



*Cora verapax* sp. nov is the newly discovered species that belongs to the *Polythoridae* family



# A new damselfly species was discovered in Colombia

There are no more than 80 experts in the world who are devoted to studying this group of insects. Currently, this insect order has approximately 6,000 species on the recent red list of endangered species, where Colombia has the highest number endangered species within the neo-tropical region.

By: Ximena Serrano Gil  
Photos Ximena Serrano, Melissa Sánchez,  
Adolfo Cordero Rivera

There was an era in the history of the Earth, before the dinosaurs, when gigantic insects conquered the skies for the first time: They were the earliest dragonflies and damselflies. Their evolutionary success has turned into an important aspect on environmental sciences research. Today, approximately 300 million years later, Colombian scientists continue to make important contributions to science with the discovery of a new species and the spotting of another 12 which had not been register before in the protected areas of the country.

Colombia is one of the most mega-diverse countries on the planet, but, paradoxically, it is one of the least explored. Its internal conflict has prevented exploration in its jungles, mountains, forests and whole regions, hence, a large part of its biodiversity is still unknown, among it, its dragonflies and damselflies. The recent findings have revealed a link which connects a whole bio-geographical corridor between Central and South America which runs from the south of Mexico to the Argentinan pampas. The latter has enabled scientists to establish conservation strategies, as they rethink their hypotheses about endemism and endangered species.

The newly discovered species, whose scientific name is *Cora verapax* sp. nov, belongs to the *Polythoridae* family. This family comprises 57 species grouped in seven genera, and now, *Cora verapax* has turned into number 58th.



### EQUILIBRIUM AND RESISTANCE

In addition to their magical wings and agile flight, dragonflies and damselflies prey on other organisms during their whole life cycle. In their immature stages, they live in freshwater habitats, like rivers and lakes. They are important regulators in trophic chains, both in aquatic and terrestrial ecosystems, therefore they of special interest for ecological studies. And they can be excellent sensors for monitoring water quality and ecosystems over time.

“Dragonflies and damselflies have inhabited these aquatic environments for many millions of years, which has enabled them to create certain tolerances and adaptations for their survival during periods of many geological and climatic changes. Therefore, they turn into sensors of past ages, which can also provide possible solutions for our future.

The fact that there are so few species, in comparison with other groups of insects, like beetles, enables us to undertake comparative studies which cover the entire 6000 species,” explained Melissa Sánchez, researcher at the Evolutionary Genetics, Phylo-geography and Ecology of Neo-tropical Biodiversity group of the Universidad del Rosario, where she is also a professor in the Biology Program of the Faculty of Natural Sciences and Mathematics.

These characteristics are not only an important aid for finding out how many species of these insects there are, but they also provide scientists with evidences which enable us to explain the origin of the biodiversity we have. Parallel to the discovering and registry of this species, there is a study which assesses the genetic diversity and origin of the group of damselflies to which *Cora verapax* belongs, the family *Polythoridae*. This project is being funded by Colombian institutions like the Universidad del Rosario and Colciencias (the government agency which supports the development of science, technology and innovation in Colombia) and international ones, like National Geographic and the Waitt Foundation.

Very few scientists in the world are devoted to studying this group of insects: Estimates are around 80. Colombia has been one of the most active groups in undertaking research into these neo-tropical insects during the past ten years. However, many of the researchers are young students, with meager financial support,

The new individual has a very special morphology. Its abdomen is longer than the usual one; above its cercus there is a very long spine lacking in other species and its wing are colorless. It was found in the Tatamá National Natural Park.





← Studying dragonflies and damselflies means that Melissa Sánchez has to go deep into the jungle, walk along rough tracks, plunge into puddles or waterfalls and fly in a light plane to reach some part of the jungles of the Pacific region, but she also has to maintain her girlish spirit as she chases after them with a collecting net. All part of the adventure of science.

which is why there are very few studies which analyze the genetic diversity and morphology of the different species.

