 16.i.2017; 10 ♂♀ (obs), 17.i.2017. **Loc 17:** 3 ♂♂, ♀, >100 ♂♀ (obs), 22.i.2017. **Loc 26:** ♀, 10 ♂♀ (obs), 27.i.2017; 2 ♂♂, 2 ♀♀, 28.i.2017. **Loc 27:** 2 ♂♀ (obs), 28.i.2017. **Loc 28:** 20 ♂♀ (obs), 28.i.2017.

Ceragrion annulatum Fraser, 1955 – Green-eyed Citril

The species distribution is concentrated on the sandy Batéké Plateau of Gabon and Congo-Brazzaville with very few other records from Brazzaville area, Cameroon, northern Angola and northern Congo-Kinshasa. It was encountered in RNgLL as the most common species of the genus widespread in dense swamp forest.

Loc 6: 6 ♂♂, 2 ♀♀, >20 ♂♀ (obs), 15.i.2017; 3 ♂♂, 16.i.2017; ♂, ♀, 17.i.2017; 2 ♂♂, 3 ♀♀, >10 ♂♀ (obs), 18.i.2017; 3 ♂♂, >20 ♂♀ (obs) 20.i.2017; 3 ♂♂, 31.i.2017. **Loc 12:** ♂, >20 ♂♀ (obs), 19.i.2017. **Loc 18:** 5 ♂♂ (obs), 22.i.2017; 2 ♂♂, 10 ♂♀ (obs), 23.i.2017; 10 ♂♀ (obs), 25.i.2017. **Loc 19:** ♂, 26.i.2017. **Loc 20:** 2 ♂♂, 10 ♂♀ (obs), 26.i.2017. **Loc 21:** 2 ♂♂, ♀, 5 ♂♀ (obs), 24.i.2017.

Ceragrion corallinum Champion, 1914 – Green-fronted Citril

Loc 6: ♂, 16.i.2017. **Loc 8:** ♂, 14.i.2017; 2 ♂♂, 15 ♀♀ (obs), 15.i.2017. **Loc 9:** 10 ♀♀ (obs), 16.i.2017. **Loc 10:** 10 ♂♂ (obs), 17.i.2017. **Loc 17:** 4 ♂♂, 15 ♀♀ (obs), 22.i.2017. **Loc 18:** 2 ♂♂ (obs), 22.i.2017. **Loc 22:** ♀, 24.i.2017. **Loc 26:** ♂, 20 ♀♀ (obs), 27.i.2017; ♂♀ in copula, 28.i.2017.

Ceragrion glabrum (Burmeister, 1839) – Common Citril

Loc 7: ♂, 2 ♂♂ (obs), 18.i.2017. **Loc 8:** ♂, 20 ♀♀ (obs), 14.i.2017; 2 ♂♂, ♀, >50 ♀♀ (obs), 15.i.2017. **Loc 10:** ♀, 29.i.2017. **Loc 17:** 2 ♂♂, 22.i.2017. **Loc 18:** 2 ♂♂ (obs), 25.i.2017. **Loc 22:** ♂, 24.i.2017. **Loc 23:** 10 ♀♀ (obs), 24.i.2017. **Loc 26:** ♂, ♂♀ in copula, >50 ♀♀ (obs), 27.i.2017; 6 ♂♂, ♂♀ in copula, 28.i.2017.

Ceragrion obfuscans Dijkstra, Mézière & Kipping, 2015 – Darkening Citril

There is only one previous record of this species from Congo-Brazzaville near Ouessou in September 2014 by G. Diedericks. The species is only known from dark swamp forest of the Batéké Plateau in Gabon and Congo-Brazzaville and from scattered records in northern Congo-Kinshasa (see DIJKSTRA et al. 2015). In RNGLL only found at swamp forest around Iboubikro and Lac Bleu.

Loc 6: 8 ♂♂, 4 ♀♀, >25 ♀♀ (obs), 15.i.2017; 2 ♂♂, 16.i.2017; 6 ♂♂, 3 ♀♀, 17.i.2017; 10 ♂♀ (obs), 18.i.2017; ♂, ♀, >20 ♀♀ (obs), 20.i.2017; 2 ♂♂, ♀, 29.i.2017. **Loc 12:** ♀, >10 ♀♀ (obs), 19.i.2017.

Ceragrion platystigma Fraser, 1941 – Variable Citril

The most scarce amongst the three forest *Ceragrion*, exclusively found around Iboubikro Camp in dark swamp forest.

Loc 6: ♀, 17.i.2017; 4 ♂♂, ♀, 3 ♀♀ (obs), 18.i.2017; ♂, 29.i.2017; ♂, 31.i.2017.

Ceragrion whellani Longfield, 1952 – Yellow-faced Citril

Loc 1: >10 ♀♀ (obs), 14.i.2017. **Loc 7:** ♂, 16.i.2017. **Loc 8:** ♀, 16.i.2017; ♂, 18.i.2017. **Loc 9:** 3 ♂♂ (obs), 16.i.2017. **Loc 10:** 2 ♂♂, 16.i.2017; 20 ♀♀ (obs), 17.i.2017; 3 ♂♂, 29.i.2017. **Loc 13:** ♂, 5 ♀♀ (obs), 19.i.2017.

Pseudagrion aureolum Dijkstra, Mézière & Kipping, 2015 – Nugget Sprite

A new species for Congo-Brazzaville. It is endemic to sandy and clear rivers on the Batéké Plateau of Gabon and Congo-Brazzaville.

Loc 16: ♂, 20 ♀♀ (obs), 24.i.2017. **Loc 19:** 10 ♀♀ (obs), 25.i.2017. **Loc 28:** 10 ♀♀ (obs), 28.i.2017.

Pseudagrion glaucescens Selys, 1876 – Blue-green Sprite

Loc 17: 3 ♂♂ (obs), 22.i.2017.

