FROGS & FRIENDS

BIG STORIES FROM SMALL MESSENGERS

DARWIN & GOLIATH

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Toxic Midgets of Colombia

Frogs & Friends on the road visiting one of the world's amphibian hot spots

Editorial

Björn Encke, CEO Frogs & Friends

The team after a successful expedition (left to right): Ximena Garcia (Univerzidad del Valle), Gustavo Gonzalez and German Forero (WCS), Carlos Galvis (Zoo Cali), Martin Bauert (Zoo Zürich), Peter Gröne (Kamera), Susann Knakowske und Björn Encke (Frogs & Friends) and a junior researcher.

Earlier this year, the *Schaubühne* in Berlin hosted the Colombian Mapa Teatro. Their play, *Los Incontados*, The Uncounted, was a reflection on the violence in Colombia, arranged in a triptych of paramilitary forces, drug cartels and guerrillas. The performance also featured the 80-year old musician Danilo Jiménez. For years, he played for the drug baron Pablo Escobar, until his band fell into disfavor and their car was blown up. His wife and several band members were killed. Jimenez survived, but was left deaf. In the play, he tells his story and sings Escobar's favourite song. His eerie, broken voice is a tragic symbol of the suffering of a country scarred by 50 years of war. Colombia struggles with its past and for its future.

Just as the country grappled with complications surrounding a peace accord between the government and left-wing FARC rebels, we were on our way there to document a new amphibian project supported by the Zurich Zoo. It was a moving journey to a country in the midst of radical change. So we found it fitting to dedicate the first issue of our new journal to the trip.

In Darwin & Goliath, we plan to tell stories that look more deeply into subjects that we have already explored in our digital projects. The name has a double significance: Darwin & Goliath of course refer to two of our amphibian flagship species, Darwin's frog and the Goliath frog. At the same time, they refer to people and the forces that inspire our actions. Such labels, at least in this new era of "alternative facts," are not always easy to assign.

Science and beliefs continue to compete for influence in determining which direction our actions must take. Conservation itself is not a "pure" discipline in a scientific sense either. We can only be successful if we work towards cultural solutions to our most pressing environmental problems. Which means that without "Friends" there will be no "Frogs"...

Enjoy your reading

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Content

ROUTE THROUGH COLOMBIA

Amphibian Survival Colombia

Colombia is home to an incredible diversity of amphibians. More than 700 species have been described, with 214 considered endangered. The most famous: *Phyllobates terribilis*, the golden poison frog.

The Zoo Zürich has been breeding the golden poison frog for many years, and it has also supported efforts at Zoo Cali to establish a breeding station. The project is now getting an extra boost. The Wildlife Conservation Society (WCS) has come on board, and the first nationwide amphibian assessment is underway.

With 49 million inhabitants, Colombia is South America's second most populous country. The population is a mix of ethnicities. Indigenous groups make up 3.4% of the population, and Afro-Colombians, descendants of slaves, make up 10.6%.

Colombia has an area of 1.1 million km2, about three times the size of Germany.

The journey to Colombia was part of our partnership with Zoo Zürich. Frogs & Friends director Björn Encke, writer Susann Knakowske, and cameraman Peter Gröne accompanied chief curator Martin Bauert from Zoo Zürich to document the zoo's new amphibian project for zoo visitors and a wider public audience.

Project partner Amphibian Survival

War, Peace and Nature Conservation – Place Your Bets

The war is over – and the fight over the future has begun

By Björn Encke

Fifty years of civil war are over. Colombia has had enough of fighting. The warriors are tired. Thousands are giving up their weapons, and many are leaving the drug business as well. But what comes next? More than six million people live as refugees in their own country. How many of these will want to go back home? What will they find there, and what will they do?
Colombia is, in fact, a rich country. Rich in mineral resources and biodiversity, and with a unique topography – lowland rainforests in the west, three cordilleras with high plateaus and mist forests in the center, the Amazon Basin in the east and the Caribbean in the north.

Large tracts of the country were off-limits for decades because of the war – controlled by left-wing FARC- or ELN-rebels, right-wing paramilitary forces, drug cartels, or freelance bandits. Caught in the middle were simple farmers, aboriginals, and Afro-Colombians who had been pushed to the fringes, hiding in the forests, without infrastructure, and without a future.

The economics of chaos: coca-farming, precious timber and – increasingly – the gold of the Andes. Exploiting nature. Will this now change? And if so, which direction will change take?

Coca made in Colombia – A litmus test for the peace process

The international drug trade, particularly in cocaine, not only made the organized crime syndicates rich, but also funded rebels and paramilitary organizations – and countless small farmers make a living cultivating the coca plant.

The rebels promised in the peace accord to stop their drug business. In response, the government has started a programme that promises development funds for communities and payments of 4000 Euros per year to farmers who stop growing coca. Nevertheless, Colombia is once again the world's largest exporter of cocaine. Nearly 700 tons left the country in 2016 according to an estimate from the US Drug Enforcement Agency, up from 300 tons in 2008.