### Networks in action

On the recent red list of endangered species, Colombia shows the highest number of dragonflies and damselflies endangered species in the neo-tropical region. However, researchers guess that this might be because there is a lack of sampling and the legal obstacles to undertaking new studies within protected areas. "It is difficult to know if those reports are due to the lack of data from the protected areas or the absence of protected areas in some strategic regions" the researchers explain.

In view of the little research being done in this field, they assembled a compendium of the literature on the subject, along with samplings in six protected areas in Colombia, in an inter-institutional project with other researchers who belong to the Network of Biodiversity and Systematics of the Institute of Ecology of Xalapa, Mexico; the Entomology Group of the Universidad de Antioquia; and the Biology Group of the Universidad El Bosque. The areas that were studied were the Tatamá, Sumapaz, Chingaza, Chibiriquete, Serranía de la Macarena, Serranía del Cocuy and Sierra Nevada de Santa Marta National Natural Parks, among others.

The study revealed 12 new registers of damselflies and dragonflies, meaning it is the first time they have been found in Colombia. And the discovery of a new species named *Cora verapax* sp. nov., collected after more than 300 days of field work

### In the distant past, some dragonflies and damselflies were as big as pelicans

The fossil remains of dragonflies and damselflies show that they have lived for 300 million years. They go back to the Carboniferous Period and became as big as a pelican. Species which are relics of this period have been found: For example, the *Petaluridae*, which, according to molecular data, go back 250 million years and are the same species, that is, they still exist.

Dragonflies and damselflies are colored insects which survive as predators during their whole life cycle, both as adults and in the larval stage. Their life cycle is known as a hemimetabolous one or that of an incomplete metamorphosis. From an egg they turn into a nymph and continue to grow until they become adults. The whole of the nymph stage takes place in water and may last up to a year, when they emerge as adults and develop the adult stage out of the water.

In contrast with the Coleoptera (beetles) or butterflies, which have millions of species, dragonflies and damselflies only fall into the thousands, around 6000 species worldwide and most of them are found in the Neotropics. They are a very small and little known order.

in the Tatamá National Natural Park, situated in the Western Cordillera in the Colombian Departments of Chocó, Valle del Cauca and Risaralda.

Among the 12 new registries, some species were thought to have been endemic to Panamá and Ecuador, that is, they were only to be found there. That implies that they have always been there and finding them allows us to find a link in the biogeographic corridor which runs through Panama, Colombia and Brazil. "This finding shows that there are many things we can still discover and that we don't know what we have. Due to its geographical position, Colombia represents a gap in South America. We need more researchers and more support so that we can learn more about our biodiversity. That is why it is important to make inventories of species in these special territories and contribute new data for conservation efforts, like a red list assessment or plans for future management," she stresses.





## Damselflies and dragonflies in flight

Dragonflies and damselflies are divided into two large groups, in accordance with the shape of their wings. The *Anisoptera* (aniso=unequal, and *ptera*=wing) and the *Zygoptera* (Zygo=equal/the same). The *Anisoptera* are the ones which are vulgarly known as dragonflies. They have strong bodies, compound eyes covering the whole of their head and when they are still, they usually spread their wings. While, *Zygoptera* often go unnoticed commonly known as damselflies: They are more slender, their eyes are on the sides of their head and when they are at rest, they close their two pairs of equal wings. In some Spanish-speaking countries, they are vulgarly called "caballitos del diablo" (little devil horses).



### A rare species

When this individual was found in the Tatamá National Natural Park, the researchers saw that it had a very particular morphology. When they made molecular examinations of one of its feet, they discovered that it was unlike that of any previously described species. Its abdomen is longer than the usual one; above its cercus there is a very long spine lacking in other species and its wing are colorless.