Pseudagrion glaucum (Sjöstedt, 1900)

Loc 2: ♂, 18.i.2017. **Loc 4:** ♂, 31.i.2017. **Loc 5:** ♂, 15.i.2017. **Loc 6:** 3 ♂♂, ♀, 10 ♀♀ (obs) 15.i.2017; 2 ♂♂, 17.i.2017. **Loc 12:** 2 ♂♂, 19.i.2017. **Loc 18:** 2 ♂♂ (obs), 24.i.2017. **Loc 25:** ♂, 27.i.2017.

Pseudagrion simplicilaminatum Carletti & Terzani, 1997 – Blue Slim Sprite

The species has its main distribution on the sandy plateaus in Gabon, Congo-Brazzaville, northern parts of Congo-Kinshasa and Angola. Abundant on the Batéké Plateau in neighbouring Gabon.

Loc 2: 2 ♂♂, ♀, 18.i.2017. **Loc 4:** ♂, ♀, 20.i.2017; ♂, 2 ♀♀, 31.i.2017. **Loc 6:** 2 ♂♂, 17.i.2017. **Loc 12:** 2 ♂♂, ♀, 19.i.2017.

Pseudagrion sjoestedti Förster, 1906 – Variable Sprite

The widespread species is highly variable both in size and colouration. In RNgLL we found the very dark and pruinose form, lacking any red colours (see Figure 15), that is also known from the Batéké Plateau in neighbouring Gabon.

Loc 4: ♂, 14.i.2017; ♂, 16.i.2017. **Loc 5:** ♂, 15.i.2017. **Loc 6:** ♂, 15.i.2017. **Loc 16:** 3 ♂♂, 20 ♀♀ (obs), 24.i.2017. **Loc 19:** ♂, 26.i.2017. **Loc 24:** ♂, 26.i.2017; 20 ♀♀ (obs), 27.i.2017. **Loc 28:** ♂, 20 ♀♀ (obs), 28.i.2017.



Figure 15: Male of the very dark and pruinose form of *Pseudagrion sjoestedti*, present in RNgLL. Here from Batéké Plateau in Gabon, 28.i.2012. Photo by JK.

Anisoptera

Aeshnidae

Anax ephippiger (Burmeister, 1839) – Vagrant Emperor

Loc 1: ♂ (obs), 14.i.2017.

Anax tristis Hagen, 1867 – Black Emperor

Loc 1: ♂ (obs), 14.i.2017.

Gynacantha bullata Karsch, 1891 – Black-kneed Duskhawker

Loc 6: ♂, 15.i.2017; ♂, 21.i.2017; ♀, 31.i.2017. **Loc 18:** ♂ (obs), 23.i.2017. **Loc 21:** 2 ♂♂ (obs), 24.i.2017.

Heliaeschna cynthiae Fraser, 1939 – Bade-tipped Duskhawker

Only the second location where the species has been found in Congo-Brazzaville.

Loc 6: ♂, 17.i.2017; ♀, 20.i.2017; ♂, 21.i.2017; ♀, 31.i.2017.

Heliaeschna sembe Pinhey, 1962 – Hybrid Duskhawker

The large and remarkable species has been described from Sembé, Souanké District in Congo-Brazzaville, 530 km north of RNgLL and is widespread in tropical Africa. Our finding is only the fourth record for the country.

Loc 6: ♂, 31.i.2017.

Gomphidae

Despite intense searches we only recorded a single adult of this family. Considering the many larvae, we found in the sandy substrate and detritus of the Lésio River it is likely that adults are more active during another season.

Gomphidia gamblesi Gauthier, 1987 – Western Fingertail

A single male, settling on tall vegetation on the Lésio River bank is only the second record of this species for Congo-Brazzaville.

Loc 2: ♂, 31.i.2017.

Lestinogomphus spec. – Fairytail spec.

Loc 3: exuvia, 30.i.2017.

Neurogomphus spec. – Siphontail spec.

Loc 2: 2 larvae, 30.i.2017.

Paragomphus spec. – Hooktail spec.

Loc 2: 15 larvae, 30.i.2017.

Phyllogomphus spec. – Leaf-tail spec.

Loc 2: 3 larvae, 30.i.2017. **Loc 3:** exuvia, 30.i.2017. **Loc 16:** exuvia, 24.i.2017.

Macromiidae

Members of the genus *Phyllomacromia* were scarce during our survey. This might have its reason in the seasonality of species as we sampled several unidentified *Phyllomacromia* larvae in leaf litter of the Lésio River.

Phyllomacromia contumax Selys, 1879 – Two-Banded Cruiser

The first record of this species for Congo-Brazzaville. All individuals showed the very black colouration typical for Central Africa.

Loc 11: 10 ♂♂ (obs), 19.i.2017. **Loc 12:** ♂, 19.i.2017. **Loc 23:** 2 ♂♂ (obs), 24.i.2017.

Phyllomacromia melania (Selys, 1871) – Western Unicorn Cruiser

Loc 6: ♀, 21.i.2017.

Phyllomacromia spec. – Cruiser spec.

Loc 2: 10 larvae, 30.i.2017.

Libellulidae

Acisoma inflatum Selys, 1882 – Stout Pintail

Loc 8: ♀, 15.i.2017. **Loc 17:** 4 ♂♂, ♀, 10 ♂♀ (obs), 22.i.2017. **Loc 26:** ♂, 27.i.2017.

Acisoma trifidum Kirby, 1889 – Pied Pintail

Loc 1: ♂ (obs), 14.i.2017. **Loc 8:** ♂, 14.i.2017; 2 ♂♂, 15.i.2017; ♂, 18.i.2017. **Loc 17:** 2 ♂♂, ♀, >20 ♂♀ (obs), 22.i.2017. **Loc 18:** ♀, 2 ♂♂ (obs), 26.i.2017. **Loc 22:** ♂, ♀, 24.i.2017. **Loc 23:** 10 ♂♀ (obs), 24.i.2017. **Loc 25:** ♂, ♀, 20 ♂♀ (obs), 27.i.2017.

