

# nature needs more explorers

What sixty new dragonfly and damselfly species from Africa can say about the state of our most critical resource and the exploration of life.

Klaas-Douwe B. Dijkstra, Jens Kipping & Nicolas Mézière (1 December 2015)

Sixty new dragonfly and damselfly species from Africa (Odonata). *Odonatologica* 44: 447-678



By naming 60 new dragonflies at once, we want to show that a biologist's greatest importance today is to provide the names and knowledge needed to add all life to the human conscience.

We do so by challenging three common misconceptions about biodiversity:

1. that most of Earth's species are known to us
2. that the remaining unknown species are hidden and detectable only by genetics
3. that enough effort is being made in the field to uncover the unknown in time

We demonstrate this with some of the most sensitive and beautiful of all biodiversity:

1. freshwater — Earth's most dense and threatened species richness
2. Africa — the continent that will change most in the 21<sup>st</sup> century
3. dragonflies — the insects that could be the best gauge of global change



The new Sarep Sprite *Pseudagrion sarepi* was named after the SAREP expedition to eastern Angola.



Mankind knows just 20% of the 9 million species of animal, plant, fungus and protist thought to inhabit our planet.

With 6000 species named, dragonflies and damselflies were regarded as well-known.

The 60 new dragonflies described now are the most to be named at once in a century, adding 1 species to every 12 known in Africa.



Their beauty and sensitivity can raise awareness for freshwater biodiversity, the densest and most threatened on earth.

The new Dawn Jewel *Chlorocypha aurora* is known from one river in Cameroon.

They also show that we must go out and discover new species now we still can!

10 of the 60 species were found around Upemba National Park in DR Congo.

So-called 'new species' existed before, but were never noticed or documented.

Most unknown life may thus seem indistinct or concealed, like recent 'new' crocodiles and a wolf from Africa based on molecular analysis of animals known for centuries.

None of the 60 new dragonflies, however, were found first in the lab. All are colourful, most even recognisable from a photo.

4260 DNA-barcodes of 80% of tropical Africa's 730 species did help confirm their validity.

Found across the continent, they are also not from especially remote places.

The Swordbearer Emperor *Anax gladiator* is named for the blade on its tail. One of Africa's largest dragonflies, it is already known from Zambia, Malawi and DR Congo.





Each new species has its own story of discovery.

The Red-veined Basker *Urothemis venata* was first recognised as new from a photo taken 32 years ago in eastern DR Congo.

It only resurfaced six years ago, first 1500 km away in Gabon and then 4500 km west in Sierra Leone.

However, this flashy species flies in the wet season when access to forest swamps is hard.





Dragonflies and damselflies all breed in freshwater, but habits vary strongly.

The Pale Cascader *Zygonyx denticulatus*, a new dragonfly from Zambia and DR Congo, hovers over sunny rapids.

The Gabon Slim Sprite *Pseudagrion dactylidium*, a new damselfly, perches by muddy puddles in deep shade.





Every lake or river is like an island in a sea of land.

Each species community develops in isolation, leading to unique biodiversity.

Thus, while freshwaters cover only 1% of Earth, they harbour 10% of known animal species, of which up to 80% are insects.

Africa's great lakes are famous for the wealth of fish species found nowhere else.

However, insects emerge to mate and, as lakes are deep, may not profit from opportunities offered as fish can.

The new Tanganyika Sprite *Pseudagrion tanganyicum* is exceptional, being unique to such a 'freshwater sea'.