There are, as usual, many reasons for the increase. In 2015, the Constitutional Court of Colombia outlawed the aerial spraying of glyphosate on coca plantations after the World Health Organization classified the herbicide as a probable carcinogen. Black market prices for cocaine rose while prices for the alternative crops of coffee and cocoa declined. And some farmers may have decided to take up coca growing just in time to be eligible for the government payoffs for quitting. In any case, the programme has taken off very slowly, which has not helped instil trust in a government that, for decades, seemed to completely forget the people living in the region. For example, the military was used again to destroy coca plantations before the accord was signed. On the other hand, the farmers face pressure from criminal gangs that want to take over the lucrative drug business from the FARC rebels.

No one can claim there's an orderly transformation process towards sustainable agriculture practices. It is not even clear that the government will be able to establish basic security or trust into the peace process in the affected regions.

The gold rush as a threat to people and nature

While the drug trade gets most of the international attention – the US alone has pumped at least eight billion dollars into the fight against the Colombian drug cartels since 2000 – illegal gold mining has quietly become a second lucrative enterprise for organized crime. The business has boomed since the price of gold increased dramatically in the wake of the financial crisis in 2008. Profits from this truly dirty business are estimated at some two billion dollars per year in Colombia—and rising. It is also estimated that eighty percent of Colombian gold originates from illegal mining. In contrast to the drug trade, illegal gold mining is barely punished, if at all. The buyers of raw gold are rarely concerned with the metal's origins, and the gold trade is a popular way to launder money. All things considered, this gold rush poses a much greater threat to the people and nature of Colombia than the farming of coca.

With organized crime in control, gold mining has been industrialized. Miners increasingly use heavy machinery that destroys entire valleys and rivers. According to a study conducted by the Global Observatory of Transnational Criminal Networks, ninety rivers are now poisoned with mercury, including two of Colombia's most important: the Magdalena and the Cauca. For every kilogram of gold extracted, 1.3 kilograms of mercury are released directly into rivers and the soil. Today, Colombia has the highest levels of mercury emission per capita in the world.

Gold extraction destroys three times as much primary forest as coca farming. Effective controls and sanctions are urgently needed, but there is no sign of them on the horizon. The illegal exploitation of mineral resources is one of the most explosive challenges to both nature conservation and to the people and communities of the region.

There are so many trees – still...

As strange as it may sound, the civil war is one of the reasons there are still large areas of intact forests in many of Colombia's most ecologically sensitive regions. Until recently, the war made systematic large-scale exploitation impossible. Increased peace and security will bring new possibilities for using the forests – both positive and negative.

More than half of the territory of Colombia, 59 million hectares, is covered with forests. However, the country lost seven million hectares, 12 percent of its forest cover, between 1990 and 2012 alone. Wherever infrastructure develops, settlements will grow, whether planned or not, and wood will be cut and sold - legally or illegally.

Drugs, gold, climate change – we need a global "domestic policy"

Bans are useless on their own. They must be accompanied by a legal and economic framework that empowers people to shape their own future. If the peace process is to be successful, the government will have to earn the trust of its people – no easy task. And it is primarily up to Colombian civil society to find ways to earn that trust.
But that doesn't absolve the international community of its responsibilities. Colombia needs support to develop a sustainable way forward and to find ways to make its plans reality.
Today, the options available to Colombia's small farmers affect all of us as well.

Part 1

Our Terribilis trip to Colombia

An excursion to a changing country – to visit the world's most poisonous frog

By Björn Encke

In November 2016, we accompanied the Zurich Zoo's Chief Curator Martin Bauert to Colombia in order to document the start of a new project in a remote corner of that country's jungles. The government and left-wing FARC rebels had just concluded years of negotiations and signed a peace accord that brought to an end half a century of civil war that had claimed more than 220,000 lives.
The peace accord had been signed with great pomp in Cuba, but President Santos also wanted affirmation from his people, who were tired of decades of war. He called a referendum to approve the accord. Much to everybody's surprise, however, the referendum failed – the people were also tired of voting, and only one third had gone to the polls. The opponents of the accord won by the thinnest of margins. The shocking result paralysed the country.

Just a few days later, the Nobel Prize Committee in Stockholm announced that it would award President Santos the Nobel Peace Prize for 2016. It was a surreal situation. Five weeks later, we started our trip – with rather mixed feelings.

10 November
Waiting in the harbour of Buenaventura

We have now been sitting here at the departure terminal for "Pacifico" for four hours. The first ferry boat offloaded our baggage for being too heavy. Now we watch as a shipment of tropical timber, which arrived tied together in rafts, is processed. Wearing flipflops or no shoes at all, workers strain to carry the wood up from the bank; the individual logs must surely weigh hundreds of kilos. My back hurts just from watching them. "Capital of Horror," the title of an article about this harbour city of Buenaventura, comes to mind. A large part of Colombia's overseas trade is processed here, and so is much of the drug trade, mostly cocaine.

The only reason to come to Buenaventura, the article had said, was to leave again right away. That was our plan, but it hasn't quite worked out. We spend our time documenting the colourful bustle of people and birds in the harbour until Plutarco Garabato points out that taking photos isn't a good idea; certain people might object.

Plutarco is the head of the indigenous community of Joaquincito, our destination on this journey. He has come together with his predecessor, Ligio Quiros, to fetch us. We still have two and a half hours on a boat ahead of us, south along the Pacific coast, and then through the mangrove forests of a river delta to the village.