Aethiothemis circe (Ris, 1910) – Golden-winged Flasher

This is a poorly known species, in Congo-Brazzaville only recorded recently in Conkouati-Douli National Park in 2010 by P. Lambret and near Ouessou in 2014 by G. Diedericks. Described as *Lokia circe* Ris, 1910 from Mayumbe in northern Congo-

Kinshasa most available records are from this country. During our survey the species was common along the edges of swamp and gallery forests. Most of the individuals were juvenile. Only two males showed the very mature colouration with blue eyes, pitch black thorax, the dark dorsal abdomen with pale blue pruinosity on S1-4 and ventral abdomen deep red with black apical rings (see Figure 18). Juveniles of both sexes were wholly pale brown (see Figure 16). As a prominent character the females bear large, soft and transparent foliations on abdominal S8 (Figure 17). Juvenile females showed either completely amber brown wings or clear wings with an amber basal patch and sometimes an additional apical one. This dimorphism is also known from adult males in MRAC collection (Dijkstra in litt.).

We observed few individuals in mating wheels. As reproduction site we assume small to medium sized forest streams. Once a mature male was seen and captured

Figure 16: Im-mature male of *Aethiothemis circe* from fo-
rest edge near
Iboubikro Camp,
31.i.2017. Photo
by JK.



Figure 17: Im-mature female
of *Aethiothemis*
circe from the
same locality,
note the large
and very thin fo-
liations on abdo-
minal S8, 18.i.
2017. Photo by
JK.





Figure 18: Mature male of *Aethiothemis circe* from RNGLL, 31.i.2017. Photo by JK.



Figure 19: Male of *Aethiothemis mediofasciata* from savanna at Iboubikro Camp, 16.i.2017. Photo by JK.

after flying down rapidly from the canopy to a small sun spot at a shaded forest stream (Loc 4).

Loc 4: ♂, 31.i.2017 (Figure 18). **Loc 7:** 3 ♀♀, 17.i.2017; 2 ♀♀, 5 ♂♂ in copula (obs), 18.i.2017; ♀, ♂ (obs), 20.i.2017; ♀, 21.i.2017; ♀, 31.i.2017. **Loc 18:** 3 ♀♀ (obs), 22.i.2017; 2 ♂♂, 6 ♂♂ (obs), 23.i.2017; ♂, ♀, 25.i.2017; 2 ♂♂, 26.i.2017.

Aethiothemis erythromelas (Ris, 1910) – Pin-tailed Flasher

Loc 7: ♂ (obs), 16.i.2017. **Loc 18:** ♀, 26.i.2017.

Aethiothemis mediofasciata Ris, 1931 – Orange Flasher

Only a historic record from Musana, a former Swedish mission post near Brazzaville, exist so far from Congo-Brazzaville. Ris (1931) described this species from a single distorted and discoloured female collected by Monard at Chimporo in southern Angola in 1928. While the holotype agrees with females associated with

a species found in Gabon and Congo-Brazzaville, the recent rediscovery of *A. gamblesi* (Lieftinck, 1969) in Zambia by the first author casts doubt on its taxonomic status. Males are almost identical, the abdomen being orange with maturity in *A. mediofasciata* (Figure 19) and blue pruinose in *A. gamblesi*. No characters to separate females are known yet. The Angolan type locality is highly isolated: 1,300 km south of the nearest recorded orange male and 900 km west of the nearest pruinose male (Kipping et al. 2017). Likely only first records of males from Angola can resolve the issue. Like on the Gabonese part of the Batéké Plateau we encountered the species always in open savanna with thin grassy vegetation near small boggy pools.

Loc 7: 3 ♂♂, 15.i.2017; ♀, 20.i.2017. **Loc 9:** ♂, 16.i.2017. **Loc 17:** ♂, 24.i.2017.

Aethiothemis solitaria Ris in Martin, 1908 – Pearly Flasher

Loc 7: ♀, 16.i.2017. **Loc 9:** ♂, 16.i.2017. **Loc 10:** ♀, 16.i.2017. **Loc 17:** ♂, 2 ♂♂ (obs), 22.i.2017. **Loc 18:** ♂, 26.i.2017. **Loc 22:** ♂, 24.i.2017.

Aethriamanta rezia Kirby, 1889 – Pygmy Basker

Loc 8: 2 ♂♂, 2 ♂♂ (obs), 15.i.2017; ♂, 16.i.2017; ♀, 18.i.2017. **Loc 9:** 2 ♂♂ (obs), 16.i.2017. **Loc 17:** 3 ♂♂, 100 ♂♀ (obs), 22.i.2017. **Loc 22:** 2 ♂♂, 24.i.2017. **Loc 23:** 10 ♂♀ (obs), 24.i.2017. **Loc 26:** 20 ♂♀ (obs), 27.i.2017. **Loc 27:** 15 ♂♀ (obs), 28.i.2017.

Brachythemis lacustris (Kirby, 1889) – Red Groundling

Loc 28: ♂, 5 ♂♂ (obs), 28.i.2017.

Chalcostephia flavifrons Kirby, 1889 – Inspector

Loc 2: ♂, 14.i.2017. **Loc 6:** ♂, 15.i.2017; ♂, 2 ♀♀, 17.i.2017; 3 ♂♂, 2 ♀, 20.i.2017; ♂, 21.i.2017. **Loc 8:** 15 ♂♀ (obs), 14.i.2017. **Loc 9:** 5 ♂♂ (obs), 14.i.2017. **Loc 18:** 5 ♂♀ (obs), 22.i.2017; 3 ♀♀, 26.i.2017. **Loc 23:** 3 ♂♂, 2 ♀♀, 50 ♂♀ (obs), 24.i.2017. **Loc 25:** ♂, 2 ♀♀, 100 ♂♀ (obs), 27.i.2017.