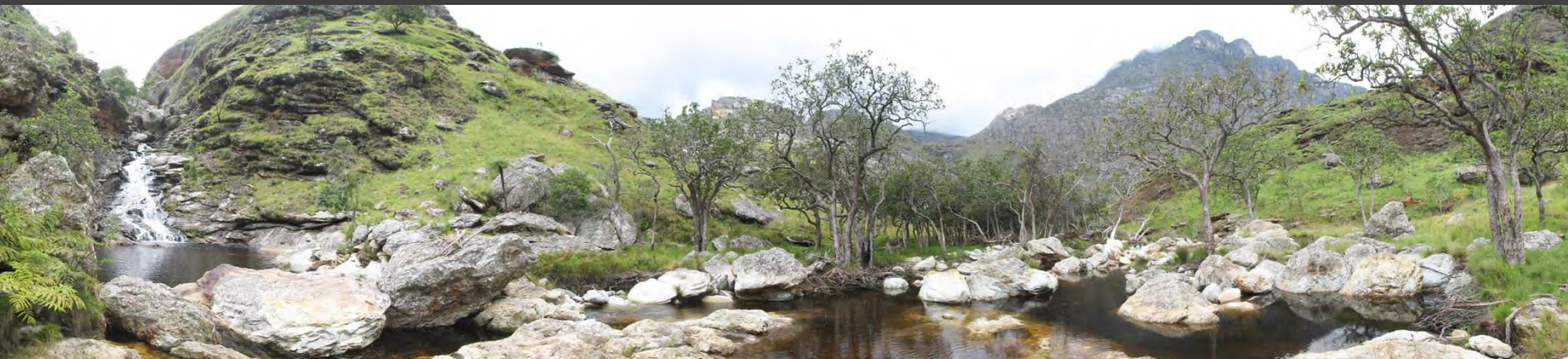
If each water body is like an island, a single dam or mine spill can erase an irreplaceable ecosystem.

Therefore, 32% of freshwater species may risk extinction versus 24% on land.

However rare, a species cannot be added to the IUCN Red List without a name.

The new Rock Threadtail *Elattoneura lapidaria* is encroached by gold mining in the Chimanimani Mts in Zimbabwe.

To absorb heat in these mist-shrouded heights, both males and females always rests on reflective rocks.





Few animal groups applied in conservation represent both the aquatic and aerial realm.

However, such groups may be most reactive to change: climate impacts water bodies directly, flight allows an active response.

No birds or butterflies are born from water, no frogs or fish are airborne: dragonflies are both!

The Goldsmith Threadtail *Elatoneura aurifex* and Nugget Sprite *Pseudagrion aureolum* only live at crystal clear streams on the sandy plateau on the border of Gabon and Congo.