The Pacifico region is FARC territory

Largely cut off from the rest of the country and accessible only via waterways, this lowland region has remained a kind of state within the state. Along the banks of the rivers, indigenas – native peoples – and Afrocolombians – former slaves – have made their homes. These two ethnic groups enjoy far-reaching rights to autonomy, although in practice the the laws laid down by FARC or the Narcos, the organized drug cartels, have held sway.

Government powers were only apparent in conjunction with military operations, during which defoliation chemicals were often used indiscriminately. Aimed at coca plantations, their deployment often caused "collateral damage" to people and nature that happened to be nearby.

All things considered, it's not a particularly welcoming spot for a frog expedition. But our Colombian partners in the project, German Forero, Scientific Director of the WCS Colombia, and Carlos Galvis, Chief Curator of the Cali Zoo, had calmed our fears: No, everything was calm and quiet, and we could come.

Doesn't it always seem that the most thrilling corners of the globe are often the most difficult to reach? You have to rely the judgement of your local contacts. After all, no one wants to risk their lives – not even for the world's most poisonous frog.

While we wait for our water taxi to the south, timber rafts are taken apart and brought on land.

10 November
Arriving in Joaquincito

It is a different world. And another dimension of time. It begins with a journey across the sea. The captains, two Afrocolombians, are genuine masters of their trade. These boys can read the ocean alright. We want to film a brief interview with them while following an invisible route through the thickets of the mangrove forest, but they say, “not here, too dangerous!” Another kilometre on and they are happy to comply – as long as certain aspects of the journey remain undocumented.

We arrive in Joaquincito, a village straight out of a picture book. The eye is immediately caught by a huge longhouse on stilts, accessible via gangplanks just like everything else in the village. The reason for these stilts becomes clear to us at night when suddenly everything is flooded. The village is so close to the coast that the incoming tide pushes the water of the Rio Naya back upriver, causing regular floods.

The first herpetological surprise awaits us the next morning: The tadpoles, which we had seen by the hundreds in shallow puddles, are still where they were the day before even though the meadow was completely flooded overnight. We presume they hold on to something on the ground during high tide so that they won’t be washed away – quite clever.


The central longhouse of Joaquincito

An unusual welcome ceremony

Shortly after our arrival, the villagers congregate in the longhouse. Everyone, except for the smallest children, introduces themselves, so we learn who does what in the village. We also explain who we are and why we are here. Then we hear speeches from the several of the village leaders.

They talk about the legal situation of the community and the lack of support from the central government. They tell us they want legal security, improved chances for education for the children, and chances for developing the region while conserving its inhabitants’ traditions and ways of life. They want us to convey their message to our governments, but what can we do? They give us important insight into the problems and views of the local people, and they are impressively farsighted and rational. Unfortunately, it’s clear that their expectations about our visit are greatly exaggerated.

Eventually, Carlos Galvis, the Curator of the Cali Zoo and our primary contact with Joaquincito, explains to the villagers that our power is also limited. What we can do is cooperate in matters of nature conservation, adding our research expertise to help protect not only *Phyllobates terribilis*, but also the ecosystem on which it – and the people here – both depend.

Alas, we can’t answer the community’s urgent political questions, but Carlos’s clear and honest explanations earn the community’s respect.

11 November
In search of the Terrible One

It is six o'clock in the morning and we are ready for our first excursion in search of *Phyllobates terribilis*. Guided by the head of the village, Plutarco Garabato, a team of fifteen sets out. This rainforest ranks among the most rain-rich in the world. We had been warned of unrelenting rains and muggy heat with temperatures in excess of 30° C, but we are lucky. It is dry and the temperatures are bearable.

We brought equipment for all possible conditions: tarpaulins against rain, dry boxes, watertight bags for everything that could mold or corrode, and rubber boots. Rubber boots are a fantastic invention. Even the villagers wear them when they go into the forest – and they use the knee-high version. First, the paths are so muddy that one is constantly sinking up to the ankles, but there's another, more important reason: There are snakes. Quite a number of highly venomous species live here, and rubber boots are known to protect best from unexpected attacks on the ground. That leaves us free to concentrate on spotting things that might be hanging in the branches at eye level.

The forest is often disrupted by small clearings in which the villagers farm yams, Papa China, banana, pineapple, but also cocoa. We are surprised to learn that the latter is not fermented, but consumed raw.

Following an hour's hike, we enter the "terribilis forest," a largely untouched piece of forest beyond the last larger clearing. We have hardly walked 20 meters before we spot the first *Phyllobates terribilis*. This is no great achievement, though, because the little fellows are bright yellow, active during the day, and don't really bother trying to hide. One might think they are fully aware of their toxicity.

Field research on the live frog

Carlos and Ximena Garcia slip on their gloves and start working. The poison frog is measured, photographed, the GPS coordinates are recorded, and a UV lamp is used to check whether this particular specimen has been handled before. Every new find is implanted with a small, coded plastic marker under the skin. These markers reflect UV light and therefore allow us to recognize individuals that have been caught before.

Ximena will visit the population at Joaquincito at regular intervals over the coming years. The goal of her work, funded by the Zurich Zoo, is to find out how stable this population may be and learn more about the behaviour of *Phyllobates terribilis* in the wild. In human care, keeping and breeding this species has turned out to be quite straightforward, but surprisingly little is known about its natural ecology.

Almost there. After an hour's hike through marshy terrain we take a short break in a clearing used for farming.