Crocothemis divisa Baumann, 1898 – Rock Scarlet

A new species for Congo-Brazzaville. *Crocothemis divisa* is regularly associated with rock pools. The single specimen originates probably from rocky cliffs at the falaise near Loc 13.

Loc 13: ♂, 19.i.2017.

Cyanothemis simpsoni Ris, 1915 - Bluebolt

The second finding of the remarkable and unmistakable black and blue species for the country after a record from rainforest areas near Ouesso in September 2014 by G. Diedericks. Sight record only.

Loc 4: ♂ (obs), 20.i.2017.

Diplacodes lefebvrei (Rambur, 1842) – Black Percher

Loc 7: ♂, 21.i.2017. **Loc 10:** ♂, 16.i.2017. **Loc 13:** ♂, 5 ♂♂ (obs), 19.i.2017. **Loc 17:** 4 ♂♂, 30 ♂♀ (obs), 22.i.2017; ♂, 25.i.2017. **Loc 22:** ♂, 24.i.2017. **Loc 26:** 20 ♂♀ (obs), 27.i.2017.

Diplacodes luminans (Karsch, 1893) – Barbet Percher

Loc 1: 5 ♂♀ (obs), 14.i.2017. **Loc 8:** 2 ♂♂ (obs), 14.i.2017; ♂, 15.i.2017. **Loc 13:** ♂, 3 ♂♂ (obs), 19.i.2017. **Loc 17:** 20 ♂♀ (obs), 22.i.2017. **Loc 22:** ♂, 24.i.2017. **Loc 26:** ♂, 27.i.2017.

Eleuthemis spec. – Firebelly spec.

Only a single sight record is available which does not enable identification to species level. One male was seen from a boat while perching on overhanging twigs on the bank of the Louna River. According to Dijkstra et al. (2015) the presence of at least two undescribed species is likely in the region. So far, the genus *Eleuthemis* Ris, 1910 has generally been treated as monotypic (Dijkstra 2007a). Today five valid species are described and there is evidence that at least three more exist: among them are two co-occurring in neighbouring Gabon that are similar to the dark *E. buettikoferi* Ris, 1910 and *E. umbrina* Dijkstra & Lempert 2015 from West Africa.

Loc 15: ♂ (obs), 24.i.2017.

Hadrothemis defecta (Karsch, 1891) – Scarlet Jungleskimmer

Loc 5: ♂ (obs), 17.i.2017. **Loc 7:** ♂, 20.i.2017. **Loc 10:** ♂ (obs), 17.i.2017. **Loc 12:** ♀, 10 ♂♀ (obs), 19.i.2017. **Loc 18:** ♂, 25.i.2017; 2 ♂♂ (obs), 26.i.2017. **Loc 23:** ♀, 24.i.2017. **Loc 24:** ♂ (obs), 27.i.2017. **Loc 26:** 3 ♂♂ (obs), 27.i.2017.

Hadrothemis infesta (Karsch, 1891) – Slender Jungleskimmer

Loc 23: ♀, 24.i.2017.

Hadrothemis versuta (Karsch, 1891) – Variable Jungleskimmer

Loc 18: ♀, 26.i.2017.

Hemistigma albipunctum (Rambur, 1842) – African Pied-Spot

Loc 1: 5 ♂♀ (obs), 14.i.2017. **Loc 8:** 2 ♂♂, 20 ♂♀ (obs), 14.i.2017; ♂, 20 ♂♀ (obs), 15.i.2017. **Loc 9:** 10 ♂♀ (obs), 16.i.2017. **Loc 10:** ♀, 16.i.2017; ♂, 20 ♂♀ (obs), 17.i.2017. **Loc 17:** ♀, 30 ♂♀ (obs), 22.i.2017. **Loc 18:** 10 ♂♀ (obs), 23.i.2017; ♂, 26.i.2017. **Loc 22:** ♂, 10 ♂♀ (obs), 24.i.2017. **Loc 23:** 10 ♂♀ (obs), 24.i.2017. **Loc 26:** 2 ♂♂, 100 ♂♀ (obs), 27.i.2017. **Loc 27:** 10 ♂♀ (obs), 28.i.2017. **Loc 28:** 10 ♂♂ (obs), 28.i.2017.

Neodythemis preussi (Karsch, 1891) – Swamp Junglewatcher

Loc 4: ♂, 30.i.2017. **Loc 6:** ♂, 20.i.2017; ♂, 31.i.2017. **Loc 12:** 7 ♂♂, 6 ♀♀, 50 ♂♀ (obs), 19.i.2017.

Neophya rutherfordi Selys, 1881 - Feeblewing

So far only recorded from the forests in the north like Odzala National Park and near Ouesso. As usual we only recorded females.

Loc 4: ♀, 18.i.2017, ♀, 31.i.2017.

Olpogastra lugubris Karsch, 1895 - Bottletail

Loc 16: 5 ♂♂ (obs), 24.i.2017. **Loc 24:** 2 ♂♂, 28.i.2017. **Loc 28:** 5 ♂♂ (obs), 28.i.2017.

Orthetrum africanum (Selys, 1887) – Elongate Skimmer

Loc 5: ♂ (Figure 20), ♀, 15.i.2017; ♀, 17.i.2017. **Loc 7:** ♀, 16.i.2017; 3 ♂♂, 20.i.2017; 5 ♂♂, 21.i.2017. **Loc 17:** ♂, 22.i.2017. **Loc 18:** 5 ♂♂ (obs), 22.i.2017; 2 ♂♂, 10 ♂♀ (obs), 26.i.2017. **Loc 19:** 2 ♂♂ (obs), 25.i.2017. **Loc 23:** 2 ♂♂, 5 ♂♀ (obs), 24.i.2017.