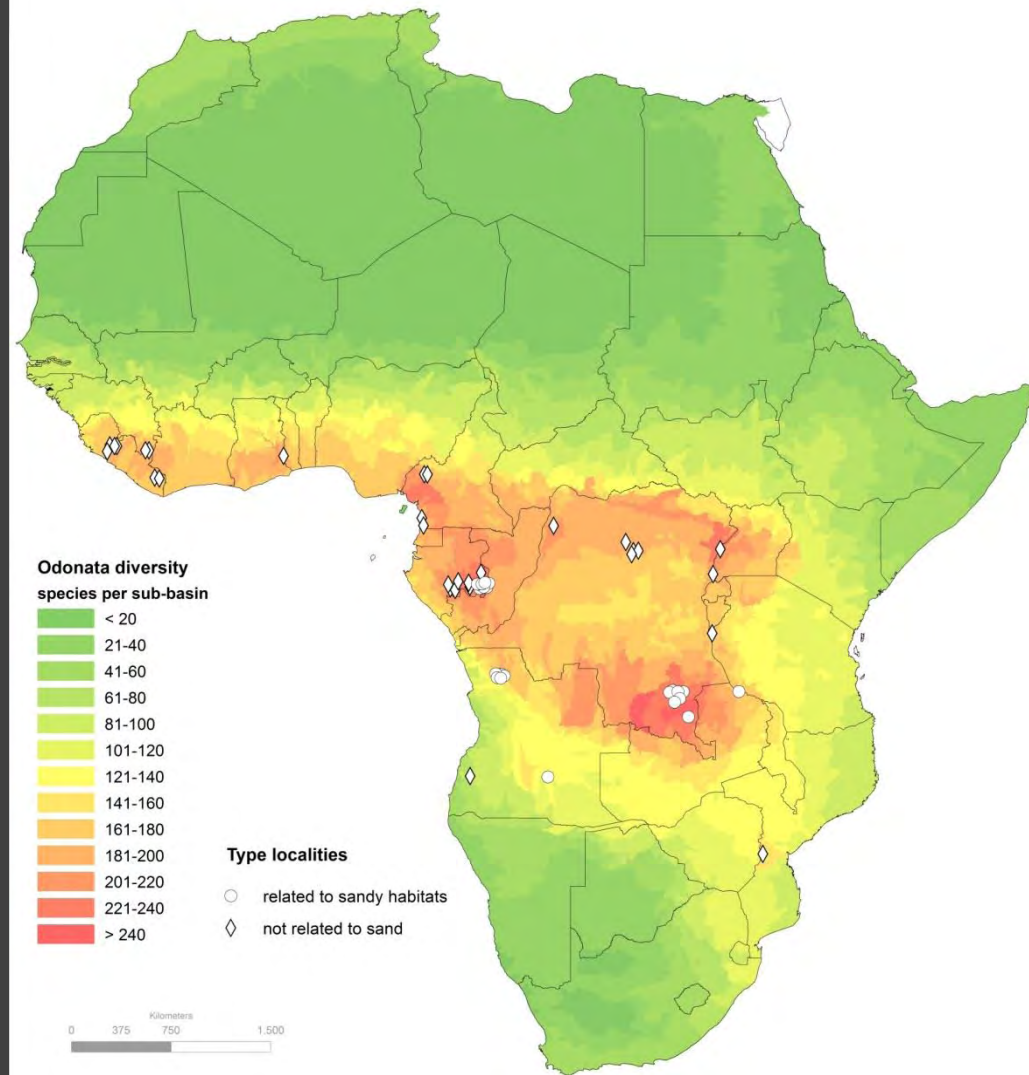
Most dragonfly and damselfly species, including many of the 60 new ones ♦, live where rainforests and mountains provide the most reliable water.

However, almost half of the 60 new species ● were found on the poor sandy soils of central Africa.

The Zambezian biodiversity hotspot is neglected, perhaps because it is relatively dry and lacks great mountains and forests.

Paradoxically, the hotspot may owe its distinct freshwater fauna partly to past aridity, as Africa saw vast climatic changes over millions of years.

The sand left behind by deserts that expanded in dry periods now absorbs the still highly seasonal rainfall, providing a permanent abundance of aquatic habitats.





As millions of animal species exist, finding and recognising new ones is specialised work.

