#### Project Update: December 2016

After 6 months of working progress, I am pleased to inform that we finished the first part of the field season successfully on 20<sup>th</sup> October 2016 when the rainy season became really strong and we returned to the city. I have been working in the museums, identifying, databasing and describing the dragonfly species from Tatamá.

#### Human resources

I was assisted in the field and during the school workshops by some really great people: Angie Orjuela and Daniela Ayala (biology students at ICESI university) were my field assistants from June to July 2016, getting engaged with the study of dragonflies; both of them are investigating the capacity of Andean dragonflies as indicators of the quality of the ecosystems for their BSc theses. Fernanda Garcia (Biology student at University of Antioquia) helped me in July 2016. Juliana Sandoval (Biologist) helped me from July to August 2016. Daniel Borbon (the school teacher) got really involved in the project with the kids, his happiness and willingness during the workshops allowed us and the children to learn a lot. Local field guide Michel Tatiana Tapasco assisted us from June to August 2016 in the field and got really involved with dragonflies and its photography.



Micrathyria simpriona, photo by Michel Tatiana Tapasco.

I held a meeting with the Tatamá National Park directives and rangers, and we got an agreement in which I helped them with the inventories of dragonflies in some places in the park where illegal mining is going on, and they helped me in the field, introducing me to the lowland

Afro communities. So I was able to expand my altitudinal gradient to 350 m asl by working at some reserves in the buffer zone of the national park. Carolina Guzman and Libaniel Osorio were the park rangers who helped me in the field.

In the lowlands Jose Manuel Mosquera and Blas Cardenas (local guides) helped us in the field from September to October 2016, teaching us a lot of their culture and perception of the forest and becoming expert hunters of dragonflies. Also during all this time I was helped by Camilo Flórez (Biologist) in the field with the temperature measurements.



Don Blas one of the local guides at Guarató River.

### School workshops

We found that one of the schools in the area got closed because of the low number of children in the zone, so we concentrated the workshops at the remaining schools. We conducted 11 sessions as follows:

- 1. Biodiversity.
- 2. Niche concept and biodiversity (using terrestrial insects and plants).
- 3. Niche concept and biodiversity (using aquatic insects).
- 4. Niche concept and biodiversity (using birds).
- 5. Ecosystemic services (related to soil).
- 6. Ecosystemic services (related to water).
- 7. Climatic change and water cycle.
- 8. Preparation of the puppet show.
- 9. Preparation of the puppet show.
- 10. Preparation of the puppet show.
- 11. Presentation to the community.

Please find a brief resume of the workshops on this video: <u>https://www.youtube.com/watch?v= KqNSiBP6mA&t=317s</u>



Some of the workshops at La Selva School and surroundings.

#### Taxonomy

Because of the extended study area to the lowlands, 32 more species were incorporated to the project raising to 81 the number of species for the altitudinal gradient Tatamá-Chocó (49 species reported inside the Tatamá National park). Among the records we found three undescribed species, and four new records for the country. Three papers are under preparation with the descriptions of the new species: I am collaborating with Jerrell Daigle in one paper about the genus *Heteragrion*; with Melissa Sanchez to describe a new species in the family Polythoridae; and a paper with the new species in the family Philogeniidae is almost ready.



Illustrations of the diagnostic characters for *Archaeopodagrion* sp. nov. one of the undescribed species in the family Philogeniidae (Illustrations by Natalia Uribe).

### Field guide

We have good quality field photographs for 66 species out of the 81 species in the area, among them 47 of the Tatmá National Park inhabitants. We still don't know if we are going to be able to print a book for the complete area or just for the Tatamá species, it would depend on the cost of the book. Here are some preliminary samples of how it will look:

## Cora aurea (Ris, 1918) Alas de bandera Cobre - Copper Banner-wing

Identificación/Identification: O Alas atravesadas en el medio por bandas negras que produ cen destellos color cobre. PAlas translucidas que producen destellos azulosos, 3 bandas claras en el pterotórax. Medidas: Abdomen 3 cm, Ala posterior 3 cm. O Medium wing bands coppery black. Q translucid wings with bluish flashes, 3 light bands in the pterothorax. Measurements: Abdomen 3 cm, Hind wing 3 cm



embra de Cora aurea/Cora aurea female (Foto/Picture: C. Bota). Historia natural/Natural history: habita pequeñas quebradas en el borde e interior del bosque. Esta especie tiene estacionalidad, solo se encuentran adultos después de las temporadas

secas. Inhabits little streams in forest and at its edge. This species presents seasonality, its adults can be found after the dry seasons.