Tadpoles between aerial roots

Around noon it looks as though rain is imminent. But just as we are about to pack up, a shout of "Eureka!" is heard from the forest. One of the assistants from the village has come across a male busy transporting tadpoles. Well concealed between spiky aerial roots we get a rare chance to photograph this fascinating aspect of *Phyllobates terribilis* reproduction. The newly hatched tadpoles will wriggle onto their father's back, and he will carry them for several hours while searching for the perfect puddle into which he can safely release them.

The basis of every meal is rice, which is served with a variety of additions that are selected according to the time of day, usually Papa China (taro root) or chicken.

12 November
Carlos and the toxic dwarfs

A night in the tropics begins when night falls around half past six. The villagers approach us with heartwarming openness and curiosity. Most of them speak Spanish, and we enjoy our evening conversations. They don't know much anymore about the use of poison frogs for hunting. The toxin, called batrachotoxin, from the skin of just one *Phyllobates terribilis* is said to be enough to kill ten people. That's intimidating enough that the villagers prefer to use rifles for hunting.

Carlos tells about his first encounter with the toxic little creatures at Joaquincito in 2005. He was scouring the forest in search of venomous snakes when he stumbled over the frogs by pure chance. He didn't have any gloves, so he caught the animals with his bare hands, which he then washed thoroughly in puddles of rainwater. But he was apparently not thorough enough. Some of the poison must have come in contact with his mouth, because he suddenly felt the left half of his face going numb. The medicine man of the village gave Carlos some yellow clay that he was supposed to place in his mouth to alleviate the effect. All the villagers sat down around him in a circle to watch what would happen, and everybody, including Carlos himself, thought he would soon die. Fortunately, he didn't, and the effect of the toxin started to subside about six hours later.

One might wonder why Carlos was in the field without gloves in the first place. But there was no reason he could have expected to encounter *Phyllobates terribilis*, because the species was not known to live in the areas bordering the Rio Naya. Until then, only two populations were known, one in the region of the Rio Yurumangí, and the other in the Rio Saija region, which was also the original home of the inhabitants of Joaquincito. Their ancestors had migrated north in search of new tribal lands in the 1920s and eventually settled on an island in the delta of the Rio Naya.

It would appear that the distribution range of *Phyllobates terribilis* here is indeed restricted to this 700-hectare island, which makes Carlos suspect that the indigenas brought the frogs along from Saija and released them here on purpose – as "renewable ammunition" for their poison darts.

INFOBOX WEBREP

The Frogs & Friends video documentary on the amphibian project of the Zurich Zoo in Colombia can be viewed in German, English and French at the Frogs & Friends stations set up in the zoos of Zurich, Vienna and Cologne – or anytime at www.frogs-friends.org

Carlos did not develop a "terribilis-phobia" in spite of his personal experience with its toxin. On the contrary - he jumps at the chance to get up close and pose for a portrait.

Guardians of the Terrible

Eperara Siapidara – one of Colombia's many peoples

By Susann Knakowske

The 240 inhabitants of Joaquincito form part of the small nation of the Eperara Siapidara. This tribe is native to the Pacific rainforests of the departments of Cauca, Valle del Cauca, and Nariño, along the rivers Saija and Naya, Lopéz de Micay, as well as in El Charco y Olaya Herrera.

The community of Joaquincito is mostly organized through family structures. Its members live mainly from what they produce on small slash-and-burn parcels within the forest where they cultivate banana, pineapple, cocoa, lime and "Papa China", the carbohydrate-rich taro root. Wood from the giant rainforest trees is used for constructing houses and canoes.

The main source of meat is chickens, with occasional monkeys, birds and small rodents that can be hunted in the forest. Traditionally, hunters used the toxin of the frog *Phyllobates terribilis* to poison their blow darts. Knowledge of this hunting method has since been lost, at least in Joaquincito, and today the hunters use rifles.

An important source of income for the villagers are handmade crafts: traditional necklaces, earrings, and bracelets made from tiny pearls, wicker baskets, and bowls carved from wood. The women of the village run a cooperative and sell their products both in their own shop and in the markets in Buenaventura and Cali.

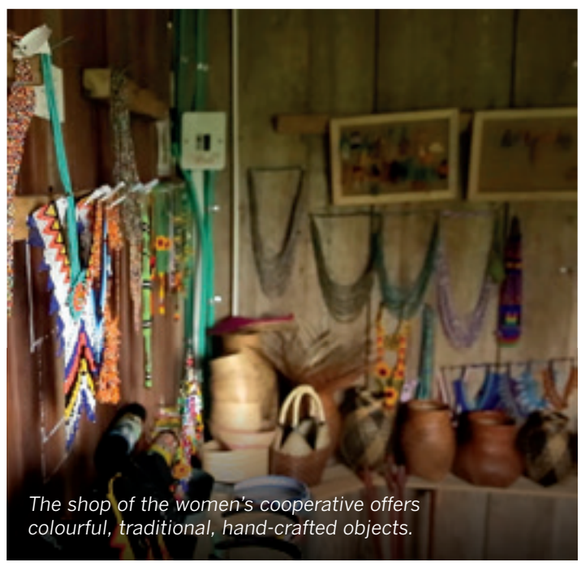
Between the front lines: Indigenas and the civil war

Decades of civil war in Colombia have especially affected the indigenous peoples. They were drawn into the conflict, displaced from their homes, and suffered from the indiscriminate spraying of defoliation chemicals with which the Colombian government was trying to fight drug plantations.