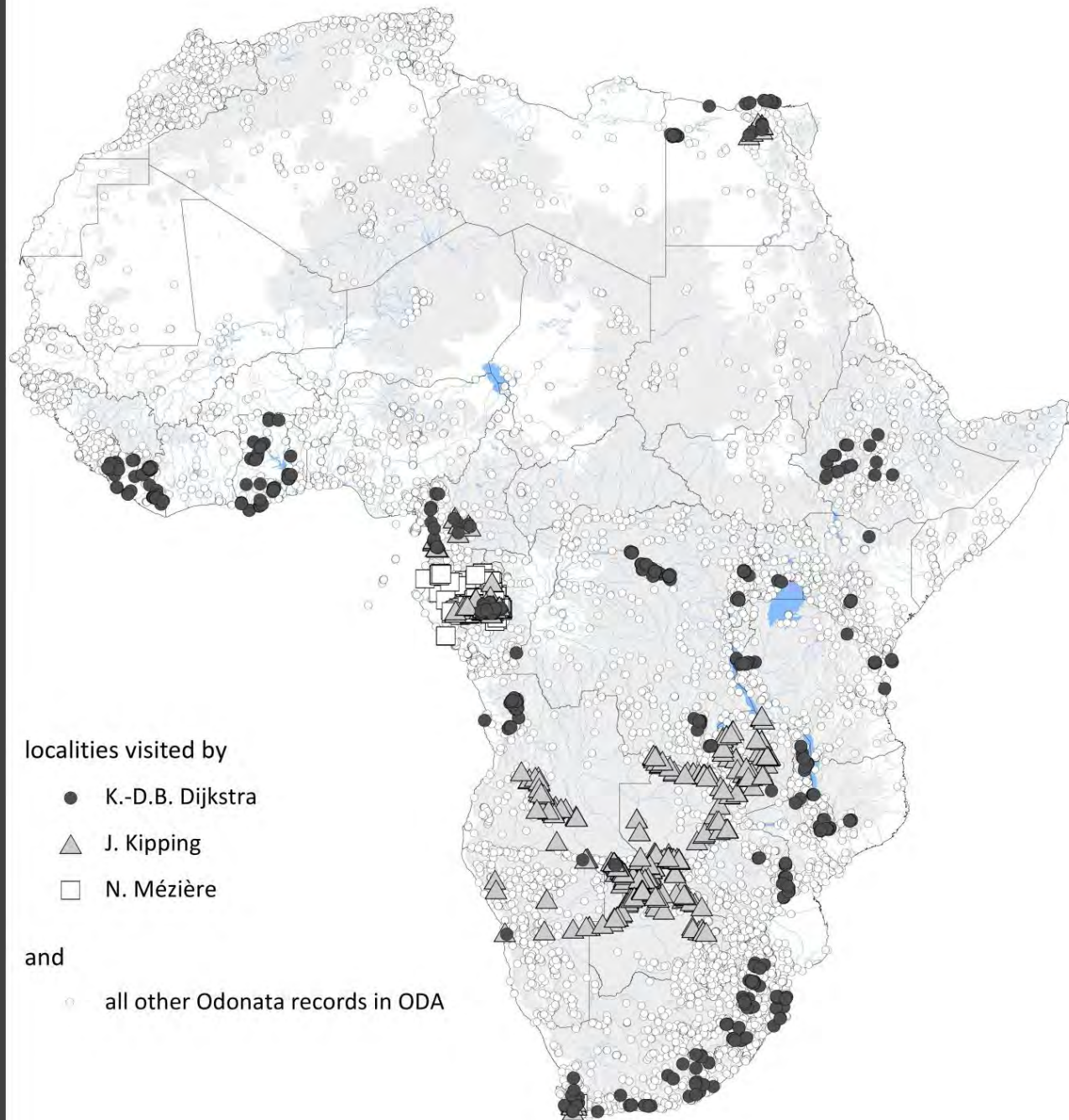
Each new species must be taken on trust until contrary evidence arises.

Their validity hinges on the expert's credibility, built only by extensive field experience.

The dark symbols show where the authors of the 60 new species have been.

The dragonfly and damselfly findings in Africa, may be the best record for any tropical insect group.

Remember that Africa is three times as large as China or the USA!





Years of experience are needed to notice the small differences.

The new Band-eyed *Ceriagrion banditum* and Spikerush Citrils *C. junceum* fly side by side at this pond in Zambia.





Finding and naming species is the foundation of the appreciation, conservation and research of nature.

Many people may think this is what most biologists do, but this work has gotten less and less support at universities and scientific institutes.

Even natural history museums offer few opportunities for such work.

Three dragonfly specialists found 60 new species across Africa, but just 9 when they worked for a university or museum, and 33 while working as environmental consultant.

School teacher Nicolas Mézière found 18 of the 60 new species, all in Gabon.

The new Blue-spotted Pricklyleg *Porpax mezierei* was named in his honour.







Nico, with co-author Jens Kipping, also discovered the Black Reticulated Damselfly *Pentaplebia mangana*.

Dark as the manganese ore mined in its range, it lurks in the gloom by forest falls.





Biological collections are a critical scientific resource, but their study and maintenance are under pressure.

Museum specimens over 30 years old were studied for 20 of the 60 new species.

The oldest specimen examined was caught in Belgian Congo in 1899.