(Foto/Picture: C. Bota)

Distribución/Distribution: Es endémica de la Cordillera Occidental en Colombia (Valle del Cauca y Risaralda). Endemic for Western Cordillera in Colombia (Valle del Cauca and Risaralda departments).

### Cora klenei Karsch, 1891 Alas de bandera care amarilla - Yellow faced Banner-wing



## Hetaerina cruentata Hagen, 1853 Alas de rubí con triángulo metálico - Metalic-triangular Rubyspot



entata male (Foto/Picture: C. Bota

Identificación/Identification: la mancha en forma de triángulo verde metálico en la parte posteriro del pterotórax es única para ambos sexos en esta especie. Medidas: Abdomen 4cm, Ala osterior 3,5 cm. Metallic green triangular spot on posterior parta of pterothorax is unique for both gen lers in this species. Measurements: Abdomen 4cm, Hind wing 3,5cm.



Historia natural/Natural history: habita quebradas y pequeños ríos en borde de bosque o áreas abiertas. Inhabits streams and small rivers in forest edge or open areas.

Distribución/Distribution: zonas montañosas desde México hasta Perú y Venezuela. En Co Iombia se ha reportado en las tres ramas de la condillera usualmente entre 100 y 200m. Mounta nous areas from Mexico to Peru and Venezuela. In Colombia is recorded in the three Andean branche usually between 1000 and 2000m.

### Familia/Family Coenagrionidae

Es la familia de libélulas con mayor cantidad de especies, habita todo el planeta con excepción de la Antártica y ha conquistado todo tipo de ecosistemas, aunque suelen ser más comunes en lagos y aguas lentas. La mayoría son pequeñas, aunque la subfamilia Psudostigmatinae cuenta con las tli-bélulas más largas del planeta.



### Heteragrion sp. nov. 2

Flamita de las cascadas - Waterfall's fire-damsels



to/Picture: C. Bota)

Identificación/Identification: d<sup>\*</sup> Mitad posterior de la frente negra. Q<sup>\*</sup> perfil del pterotórax con cuatro bandas oscuras. Medidas: Abdomen Scm, Ala posterior 3 cm. d<sup>\*</sup> frons posterior half black. Q<sup>\*</sup> pterothorax profile with four dark stripes. Meassurements: Abdomen 5 cm, Hind wing 3 cm.

Historia natural/Natural history: habita pequeños rios, en el borde del bosque, preferiblemente cerca a paredes de roca y cascadas. Se aparean y oviposita ne cascadas, donde probablemente viven sus larvas. Inhabits small rivers, in the edge of the forest, usually close to stone walls and waterfalls. They mate an oviposite close to waterfalls, where their larva can inhabit.

Distribución/Distribution: Es endémica de la Cordillera Occidental en Colombia, hasta ahora solo se ha encontrado en el Parque Nacional Tatamá. Endemic for Western Cordillera in Calombia, it is only known location is Tatamá National Park.

### Familia/*Family* Megapodagrionidae

Areja de Heteragrion sp. nov. 2 en cópuja/Heteragrion sp. nov. 2 couple mating (Fo

distinctive long legs. They step on rocks or leaves with their wings in flat position which combined with their color patterns, usually white torax and black abdomen, make them look as little airplanes.

> Ieinopodagrion croizati Avioneta de tórax cobre - Copper flatwing



Identificación/Identification: Coloración cobre en la parte superior del pterotórax. Las hembras de esta especie se desconocen. Medidas: Abdomen 3cm, Ala posterior 3cm. Coppery coloration on the supperior portion of ther pterothorax. Females for this species remain uncknown. Meassurements: Abdomen 3cm, Hind wing 3cm.