Orthetrum austeni (Kirby, 1900) – Giant Skimmer

Loc 5: ♀, 17.i.2017. **Loc 7:** 10 ♂♀ (obs), 18.i.2017. **Loc 8:** ♂, ♀, 10 ♂♀ (obs), 15.i.2017. **Loc 9:** 10 ♂♀ (obs), 16.i.2017.



Figure 20: Male of *Orthetrum africanum* showing the very slender abdomen, unique among African Skimmers, 17.i.2017. Photo by JK.

Orthetrum brachiale (Palisot de Beauvois, 1817) – Banded Skimmer

Loc 8: ♂, ♀, 2 ♂♂ (obs), 15.i.2017. **Loc 10:** ♂, ♀, 2 ♂♂ (obs), 17.i.2017. **Loc 13:** 2 ♂♂, 10 ♀♀ (obs), 19.i.2017. **Loc 17:** 2 ♂♂, 22.i.2017. **Loc 18:** 10 ♂♀ (obs), 23.i.2017. **Loc 23:** 2 ♂♂ (obs), 24.i.2017.

Orthetrum hintzi Schmidt, 1951 – Dark-shouldered Skimmer

Loc 7: 3 ♂♂, 5 ♀♀ (obs), 15.i.2017; ♂, 18.i.2017; ♂ (obs), 21.i.2017; 2 ♂♂, ♀, 31.i.2017. **Loc 8:** ♀, 14.i.2017. **Loc 10:** 2 ♀♀, 16.i.2017; ♂, 10 ♀♀ (obs), 17.i.2017. **Loc 13:** 20 ♀♀ (obs), 19.i.2017. **Loc 17:** ♂, 22.i.2017. **Loc 18:** 10 ♂♀ (obs), 22.i.2017; ♂, 23.i.2017; 2 ♂♂, 25.i.2017. **Loc 22:** ♂, 24.i.2017.

Orthetrum icteromelas Ris, 1910 – Spectacled Skimmer

Loc 8: ♂, 31.i.2017. **Loc 9:** 10 ♂♀ (obs), 16.i.2017. **Loc 10:** 2 ♂♂, ♀, 16.i.2017; 10 ♂♀ (obs), 17.i.2017. **Loc 26:** ♂, ♂ (obs), 27.i.2017.

Orthetrum julia Kirby, 1900 – Julia Skimmer

Loc 7: ♂, ♀, 20.i.2017.

Orthetrum saegeri Pinhey, 1966 – Eastern Mushroom Skimmer

Loc 6: ♂, 17.i.2017. **Loc 7:** 2 ♂♂, 5 ♀♀ (obs), 18.i.2017; 2 ♂♂ (obs), 20.i.2017; ♂, ♀, 31.i.2017. **Loc 18:** ♂, 10 ♂♀ (obs), 23.i.2017. **Loc 23:** 2 ♂♂ (obs), 24.i.2017.

Orthetrum stemmale (Burmeister, 1839) – Bold Skimmer

Loc 23: ♂, 24.i.2017.



Figure 21: Male of *Oxythemis phoenicosceles* from a Marantaceae forest swamp at Iboubikro Camp, 17.i.2017. Photo by JK.

Oxythemis phoenicosceles Ris, 1910 - Pepperpants

Loc 3: ♂, 14.i.2017. **Loc 5:** 4 ♂♂, 2 ♀♀, 15.i.2017; 2 ♂♂, ♀, 17.i.2017; ♂ (Figure 21), 18.i.2017; ♀, 20.i.2017. **Loc 7:** 10 ♂♀ (obs), 18.i.2017; ♀, 20.i.2017; 20 ♂♀ (obs), 21.i.2017; 2 ♂♂, 31.i.2017. **Loc 23:** ♂, ♀, 25 ♂♀ (obs), 24.i.2017.

Palpopleura albifrons Legrand, 1979 – Pale-faced Widow

First describing this species from Makoukou in Gabon, Legrand (1979) initially considered it a forest species. This would be a very unusual habitat for a genus whose members belong to the savanna faunas of Africa. In reality *P. albifrons* is typical of the forest-savanna mosaic, living at small boggy pools and seepages in open savanna always in the close proximity to forest. It is common in the Gabonese part of the Batéké Plateau and distributed over Congo-Kinshasa and northern Angola to northern Zambia. In Congo-Brazzaville it is so far known only from Lefini and Odzala. It was locally common in RNGLL at small savanna pools and regularly encountered at nearby forest edges, but never in forest.

Loc 7: 5 ♂♀ (obs), 18.i.2017. **Loc 9:** 5 ♂♀ (obs), 16.i.2017. **Loc 10:** 2 ♂♂, ♀, 16.i.2017; 7 ♂♂, >30 ♂♀ (obs, see Figure 22), 17.i.2017. **Loc 13:** 15 ♂♀ (obs), 19.i.2017. **Loc 17:** ♀, 22.i.2017. **Loc 18:** 10 ♂♀ (obs), 22.i.2017; 10 ♂♂ (obs), 23.i.2017; 5 ♂♀ (obs), 26.i.2017. **Loc 22:** ♂, 24.i.2017. **Loc 23:** 10 ♂♀ (obs), 24.i.2017.

Palpopleura lucia (Drury, 1773) – Lucia Widow

Loc 1: 20 ♂♀ (obs), 14.i.2017. **Loc 7:** ♂, 18.i.2017. **Loc 8:** 15 ♂♀ (obs), 15.i.2017; ♀,



Figure 22: Male of *Palpopleura albifrons* with the characteristic white frons defending territory at a small savanna pool, 17.i.2017. Photo by JK.

18.i.2017. **Loc 10:** 2 ♂♂, 3 ♀♀, 16.i.2017; 3 ♂♂, 17.i.2017. **Loc 13:** ♂, ♀, >50 ♂♀ (obs), 19.i.2017. **Loc 17:** ♂, 22.i.2017. **Loc 18:** 10 ♂♀ (obs), 22.i.2017; 25 ♂♀ (obs), 23.i.2017; ♂, 26.i.2017. **Loc 22:** ♂, 24.i.2017. **Loc 23:** 10 ♂♀ (obs), 24.i.2017.