Final proof of the Congo Duskhawker *Gynacantha congolica* was found 111 years later, 50 years after independence, on the Congo River expedition.

Lead author KD Dijkstra joined and so could add to a collection that now contains 9 in every 10 tropical African species.

This will be an indispensable future reference for research in such a rapidly changing continent.





Nature needs names,  
they allow us to care.

Like a person's name, they  
introduce species to society  
and into our conscience.

As one budding enthusiast  
exclaimed: *You don't notice  
them until you know they can  
have a name!*

Scientific names are more than  
a label, signifying a species'  
closest relatives in the first  
part, and a feature of the  
species itself in the second.

The Darkening Citril *Ceriagrion  
obfuscans* is glowing red when  
young, but with age fades into  
the deep shade of central  
Africa's flood forests.





First identified in 1869, *Spesbona angusta* was lost from 1920 until found at a single site near Cape Town in 2003.

Genetic research revealed that its only relatives survive in Madagascar and on Pemba, an island off Tanzania.

Epochs of climatic change may have eradicated these damselflies everywhere in-between.

Centuries of cultivation almost did the same with their vestige in the Cape.

These findings led to the new genus name *Spesbona* in 2013, Latin for 'Good Hope'.





Africa is too often equated with bad news.

The Peace Sprite *Pseudagrion pacale* was found on the Moa River near Sierra Leone's diamond capital Kenema.

Twenty years earlier, villagers trapped between rebel and government forces jumped off this bridge, drowning in now tranquil waters.

Two years later Kenema became the national epicentre of the Ebola outbreak.





The name of the Redwater Leaftipper *Malgassophlebia andzaba* means 'red water' to Gabon's Batéké people.

The clear water they and the Lovely Fairytail *Lestynogomphus venustus* rely on is stained by leaf litter.





The new Great Jewel  
*Chlorocypha maxima* from  
Gabon was **not** named after  
Queen Máxima of the Dutch  
royal house of Orange-Nassau.

This deep orange damselfly  
is just very large!





The new Robust Sparklewing *Umma gumma* from central Africa was named for the classic 1969 album by Pink Floyd.

“Ummagumma” is said to be slang for making love.

PINK FLOYD  
**UMMAGUMMA**  
STUDIO ALBUM





Like birds, male damselflies impress both mates and rivals with colour.

None do so more emphatically than the jewels with their frantic aerial dances.

What the new Polychrome Jewel *Africocypha varicolor* from Gabon signals with its either red, yellow or blue tip is still a mystery.

The males' colour variation is unique among dragons and damsels.



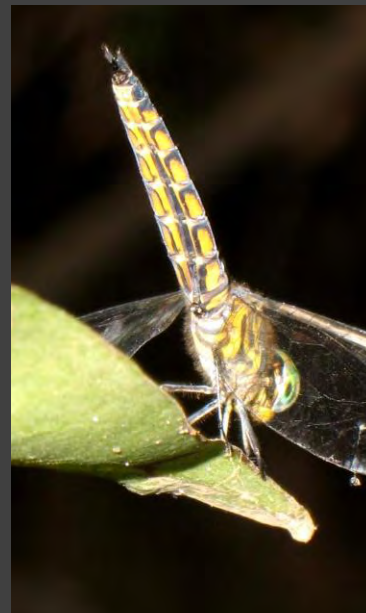


Firebelly males flash their bright backs to scare off rivals, but wave their coloured bellies to lure mates.

The hues of the new Sunrise Firebelly *Eleuthemis eogaster* from Angola are unique, like clouds in the dawn sky.

The Shadow Firebelly *Eleuthemis umbrina* from Liberia attracts females with its black-and-yellow underside, but solely in shade.

On the same rivers another species waves a purely orange belly, but only in full sun.





Mankind relies on the freshwater that covers only 1% of Earth's surface and 10% of all animal species breed only there.



Pristine habitats like this Liberian stream and the onomatopoeic Umvumvumu River, babbling over rocks in Zimbabwe, provide reliable clean water.





