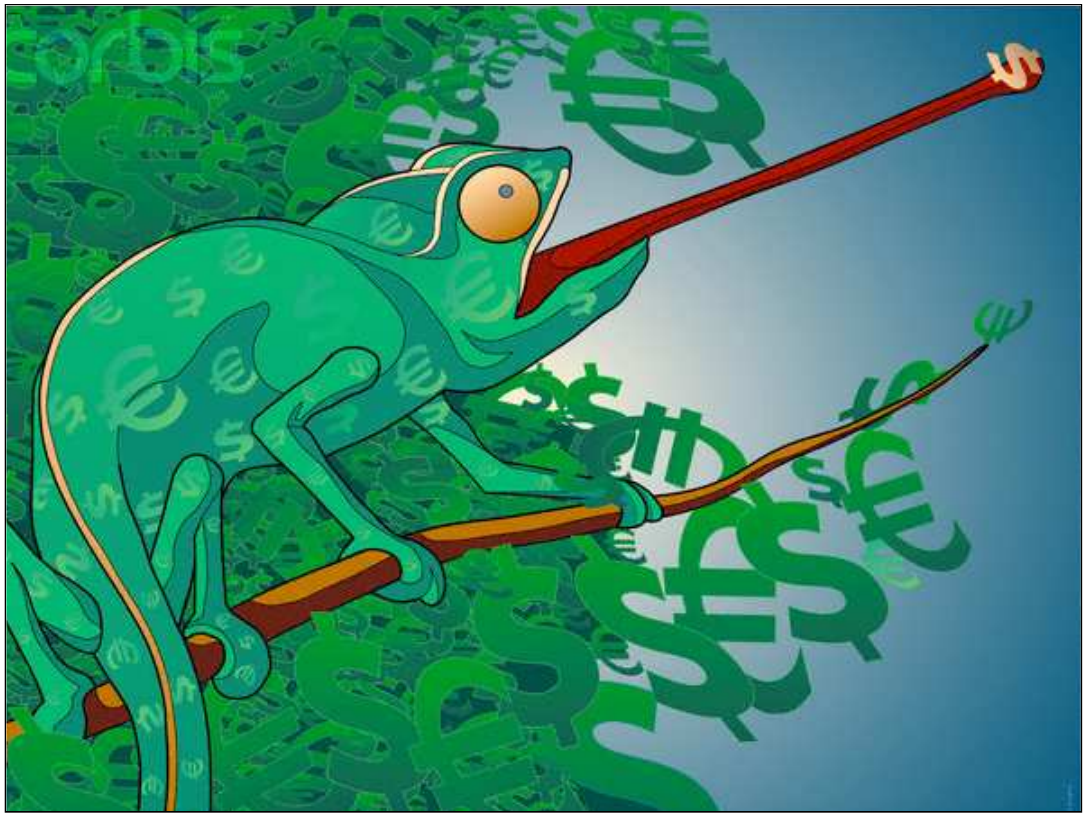

Dear Mr chairman, dear XXX,

Thank you for inviting me to this wonderful place to address this international gathering of scientists and policymakers that form the hart of Europe's thinking tank in relation to taxonomy and biodiversity conservation.

As I'm the first speaker of the day, I'd like to remind the audience of the reason of our gathering here today.

We have to discuss the research that is needed to enhance the contribution of taxonomy to biodiversity conservation and management and we have to illustrate taxonomy related issues that are crucial to European States and for which research is now needed.



And all this without wanting to appear as chasing bucks for our favorite research topic in taxonomy…

BELGIAN CAPACITY BUILDING PROGRAM
FOR THE GTI FOCUSING ON EDUCATION &
TRAINING IN BIODIVERSITY-RICH
DEVELOPING COUNTRIES

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The research related issue that I, on behalf of the Belgian National Focal Point to the Global Taxonomy Initiative, believe needs a large amount of attention resides with taxonomic capacity building to the benefit of the developing world where biodiversity is overwhelming but threatened as never before and where very little taxonomic capacity is fully functional.

## WHY DO WE NEED TAXONOMIC CAPACITY?

Taxonomists:

- detect taxa
- describe taxa
- identify / name taxa
- classify taxa
- characterize patterns of biodiversity

So why do we need taxonomic capacity in the first place?

Well, it are the taxonmists who detect taxa; who tell us where they live, in what abundance, in what composition, with what particular natural history traits?

It are taxonomists who describe taxa and assess the taxonomic characters and their respective states.

It are taxonomists who identify taxa and provide them with unique and unambiguous scientific names

It are taxonomists who classify taxa, and this by application of the theory of evolution.

It are thus the taxonomists who provide the rough data to characterize biodiversity both through time and through space.

But wait a minute; how do they do this?

Let me give you an example with a recently discovered new species in the small genus *Pseudocodium*, a group of tropical marine seaweeds

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# Systematics and biogeography of the genus *Pseudocodium* (Bryopsidales, Chlorophyta), including the description of *P. natalense* sp. nov. from South Africa

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O. DE CLERCK, H. VERBRUGGEN, J.M. HUISMAN, E.J. FAYE, F. LELIAERT, T. SCHILS AND E. COPPEJANS. 2008. Systematics and biogeography of the genus *Pseudocodium* (Bryopsidales, Chlorophyta), including the description of *P. natalense* sp. nov. from South Africa. *Phycologia* 47: 225–235. DOI: 10.2216/07-79.1

Let us analyse the process of taxonomy by using a concrete example. For instance let us have a look at this recent taxonomic paper that introduces a new species of algae: Pseudocodium natalense.