All of these problems affected Joaquincito, since it lies in the middle of a region that the FARC guerrillas, paramilitary forces, and drug cartels fought over for decades.

Continuous rain and strong tides determine life here: village roads are gangplanks, and the traditional "tambo" houses are erected on stilts. The villagers use everything the forest provides. Palm fronds are turned into "roof tiles" due to their water-repellent properties and the stalks are used for constructing floors.

Since rivers are the only routes of transport and communication in the dense rainforest, settlements are often directly on the river banks.



The shop of the women's cooperative offers colourful, traditional, hand-crafted objects.

Ligio Quiros, member of the village council

"We know nothing about the manufacturing of poison darts anymore. This was something our elders did. And they failed to pass on their traditional knowledge to us. We want to relearn it though, because it is part of our culture."

The indigenous peoples of Colombia

Social and political position in a multicultural country

By Susann Knakowske

Even though they make up a mere 3.4 percent of the total population of Colombia, the indigenas comprise (depending on the source) somewhere between 87 and 102 peoples with more than sixty distinct languages.

The most numerous ethnic groups are the Paeces, Wayú, Embera, and the indigenas of Nariño. Together, they represent more than half of the indigenous population of Colombia.

States within the state: indigenous self-administration

There are 788 indigenous territories within Colombia, so-called Resguardos. These cover nearly one third of Colombia's territory. They have borders that are fixed by law and are administrated autonomously by indigenous councils (Cabildos). These land titles are collective and not transferable.

These rights are guaranteed by law and are of particular importance for the indigenas, as the land is not only of value to them economically, but also spiritually. It is the basis of their identity and their sense of belonging.

For example, the Eperara Siapidara people distinguish between two worlds, the spiritual world of the Jai, which is home to spirits and shadows, and the physical world in which their society unfolds. In their tradition, the Tachi nawe – Our Mother – is the highest spiritual leader and priest of the community, while the Jaipana traditionally is the highest healer. Together, Jaipana and Tachi nawe possess the entire body of mythical and traditional knowledge.

The indigenous community is politically organized through a council (Cabildo), which is elected each year. It takes care of the internal affairs of the village and represents it in dealings wih state authorities.

Plutarco Garabito Mejia, Head of the Village Council

> *"The peace process changes some things for us: the armed groups have left, and the situation is calmer. Nevertheless, we have to make sure that as the militias disappear, the government also becomes more present in our region, so that we can live in safety. Otherwise other criminals will take their place and harm our community."*
>
> *Ligio Quiros, member of the village council*

For the villagers of Joaquincito, the river serves both as a bath and a laundry. They belong to the ethnic group of the Eperara Siapidara that originally lived further south.

A communal house, a kiosk, a soccer pitch, and an elementary school – that's all the infrastructure there is in Joaquincito. Those who want to attend high school or see a medical doctor have to travel to the nearest larger town of Puerto Merizalde or even to the port city of Buenaventura, two and half hours away.

The project's key players

Frogs & Friends Sponsorship

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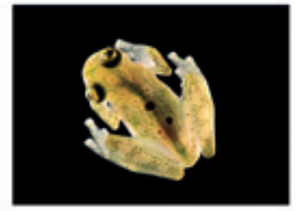


A dam in Anchicaya; the end of the rainy season is evident in the water level.

Part 2

Our Terribilis trip to Colombia

Into frog's paradise – surveys in the Farallones de Cali National Park

By Björn Encke

14 November
From Queremal to Anchicaya

Surprises lurk everywhere. We thought our journey across the sea to Buenaventura was exciting and dangerous, but it now seems quite relaxed compared to the road we have to take to today to reach our base camp in Anchicaya. This is the second stop on our Colombian frog quest: a visit to the Farallones National Park, a vast area of the size of Tenerife that, because of its mountains, includes a variety of vegetation zones.

The morning starts with a visit to some cleared patches at the margins of the park and a small population of *Andinobates bombetes* persisting in the midst of agricultural land in the more elevated Queremal region (about 1500 m above sea level). It is a pretty little poison frog that is at home in the layer of leaf litter in a small forest near a river. The forest remnant lies on private property. Here we get a glimpse of the work of park rangers Danny and Oscar. These two are responsible for overseeing a vast area between Queremal and Anchicaya. With so few resources, official controls and sanctions have little effect.

Typical vegetation in the mist forest in Queremal

Andinobates bombetes

Wild rainforest romantic: A colorful house in a downpour, erected on top of a hill for good reason.

The continuous rain turns the small road between Queremal and Anchicaya into a torrential stream.

Night descends over the station of the EPSA power plant in Anchicaya, the base camp for our excursions into the Farallones National Park.

Here, a crucial part of nature conservation work is maintaining constant and amicable relations with the local people and convincing them to participate in protecting the forest. The owner of the Andinobates forest invites us to a snack of sugarcane. In the end it will be up to him whether this patch of forest continues to exist – and the frogs with it.

When we leave the Queremal around noon the mountains are already shrouded in thick mist. As we make our way down to Anchicaya, which is about 400 meters above sea level, the rain increases to a real storm. Suddenly we find the road blocked by a landslide that has buried a car. Fortunately there are no people trapped in it, and Oscar and Danny can hack a path through with their machetes so that we can continue. We reach the gate to the power plant of the EPSA in Anchicaya shortly before dark.