Africa's landscapes are among the world's most natural, but 83% of global population growth from 7 to 11 billion people by 2100 is predicted to occur here. Change will be greater than anywhere else. The continent's already fickle climate is also thought to become even more extreme.



Impacts such as by gold mining in Zimbabwe and forest loss in Angola will be great, affecting all who depend on this water.





7 million plant and animal species may still await discovery.

As their habitats disappear, uncovering them must be biology's top priority.

Just in freshwater a quarter of a million species could be gone before they are known.

Most African dragonflies knowledge was assembled by foreign researchers and volunteers.

Literally rising from the water, few animals are better to raise awareness and assess impacts on our most threatened biodiversity.

We must now repatriate this knowledge as handbooks, field guides, websites, Red Lists, workshops and training.





*A memory that will never fade  
is watching dragonflies, in their  
variegated splendour of colour  
and dazzle, hovering and  
darting over stagnant pools.*

*They helped me to transport  
to better things than war.*

*If we found water to fill our  
canteens and I saw these little  
creatures, I would always try  
to get back to the pool  
later, by myself.*

*And I would find a little  
piece of heaven.*

veteran of Angolan civil war

*Water no get enemy.*

Nigerian jazz legend Fela Kuti





KD Dijkstra (1975) grew up in Egypt, drawing and describing his first dragonflies when he was 12 years old. Finding The Netherlands' first Vagrant Emperor *Anax ephippiger*, an African visitor, in 1995 focused his passion. He has since spent over 1000 field days in 20 African countries, finding 80% of all 770 species and describing 78 of them as new. He authored the highly successful *Field Guide to the Dragonflies of Britain and Europe* (2006), *The Dragonflies and Damselflies of Eastern Africa: Handbook for all Odonata from Sudan to Zimbabwe* (2014), and is honorary research associate at the Naturalis Biodiversity Center (The Netherlands) and the University of Stellenbosch (South Africa).

[science.naturalis.nl/dijkstra](http://science.naturalis.nl/dijkstra)



Read up on all 60 new species

[www.osmylus.com/index.php/downloads](http://www.osmylus.com/index.php/downloads)

Watch their discovery in Upemba NP, DR Congo

[youtu.be/Arr2k7dwzSU](https://youtu.be/Arr2k7dwzSU)

Contact for interviews and to support

[african.dragonflies@gmail.com](mailto:african.dragonflies@gmail.com)

Handbook of African dragonflies

[freshwaterblog.net/2015/06/01/](http://freshwaterblog.net/2015/06/01/)

Freshwater health monitoring tool

[jrdbiodiversity.org/grant/stellenbosch\\_dragonflies/](http://jrdbiodiversity.org/grant/stellenbosch_dragonflies/)

Follow [African Dragonflies](#) on Facebook and [@bionomer](#) on Twitter



**Jens Kipping (1965)** began his career as a mining mechanic and hobby entomologist in the former German Democratic Republic, but after the German reunification in 1990 studied landscape planning and conservation to become an independent environmental consultant and lecturer at Anhalt University. He maintains the Odonata Database of Africa (ODA) and is the leading photographer of African dragonflies, with a special interest in Angola, Botswana and Zambia.

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**Nicolas Mézière (1980)** moved from his native France to Gabon in 2008 to teach science at a secondary school. Intending to study butterflies, a friend convinced him that dragonflies would be more worthwhile! He found a record 262 species in his home province alone, including 23 of the 60 new species: 15 are yet to be found elsewhere. In 2015 Nico moved with his Gabonese family to French Guyana. Who knows what he will discover there!

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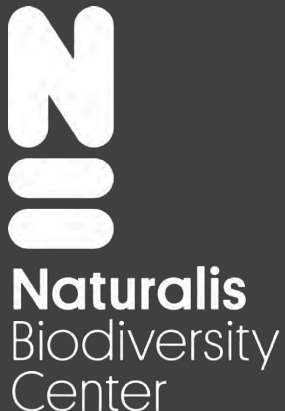
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