In order to determine which groups, independent lineages or species the specimens belong to, molecular studies are not sufficient: It is also important to know the relation between some and others and study the geographical or morphological barriers which enable one species to evolve a specific morphology that turns it into a new species.

"Finding a name for this new species was not easy. We took into account its special morphology, the ephemeral nature of its discovery (only one individual) and our interest in portraying the special time in Colombian history due to the peace agreements, and that is how we end up with the name *Cora verapax*: From the Latin words *verus*, which means truth, and *pax*, which means peace," explains the researcher Melissa Sánchez.

### And who is the new species related to?

In addition to studying the relations between one species and another and finding guidelines for the morphologies of those groups, Sánchez studies the origins and evolutionary history of the *Polythoridae*, the family this

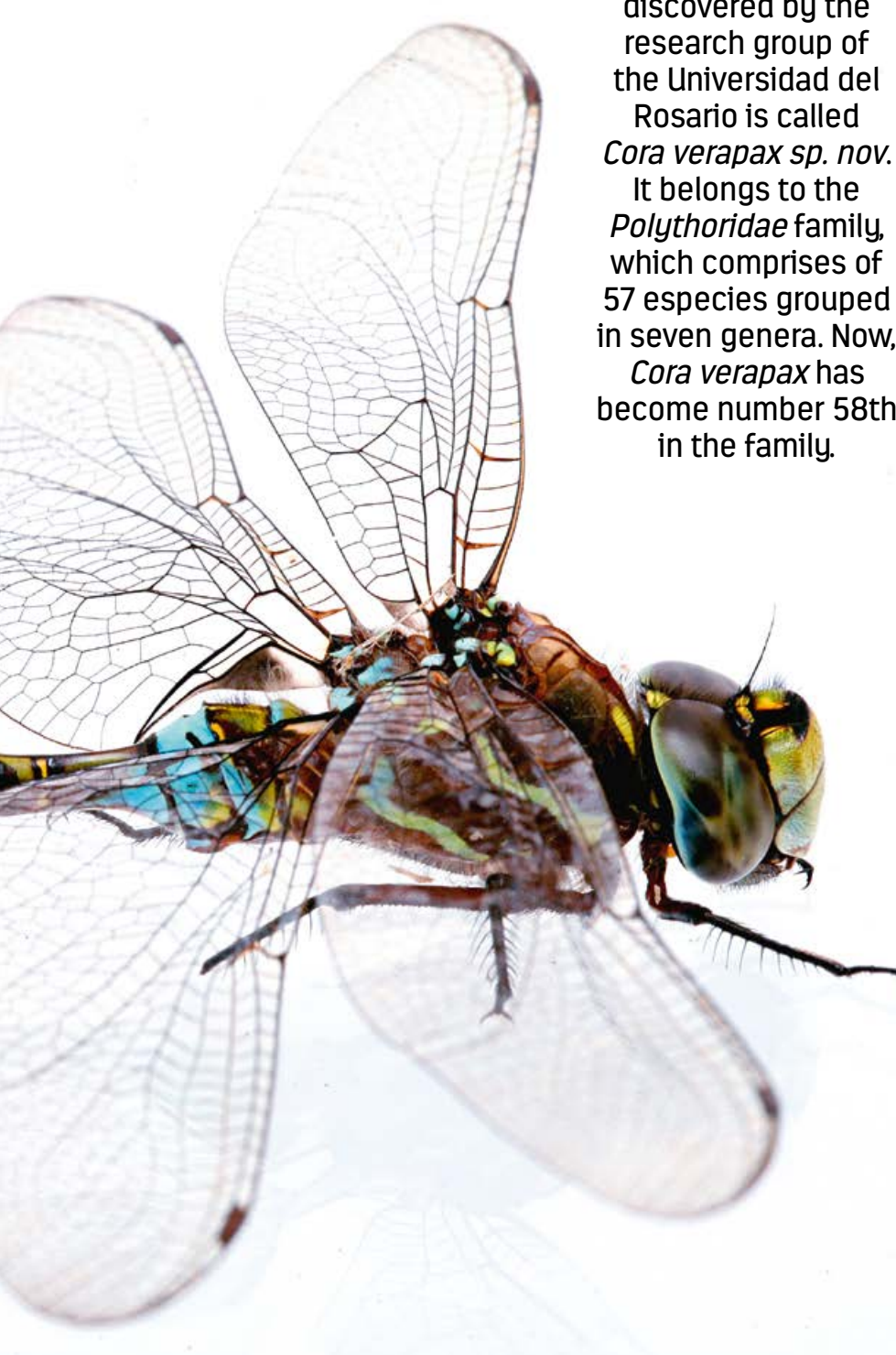


new species, *Cora verapax*, belongs to. It is part of the *Zygoptera* group, which are known as bannerwing damselflies because many of the species have colored patterns in their wings. They are only found in the neo-tropical region, especially in riparian forests near waterfalls. They are spread over the Amazon region and in the Andes, in places which are below 3,000 meters above sea level.

Most of the damselflies in this group have colors on their wings and many descriptions of the species depend on these colorings, since the other classic structures which are used to classify them are very similar. "Therefore, my work began with the following questions: If these wing colorings are really distinguishing among these species? What is the evolutionary history of this particular group? Which characteristics do not follow the norm when you compare them with other species of damselflies?" she remarks. She also seeks to find out how long they have been in existence and how they have spread over the continent in the course of their evolution, using methods which combine genetic data with fossils of their ancestral related lineages, who were in the Mediterranean, with some others in North America.

After the Miocene epoch, there was a great upsurge of diversity as the Andes rose: A large part of the continental area





The species discovered by the research group of the Universidad del Rosario is called *Cora verapax* sp. nov. It belongs to the *Polythoridae* family, which comprises of 57 especies grouped in seven genera. Now, *Cora verapax* has become number 58th in the family.