Two huge hydroelectric plants right in the middle of the park produce power for the entire Colombian southwest. It is a high-security area. At the entrance, surrounded by military guards, we show our papers - what a contrast to Joaquincito. For the next three days, this is the base for our excursions. We sleep in the power plant guesthouse and eat in the workers' cafeteria. It all exudes the slightly bedraggled charm of tropical-style socialism.

15 November
Endangered beauty: *Oophaga lehmanni*

We are trapped. The landslides from yesterday's downpour have blocked the road in both directions. Until the roads are cleared, no one can come in or get out. Grateful that we made it in when we did, we set out to hike to a fairly steep slope where Lehmann's poison frog *(Oophaga lehmanni)* is known to live. Small markers on the slope indicate that we are moving along one of the many transects that WCS-herpetologist Gustavo Gonzalez and his team have set up. They are part of a project to gather data on the amphibian populations of Colombia over the next few years. Five of the 59 Colombian national parks have been selected for this project. It is the first large-scale national monitoring project for amphibians in Colombia, funded by the Zurich Zoo and executed by the Wildlife Conservation Society (WCS).

Our luck continues: Within half an hour we find two specimens of this gorgeous poison frog with its pattern of reddish orange and black bands. Lehmann's poison frog is considered threatened for several reasons: its distribution range is both extremely small and easily accessible, and its beauty makes it attractive for the illegal pet trade. If collectors target this population of *Oophaga lehmanni*, it could pose an existential danger for the species.

This is exactly what the researchers want to find out: They will monitor population trends so that, if necessary, they can establish conservation breeding projects in time to at least ensure that a reserve population exists in captivity. This also has a side benefit: If successful, "officially" produced offspring could be used to dry up the black market pet trade. There is also the ever-present risk of a pandemic in the wild, and even a locally restricted outbreak of chytridiomycosis could be all that is needed to quickly wipe out this wild population.

So far, that risk does not appear to be a pressing one, though, as all tests for the chytrid fungus in *Oophaga lehmanni* were negative. Then again, this project only started in September of 2016...

How effective the poison of Oophaga lehmanni really is has not been investigated yet, but Rangers Danny and Oscar told the story of someone who was temporarily blinded by just a trace of the poison in his eye.

15 November
A night excursion in Farallones

We are back from a night excursion. What a treat for a herpetologist! We had hiked up a small river and checked under just about every leaf, which yielded two species of glass frogs and an assortment of others. These will be examined more closely later and then released where they were caught.

The hike had begun with a bit of excitement: right where we parked the car, Martin Bauert practically stumbled over a terciopelo viper (aka fer-de-lance), the most dangerous venomous snake that lives here. Measuring nearly a meter in length, it was not quite fully grown, but still quite aggressive. After that we all keep an even closer eye on the ground – which helps us discover more small frogs there and – hard to miss – an impressive gathering of cane toads in a large puddle. They had apparently organized a mating party – these are definitely not the European toads we're used to.

One of the most beautiful photographs of the evening is an anole *(Anolis latifrons)* that was found sleeping on a leaf and now eyes us with an accusing glare when we disturb him with the camera light. Two leaves later we find a prize that is less pretty, but no less interesting: A mushroom-tongued salamander *(Bolitoglossa biseriata)* tries in slow-motion to remove himself from the glare of our camera light. We are also impressed by some large frog species, like Spurell's red-eyed treefrog *(Agalychnis spurelli)* or its prettier colleague, (presumably) *Hypsiboas rosenbergi*. The animals are not happy about our interest in them and watch us with great scepticism as we wrestle with our cameras, floodlights, and tripods. They can rest assured, though, that the humans bothering them are even more stressed.

When the rain intensifies once more and becomes a risk to the technical equipment, the mood of cameraman Peter darkens fast. Both are reason enough to call it a day. Team excursions forge strong bonds, and by now we know each other quite well.

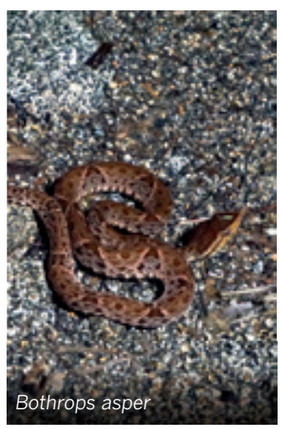

Smilisca phaeota


Agalychnis spurelli

Even though we have hardly spent a week in Colombia, we all have the feeling that we have been on tour forever. Measured by the wealth and frequency of new experiences and discoveries, the actual number of hours and days can't keep up.


Hypsiboa rosenbergi


Anolis latifrons


Bothrops asper


Rhinella marina


Bolitoglossa biseriata

16 November
EPSA Station, Farallones National Park

Today it's already raining in the morning. We take the chance to do what was on the schedule anyway: taking samples from last night's finds. The work requires patient, exacting concentration. Gustavo and his team will repeat the procedure thousands of times in the coming years.

Danny and Oscar, the national park rangers, assist Gustavo. This is an important part of the project: training the staff of the national parks. The aim is to enable Danny, Oscar and their colleagues to make spot checks on their own, recognize specific warning signs, and respond with appropriate countermeasures.