Palpopleura portia (Drury, 1773) – Portia Widow

Loc 9: 2 ♂♂ (obs), 16.i.2017. **Loc 10:** ♂, 16.i.2017.

Pantala flavescens (Fabricius, 1798) – Wandering Glider

Loc 10: ♂, 20.i.2017.

Parazyxomma flavicans (Martin, 1908) – Banded Duskdarter

Loc 5: ♂, 17.i.2017.

Porpax asperipes Karsch, 1896 – Powdered Pricklyleg

Loc 12: 2 ♂♂, ♀, 5 ♂♀ (obs), 19.i.2017. **Loc 18:** 2 ♀♀, 25.i.2017; ♂♀ in copula (obs), 26.i.2017.

Porpax sentipes Dijkstra, 2006 – Congo Pricklyleg

These are the first records for the country. Occurring in northern Congo-Kinshasa, on the Batéké Plateau of Gabon and now in Congo-Brazzaville.

Loc 7: ♂, ♀, 18.i.2017; ♂, 20.i.2017.



Figure 23: Male of *Rhyothemis notata* from Marantaceae swamp near Iboubikro, 17.i.2017. Photo by JK.

Rhyothemis fenestrina (Rambur, 1842) – Skylight Flutterer

A widespread African species with only two older records from Congo-Brazzaville. In RNGLL found at the open and sunny savanna pools, whereas the similar *R. notata* preferred half-shaded Marantaceae swamps in forest.

Loc 1: 2 ♂♀ (obs), 14.i.2017. **Loc 8:** ♂, 15.i.2017. **Loc 17:** 3 ♂♂, ♀, 22.i.2017. **Loc 18:** 2 ♀♀ (obs), 22.i.2017; 10 ♂♀ (obs), 23.i.2017. **Loc 26:** ♂, 20 ♀♀ (obs), 27.i.2017.

Rhyothemis notata (Fabricius, 1781) – Veiled Flutterer

This species was seen in large fluttering flocks swarming over the swamp forests with many hundreds of individuals.

Loc 2: 2 ♂♂ (obs), 14.i.2017. **Loc 5:** 4 ♂♂, 20 ♂♀ (obs), 15.i.2017; ♂ (Figure 23), 17.i.2017. **Loc 7:** ♂, 20.i.2017; 3 ♂♂, ♀, 31.i.2017. **Loc 16:** ♂, 24.i.2017. **Loc 18:** 5 ♂♂ (obs), 22.i.2017; ♂♀, 10 ♂♀ (obs), 23.i.2017; 30 ♀♀ (obs), 26.i.2017. **Loc 23:** ♂, 50 ♂♀ (obs), 24.i.2017. **Loc 25:** ♂, 2 ♀♀, 20 ♂♀ (obs), 28.i.2017. **Loc 28:** >1,000 ♂♀ (obs), 28.i.2017.

Tetrathemis camerunensis (Sjöstedt, 1900) – Forest Elf

Not many records from Congo-Brazzaville exist of this widespread African forest species and it was rather scarce during our survey.

Loc 5: ♂, 17.i.2017. **Loc 7:** ♂, 18.i.2017; ♂, 20.i.2017; ♂, 31.i.2017. **Loc 13:** ♂, 19.i.2017. **Loc 18:** ♀, 25.i.2017. **Loc 23:** 2 ♀♀, 24.i.2017.

Thermochoxia equivocata Kirby, 1889 – Dash-winged Piedface

This species was the most regularly seen Libellulidae in all forest habitats in RNGLL.

Loc 2: 2 ♂♂ (obs), 14.i.2017. **Loc 5:** 2 ♂♂, 2 ♀♀, 15.i.2017; ♂, 17.i.2017. **Loc 6:** 3 ♂♂, 14.i.2017; 10 ♂♀ (obs), 15.i.2017; 10 ♂♀ (obs), 16.i.2017; ♂, 20 ♂♀ (obs), 20.i.2017. **Loc 7:** ♀, 16.i.2017; ♀, 18.i.2017; 15 ♂♀ (obs), 21.i.2017; 5 ♂♂, 31.i.2017. **Loc 12:** 20 ♂♀ (obs), 19.i.2017. **Loc 18:** 5 ♂♂ (obs), 22.i.2017; ♂ (obs), 23.i.2017; ♀, 25.i.2017. **Loc 21:** 10 ♂♀ (obs), 24.i.2017. **Loc 23:** 2 ♂♂, ♀, 24.i.2017. **Loc 25:** 2 ♂♂, 15 ♂♀ (obs), 27.i.2017.

Tholymis tillarga (Fabricius, 1798) – Twister

Loc 17: ♀, 22.i.2017. **Loc 18:** ♂, 22.i.2017.

Tramea basilaris (Palisot de Beauvois, 1817)

Loc 1: 2 ♂♂ (obs), 14.i.2017. **Loc 8:** ♂, 2 ♂♀ (obs), 14.i.2017; 10 ♂♀ (obs), 15.i.2017; ♂, 18.i.2017. **Loc 9:** 10 ♂♀ (obs), 16.i.2017. **Loc 10:** ♀, 10 ♂♀ (obs), 17.i.2017. **Loc 13:** 10 ♂♀ (obs), 19.i.2017. **Loc 17:** ♂ (obs), 22.i.2017. **Loc 23:** 10 ♂♀ (obs), 24.i.2017. **Loc 26:** 5 ♂♂ (obs), 27.i.2017. **Loc 27:** 2 ♂♂ (obs), 28.i.2017.

Trithemis aconita Lieftinck, 1969 – Halfshade Dropwing

Loc 7: ♂, 31.i.2017.

Trithemis aenea Pinhey, 1961 – Bronze Dropwing

Loc 28: ♂, 28.i.2017.