of South America was an ocean, which caused many geological movements and led to the formation of the Amazon, which, in turn, came to be responsible for the number of species we now have. "My hypothesis is that this family has always been a tropical one. It originated in the Eocene epoch, fifty million years ago, and the creation of suitable habitats during the Miocene epoch enabled it to consolidate itself. Its evolutionary success lay in the fact that it has always been a predator (it eats what is at hand) and does not depend on others organisms in order to survive," Sánchez explains.

### Environmental DNA

In order to give continuity to their studies, the research group obtained funding from the Colciencias call proposals, *Retos: Conocimiento verde* (Challenges: Green growth), to carry out a study called *Pescando libélulas* (Fishing Dragons: Mitogenomes, barcodes and DNA of odonates), where they will use these insects as sensors to establish a conservation protocol based on the environmental DNA found in freshwater habitats.

Like a big sieve which filters enormous amounts of water, the environmental DNA technique sets out to recover particles of DNA from the organisms which live in the water, and when they are compared with the genetic reference library of the species of interest, will allow us to determine whether that species is or is not found in the water. This procedure can be used for species which are vulnerable or have a very small distribution. The latter will create monitoring mechanisms which do not depend on an active collection of such organisms but will establish new objective strategies for the conservation of their habitat.

With the new technique of environmental DNA, scientists hope to discover new species not only of damselflies but other organisms which live in water like fishes, frogs, aquatic insects, etc. A test of the procedure will be made in the reservoir of the Anchicayá hydroelectric power plant, in the Valle del Cauca, with the aim of discovering how anthropic intervention plays a role in the environment.

These processes will be repeated in the Tatamá National Natural Park and the rest of the country's protected areas, since "in the end what we want to do is to establish protocols and assemble reference database for all of the damselflies in the country. This project will lead to international collaborations. It will make Colombia a referent for initiatives in studying the evolution of these insects and allow us to find more biodiversity," the researcher Melissa Sánchez concludes. ■