Danny and Oscar are smart, enthusiastic young men. They alone are responsible for a vast area between Queremal and Anchicaya. Working only to enforce the relevant laws is impossible. The two regard themselves as mediators, emphasizing the importance of continuous dialogue and a willingness to compromise. They are ambassadors for the benefits and needs of nature conservation. If serious problems do arise, they can ask for additional help.

But what will happen if these calls for help are

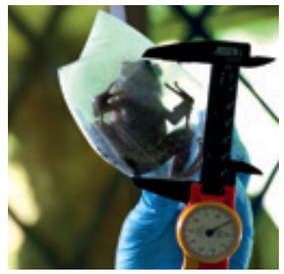
Park Rangers Danny Leandro Mora (left) and Oscar Fernando Martinez (right) together with German Forero of the WCS; they are two of just twenty rangers for the Farallones National Park, an area as large as the island of Tenerife.

ignored? What will become of Danny, Oscar and their enthusiasm if they become mere chroniclers of demise? They need at least the occasional experience of success to continue believing that their work really does serve a greater goal. This is another aspect of the project: uniting various partners with different abilities and means to achieve one common goal: the conservation of biodiversity in one of the world's most species-rich regions. It can only be successful when everyone takes their role seriously.

The WCS Colombia takes care of scientific coordination. The Zurich Zoo helps with funding, cooperates with the Cali Zoo on captive breeding programs, and provides a "home base" for the project in Europe. And Frogs & Friends helps tell the stories in as many ways as we can, to try reach as broad a public audience as possible. It would be a mistake to think Frogs & Friends is interested only in the frogs. Only together with the "Friends" can we help create a story with any chance of success.

Of course, salamanders, newts and caecilians are also "Friends," but it is the people involved who really make the difference – dedicated partners, generous donors, enthusiastic children, inspired artists, caring amphibian breeders, all

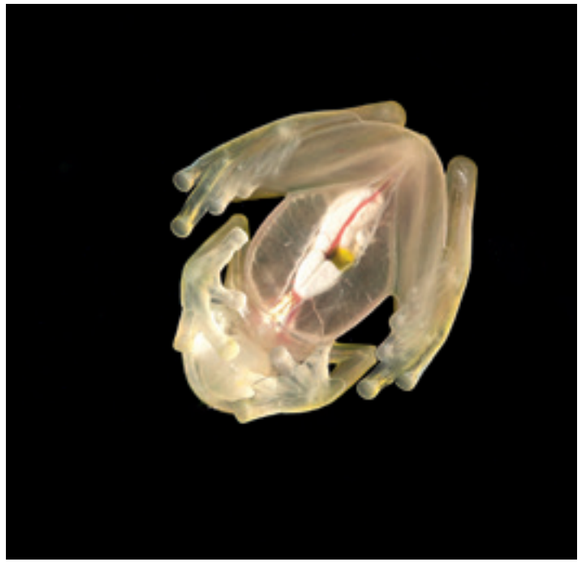
Gustavo Gonzales, the head herpetologist of the monitoring project, weighing toads (Rhaebo haematiticus)

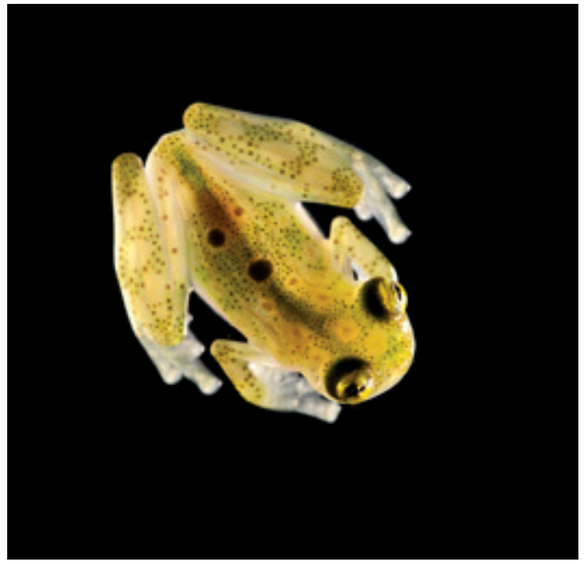


Measuring toads

Taking swipes for a chytrid fungus test

the Ligios and Plutarcos from Joaquincito and the Dannys and Oscars in Farallones.





16 November
EPSA Station Farallones National Park

We can't resist. Before our evening trip to return the frogs to the sites where we found them, we have to do a photo shoot with the two little glass frogs in an improvised studio on the balcony of our guesthouse.

The miniature glass frog *Hyalinobatrachium aureogutatum* measures barely 2 cm, weighs just a gram and a half and is almost transparent. We are keen on making him show us his underside – and he complies!

He patiently clings to a window pane and lets us take a look at his inner structure: his heart, lungs, and intestines – a perfectly formed organism in miniature. It is a wonderful highlight of our time in Farallones.

Heavy artillery aiming at a little frog: Frogs & Friends' author Susann Knakowske and cameraman Peter Gröne at work.