Trithemis apicalis (Fraser, 1954) – Furtive Dropwing

In Congo-Brazzaville the species was so far known only from an unpublished record



Figure 24: Male of *Trithemis apicalis* at forest edge near Abio II, 26.i.2017. Photo by JK.

north of Ouessou in September 2014 (G. Diedericks). In RNGLL it was rather common along the sunny edges of swamp forests (see Figure 24).

Loc 7: 2 ♂♂, 15.i.2017; 2 ♀♀, 18.i.2017; ♀, 20.i.2017. **Loc 18:** 2 ♂♂, 23.i.2017; ♂, ♀, 10 ♂♀ (obs), 25.i.2017; 3 ♂♂, ♀, 25 ♂♀ (obs), 26.i.2017.

Trithemis congolica Pinhey, 1970 – Congo Dropwing

We found this species exclusively along the bank of the Louna River where males settled on overhanging grass.

Loc 15: 4 ♂♂, 10 ♂♀ (obs), 24.i.2017. **Loc 16:** 2 ♂♂, ♀, 25 ♂♀ (obs), 24.i.2017. **Loc 28:** 2 ♂♂, ♀, 10 ♂♀ (obs), 28.i.2017.

Trithemis grouti Pinhey, 1961 – Dark Dropwing

Locally common at Lac Bleu and nearby forest edges and at a large open river.

Loc 11: 10 ♂♂ (obs), 19.i.2017. **Loc 12:** 2 ♂♂, 3 ♀♀, 10 ♂♀ (obs), 19.i.2017. **Loc 16:** ♂, 24.i.2017.

Trithemis imitata Pinhey, 1961 – Copycat Dropwing

Loc 7: ♂, 21.i.2017; ♂, 31.i.2017. **Loc 9:** 15 ♂♀ (obs), 16.i.2017. **Loc 10:** 3 ♂♂, 16.i.2017; ♀, 17.i.2017. **Loc 13:** ♂, 19.i.2017. **Loc 17:** ♂, 22.i.2017. **Loc 18:** 2 ♀♀, 22.i.2017. **Loc 22:** ♂, 24.i.2017.

Trithemis tropicana Fraser, 1953 – Eastern Mantled Dropwing

The single sight record of this species is reliable due to the distinctive large black basal wing patch.

Loc 7: ♂ (obs), 18.i.2017.



Figure 25: Male of *Trithetrum navasi*, we provide the first record of this species from Congo-Brazzaville, 22.i.2017. Photo by JK.

Trithetrum congoense (Aguesse, 1966) – Sooty Darter

This is only the third record of this species for the country. Described as *Sympetrum navasi congoensis* subsp. nov., a subspecies of *Trithetrum navasi* from Tsiama Forest near Brazzaville (Aguesse 1966) this species is known to occur exclusively in Gabon, Congo-Brazzaville and northern Congo-Kinshasa.

Loc 8: ♂, 31.i.2017.

Trithetrum navasi (Lacroix, 1921) – Fiery Darter

We provide the first record of this species for Congo-Brazzaville.

Loc 8: ♂ (obs), 14.i.2017; ♂ (obs), 15.i.2017. **Loc 17:** ♂, 5 ♂♂ (obs, see Figure 25), 22.i.2017.

Loc 27: ♂ (obs), 28.i.2017.

Urothemis edwardsii (Selys, 1849) – Blue Basker

Loc 8: ♂ (obs), 14.i.2017; ♂, ♂ (obs), 15.i.2017. **Loc 17:** 3 ♂♂, ♀, 25 ♂♀ (obs), 22.i.2017.

Loc 27: 2 ♂♂ (obs), 28.i.2017.

Urothemis venata Dijkstra, Mézière & Kipping, 2015 – Red-veined Basker

This species is known to occur locally in large numbers on the Batéké Plateau in neighbouring Gabon but had not been recorded yet in Congo-Brazzaville.

Loc 8: ♂, 31.i.2017.

Zygonyx regisalberti (Schouteden, 1934) – Regal Cascader

Loc 3: ♀, 30.i.2017. **Loc 16:** 2 ♂♂, 24.i.2017. **Loc 19:** ♂♀ in copula (obs), 25.i.2018.

Zyomma atlanticum Selys, 1889 – Smoky Duskdarter

A crepuscular species found flying only at dusk or at night.

Loc 5: ♂, 17.i.2017. **Loc 24:** 2 ♂♂, 31.i.2017. **Loc 25:** ♀, 5 ♂♀ (obs), 27.i.2017.

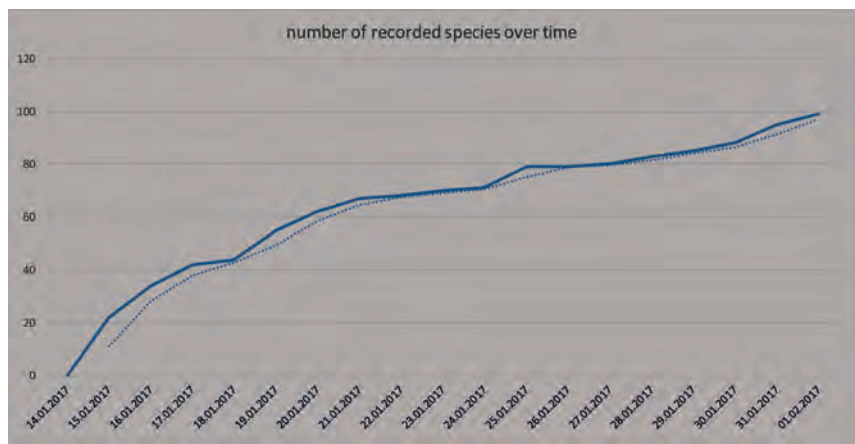


Figure 26: Graph showing the number of recorded species over the 18 field days at RNgLL.