Historia natural/Natural history: habita quebradas y brazuelos de pequeños ríos. Los mamachos se paran sobre rocas y hojas usualmente cerca al suelo. No se conoce nada sobre sus habitos reproductivos. Inhabits streams, and "brazuelos" in small rivers. Males usualy step on stones or leaves close to the floor. Its reproductive behaviour remains completly uncknown.

Rhionaeschna marchali (Rambur, 1842) Corta nariz de bandas limón - Lemon- striped darner



Hembra de Rhionaeschna marchali/Rhionaeschna marchali female (Foto/Picture: C. Bota).
Identificación/Identification: En ambos sexos delgadas bandas torácicas color amarillo limón. Medidas: Abdomen 5.5 cm, Ala posterior 4.5 cm. For both genders thoracic thin stripes color lemon. Measurements: Abdomen 5 cm, Hind wing 4.5 cm.

lemon. Measurements: Abdomen 5 cm, Hind wing 4.5 cm. Historia natural/Natural history: se puede observar en áreas abiertas como carreteras o lagos. Suele percharse en paredes de tierra o rocas, donde se camufla bastante bien. La hembras ponen los huevos en plantas acuáticas o semiacuáticas en lagos, donde viven sus larvas. It can be observed in open areas as roads or lakes. Lisually perches on earth or stone walls where it comouflages. Females insert their eggs in aquatic or semiaquatic plants in lakes, where their larvae live

Distribución/Distribution: se encuentra a lo largo de la Cordillera de los Andes, desde Bolivia hasta Venezuela. En Colombia se ha reportado en las tres ramas de la cordillera, usualmente entre 2000 y 4000m. Along the Andes, from Bolivia to Venezuela. In Colombia is recorded in the three Andean ranges, usually between 2000 and 4000m.

# Familia/Family Libellulidae

Es la familia de anisópteros con mayor cantidad de especies. Habita todo el planeta con excepción de la Antártica y ha conquistado todo tipo de ecosistemas, aunque suelen ser más comunes en lagos y aguas lentas. Deben su nombre común al particular comportamiento de oviposición de las hembras, durante el cual repetidamente meten la parte posterior del abdomen en el agua mientras vuelan, haciendo que el agua salpique, en muchos casos fuera del pozo. This is the most diverse Anisoptero family, inhabits everywhere accross the planet except Antacricia. Although it has conquered all kinds of ecosystems, it is commonly found in lakes and slow moving waters. Females usually have a special oviposition behavior: they repeatedly insert their posterior abdominal segments in the water as they thy, making it splash.



#### **Measurement of Critical flight temperatures**

At the beginning, we have several difficulties with the protocol but we adjust some of the problematic issues and we manage to make reliable measurements. We had to change the way we were measuring the minimum flight temperature, because the dragonflies can equal the environmental temperature in less than 2 minutes, so we were getting really high minimum flight temperatures due to our delay between the moment in which the dragonfly could fly and the moment in which we manage to insert the thermocouple wire in its thorax.

Now, the new procedure is as follows: one by one, each dragonfly is tied by pterothorax with a thin thread to facilitate recapture, then it is placed in a refrigerator with a PELT 5 temperature controller at 5 °C (which is the minimal temperature reached with our equipment); all dragonflies remain under these conditions for 30 minutes, after which we check if they can fly by throwing away each one into the air, if they are able to fly, then their minimal temperature is under 5 °C , if they cannot fly they should stay for seven more minutes inside the refrigerator but the temperature is raised 1°C, and then their capacity to fly is checked again, repeating this procedure until all the dragonflies reach the minimal temperature that permit them to fly.

To the date, we have measured 525 minimum critical temperatures in 51 species and 640 maximal critical flight temperatures in 53 species (Table 1). The data are still in the exploratory phase, but apparently, there are species with a high variation in temperature resistance and species with low variation in temperature resistances. The whole and formal analysis of the data will be completed after the end of the 2017 field season on March.

	Number of Measured Species	Number of Measurements	Number of Species with more than 8 Measurements
Minimum critical	51	525	33
temperature			
Maximum critical	53	640	33
temperature			