Espadarana prosoblepon

December 2016 – Berlin

By 17 November, the road from Farallones to Cali had been cleared, and we could travel back to Cali as planned. At the zoo, we met again with Carlos Galvis who was discussing with Martin Bauert of the Zurich Zoo the upcoming revamping of the Amphibian Station – necessary preparations that would facilitate a quick response if certain species need conservation breeding programmes. We spent our last evening in the company of Carlos, German, and his Brazilian wife, Andrea.

While we dined in a street café we could watch dozens of actors and extras as they waited in a neighbouring restaurant for their scenes in an episode of "Narcos," a popular Netflix series about the drug baron Pablo Escobar. Fortunately, Cali is not only known for its drug lords, but also as the world's salsa capital.

We wrapped up our time together in style in a traditional salsa bar with Aguardiente and dancing. On 20 November, we boarded our flight back to Berlin. It was only a short visit to a country full of contradictions and a fascinating variety of people and natural treasures, a country battered for decades and now on the threshold of re-emerging into a new and better future. We are convinced it is the right time to start supporting nature conservation in Colombia.

Four days after our return, the government and the FARC agreed on a new peace accord, just seven weeks after they restarted negotiations. On 1 December 2016, the Colombian Congress ratified it, hopefully bringing an end to half a century of the country's self-destruction.

Light and shadow in the Colombian rainforest

The herpetologist Gustavo Gonzalez Duran is the scientific director of a pilot study, financed by the Zurich Zoo, to assess the status of amphibians in Colombia. Frogs & Friends spoke with him about his experiences during the first eight months of the project.

The interview led by Björn Encke

Gustavo Gonzalez Duran (front) is the chief herpetologist in charge of the monitoring project in five Colombian national parks. Behind him are German Forero-Medina, species conservation director for WCS Colombia and park ranger Oskar Fernando Martinez from project partner Parques nationales naturales de Colombia.

What are your fundamental findings so far regarding the species you've found?

We found about half of the threatened species expected in each national park. However, it is sad that in some of the localities these species at some point were abundant and today we no longer find them. On the other hand, we have noticed that some species are affected by human threats. This will be crucial for the monitoring and the conservation pilot to try to eliminate the risks of these sites with the help of our partner, Parques nationales naturales de Colombia.

What have you found about the condition of the populations of threatened species?

Some endangered species are affected by the threats that we have documented. However, in these conserved places their populations are doing well. On the other hand, some species have disappeared or exist only in tiny populations in most of their former range, even in very conserved areas.

It is possible that the fungus has caused these species to decline; we are currently analysing whether the fungus is present in these sites. But the picture is complicated for frogs as they need in-situ and ex-situ conservation actions and few people are working on this in Colombia.

Five of Colombia's 59 national parks were selected for the pilot study. They include a broad variety of ecosystems (with elevations between sea level and 5775 meters) and a rich diversity of amphibians. One-third of Colombia's endangered amphibian species live in the study regions.

What insights do you hope to gain during the survey?

This study is critical for conservation in Colombia since most of the national parks have been without research for many years, because of the armed conflict, and we did not know if the amphibian species were still present. Currently I hope that this will prioritise species for conservation ex-situ and in-situ. Knowing what threats are causing them to decline and taking actions to reduce them will hopefully help us increase the population sizes of amphibians. In addition, we hope to establish what it is that has caused so many species of amphibians in the Andes to disappear in the last 30 years.

What are the potential benefits of your research to other regions in Colombia that are not part of the recent survey?

With the selected national parks, a large proportion of threatened species is covered in the country. So when working in these protected areas, it is possible for a large number of these species to implement the conservation plan. On the other hand, with the results obtained we will know which actions are the priority for other areas and what are the main problems of amphibian conservation in Colombia.

Is there a typical story you can tell about something you experienced that you hadn't expected?

In the National Park Tatama we ascended from 1800 to 3900 m of elevation in 7 hours, by cliffs, climbing, rolling, and dragging. Psychologically and physically it was very demanding—the most difficult ascent I'd ever made. This is a remote site, where human agriculture never arrived, one of the most preserved highland sites in Colombia. It was fantastic. It was also surprising since we found several new and endemic species at the site.

For you personally, what was your amphibious highlight so far?

Undoubtedly to find species that I thought I would never see, to see them after 20 or 30 years without records is a joy for us, and to know that we can still do something for them. However, it is equally sad to know that for some species it is too late and despite these efforts to find them we will never know them. It is a great loss.

What are the general challenges you are facing undertaking your research work?

Most amphibian extinctions were reported in the 80s and 90s. For this reason, it may be too late for some species since there was no conservation programs for amphibians and hardly any ex-situ conservation efforts in the country.

It should not be a surprise that after 20 or 30 years of declines in amphibians, researchers are no longer able to find the majority of threatened species. On the other hand, there are many environmental threats such as climate change. For species that are being affected by extreme droughts, it will be tough to solve the problem, since they are external factors that cannot be controlled.

How did you become part of the project, and why did you become a frog specialist in the first place?

I started with snakes. I liked them a lot, but I had friends and teachers who knew about frogs and began to learn from them. When I discovered that amphibians were going through a difficult situation due to declines, I decided to dedicate my life to this. I hoped to bring something to the conservation and to learn about the impressive biology of the frogs. Later it became a passion.

Now, about how I got to the project, I had been doing research in some National Parks of Colombia and also in the Andes, which allowed me to know many of the problems and threatened species. Coincidentally some of these parks are the ones we are working on. I think that was decisive to be part of this project.

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