Discussion

With 99 Odonata species collected in a rather short period of 18 field days RNGLL proved to be a diverse and species rich. We assume that many more species can be found at other seasons of the year, especially at the beginning of the rainy season in September/October. Even our last collecting day produced additions to the list, which suggests more species can be found also in January/February, as the species accumulation curve confirms (Figure 26). A total of 128 species is known to occur on the Gabonese part of the Batéké Plateau, but this number results from many sampling days in the field by N. Mézière and colleagues in the time period between 2007 and 2015. On the other hand, Mézière & Lekogo (2014) collected 61 species within only five days in the Parc des Plateaux Batékés that forms the southern half of the Gabonese plateau.

The similarity to the Gabonese part of the Batéké Plateau is obvious. We immediately found some characteristic and typical species as *Platycypha picta*, *Elattonaura aurifex*, *E. tsiamae*, *Ceriagrion obfuscans*, *Pseudagrion aureolum*, *Palpopleura albifrons* and *Urothemis venata*. Other species not recorded in January 2017 can be expected as habitat conditions are very similar. *Malgassophlebia andzaba* Dijkstra & Mézière, 2015 could possibly be found at sandy streams as well as *Paragomphus darwalli* Dijkstra, Mézière & Papazian, 2015, *P. kiautai* Legrand, 1992 and *P. machadoi* Pinhey, 1961. *Trithemis fumosa* Pinhey, 1962, *T. hinnula* Dijkstra, Mézière & Kipping, 2015 and *Nesciothemis nigeriensis* Gambles, 1966 may fly at savanna pools in other seasons.

When analysing all available records from Congo-Brazzaville in ODA it became clear that RNGLL is likely to be one of the most diverse areas in the country. At least with current knowledge no other area of similar size has more Odonata species. Carletti (1997) provided a large amount of data from various parts of the Republic of Congo. From Djili, Loufoula and Kintele that are not too far located from RNGLL 54, 38 and 64 different species are known respectively. Tsinguidi and Voka have 40 and 30 species. P. Lambret recorded a total of 54 species from Conkouati-Douli National Park. Terzani & Marconi (2008) reported 16 species within Réserve Naturelle de Tchimpounga. Biosphere Reserve Dimonika, a forest area near Dolisie has been sampled by various collectors at different times and altogether 42 species came on record.

Despite the high species number in RNGLL some genera are under-represented. We only found a single gomphid as adult, but these are usually scarcely collected and highly seasonal. On the Batéké Plateau in neighbouring Gabon N. Mézière with the first author observed a massive occurrence of many hundreds of *Gomphidia quarrei* (Schouteden, 1934), *Diastatomma multilineatum* Fraser, 1949, *D. tricolor* (Palisot de Beauvois, 1807), *Phyllogomphus annulus* Klots, 1944 and *Phyllogomphus bongorum* Kipping, Mézière & Dijkstra, 2015 in September 2014, whereas in other months these species were only rarely seen or absent. This strong seasonality might apply to RNGLL as well.

Chlorocyphidae normally show a high diversity in African rainforests. With only two species this family is poorly represented in RNGLL. The reason is probably the similarity of visited riverine habitats. Soft, sandy substrates with more or less accumulated detritus and organic matter dominated. Due to their absence we sampled no streams or rivers with hard substrates such as rocks, stones or gravel. The lack of rapids or water-

falls is responsible for the absence of habitat specialists within this group but also of the libellulid genus *Zygonyx*.

Of the typical central African forest species some species were missed, notably *Neodythemis klingi* (Karsch, 1890) that is often dominant in comparable habitats. Instead we found *Neodythemis preussi* commonly. No species of *Micromacromia* could be recorded. The genus *Allocnemis* was represented only by the most widespread species *A. nigripes* whereas two others known from the Gabonese part of the Plateau, *A. cyanura* (Förster, 1909) and *A. pauli* (Longfield, 1936), were absent.

Disturbance of freshwater habitats by both humans and animals is very limited within the Reserve. This probably explains the absence of widespread African species such as *Ischnura senegalensis* (Rambur, 1842), *Anax imperator* Leach, 1815, *Crocothemis erythraea* (Brullé, 1832), *Brachythemis leucosticta* (Burmeister, 1839) and *Orthetrum trinacria* (Selys, 1841). They are often associated with human settlements or livestock and wild animals that disturb habitats by trampling, pollution and watering. RNGLL has no livestock and only few wild animals occur here. Apart from hippopotamuses which can regularly be seen along the Louna and Lefini Rivers, the rest of the mammal community of the Reserve is rarely encountered (King 2008). Fire is the main factor in forming forest-savanna mosaic rather than grazing and browsing by herbivores.

With further research in the area at other times of the year the number of species could easily exceed 150 species. It is recommended to sample areas around Iboubikro also during the dry season and at the beginning of the rainy season in September/October. Collecting and rearing of larvae is a probate tool to gather records of otherwise rarely collected species of *Phyllomacromia*, of many Gomphidae and some forest Libellulidae. The steep escarpments along the eastern park boundary probably have some small springs, seeps and streams on rocky ground and with more current. Here a totally different species community can be expected.

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Authors are advised to avoid any formatting of the text. The manuscripts will be stylised according to the font type and size adopted by the journal. However, check for: a) all species names must be given in italic, b) the authority and year of publication are required on the first appearance of a species name in the text, but not thereafter, and c) citations and reference list must be arranged following the format below.

Reference cited in the text should read as follows: Tillyard (1924), (Tillyard 1924), Swezey & Williams (1942).

The reference list should be prepared according to the following standard:

Swezey, O. & F. Williams, 1942. Dragonflies of Guam. Bernice P. Bishop Museum Bulletin 172: 3-6.

Tillyard, R., 1924. The dragonflies (Order Odonata) of Fiji, with special reference to a collection made by Mr. H.W. Simmonds, F.E.S., on the Island of Viti Levu. Transactions of the Entomological Society London 1923 III-IV: 305-346.

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