How did these authors come to this result?


Here a small pictorial overview of the taxonomic process. Material is detected and sampled during a survey; it is sorted out in the field in, let's call them 'phenetic groups'; tissue is adequately sampled and preserved so that molecular studies can be performed once back in the lab; material is properly mounted so as to get a correct herbarium; material is deposited in one or several established museums. So far the detection process; now the  material still has to be identified and get a name.


To do that taxonomists fall back on their toolbox; a toolbox that in this case is developed largely by the taxonomists themselves. Here you can see a screen shot of the homepage of the team who described the species. We see that their university is home to one of the most important reference collections for marine algae; we see also that they have virtually all the existing literature on the subject at their disposal. And as not enough they have the facilities to culture different species and by doing so get information on different life stages.

*Figure 63.* Pseudocodium floridanum

***Pseudocodium floridanum*** Dawes & Mathieson
1972: 273.

**Description:** Plants erect, up to 2 cm long, occurring in groups, green; axes flattened, 1.0–1.8 mm wide, dichotomously branched every 2–7 mm; utricles closely adherent (as opposed to free in the genus *Codium*), polygonal in surface view, with somewhat rounded corners, 70–110 µm in diameter. Reproductive structures have not been observed.
**Habitat:** Common species of deeper subtidal sites (> 15 m) in northern KwaZulu-Natal, growing on rocks and coral rubble.
**Distribution:** Known only from a few places in the Sodwana Bay area; reported from scattered localities (Florida, Papua New Guinea, Indonesia and South Africa), but presumably pantropical.
**Type locality:** Egmont Key, Florida, USA.
**Note:** The Indo-Pacific specimens (see also Verheij & Prud'homme van Reine 1993; Coppejans *et al.* 2001) are smaller than the type material from the Caribbean, and the utricle diameter of the South African specimens falls outside the range measured for the type material (140–340 µm). *Further investigation should determine the relationship between the South African and Caribbean plants.*

(De Clerck et al. 2005)

Aided by identification keys and other identification tools they assign the hundreds of different species they collected into their respective taxonomic categories. One of the groups they recognise is the small genus Pseudocodium and they identify their specimens in the genus as being Pseudocodium floridianum; a species with a broad Indo-Pacific distrinution.

End of taxonomic process?

No!

Detection, identification, description and naming is just the beginning of taxonomy. Taxonomists perform science; and science always works with hypotheses. Here the hypothesis was that the Pseudocodium material collected in Natal belonged to the species P. floridianum. But as with all scientific hypothesis, they stand only until new data make them fall.

By the way, note that the taxonomists were somehow aware that their identification did not completely match.

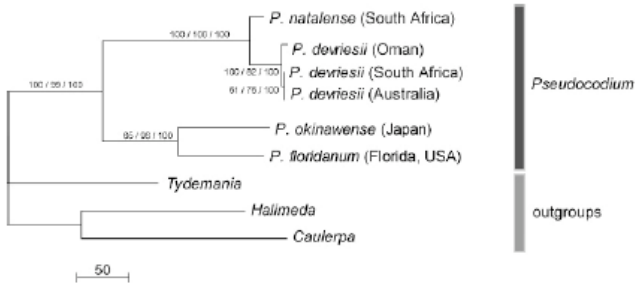


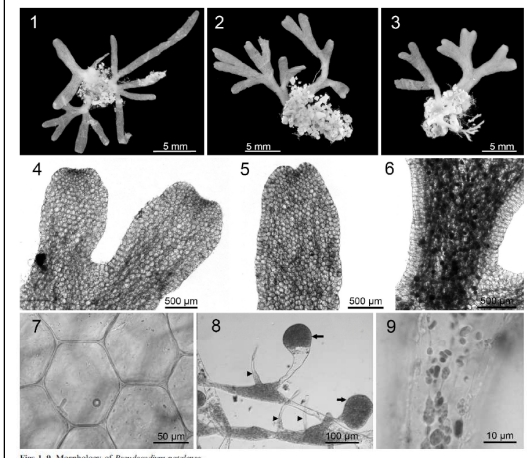

**Table 2.** Diagnostic characteristics of *Pseudocodium* (excluding *P. australasicum*).

| | *P. devriesii* | *P. floridanum* | *P. natalense* | *P. okinawense* |
|---|---|---|---|---|
| Height | ≤ 10 cm | ≤ 10 cm | ≤ 2 cm | ≤ 2 cm |
| Axes | | | | |
| Morphology | subterete to compressed | terete | compressed | terete |
| Diameter | to 2.5 mm | to 5 mm | to 1 mm | to 1 mm |
| Constrictions | present | absent | absent | absent |
| Apex | depressed | rounded | depressed | rounded |
| Utricles | | | | |
| Coherence | laterally adhering except at the corners | closely laterally adhering along the entire length | adhering laterally except at the corners | relatively loosely adhering |
| Apex | flat | rounded | flat | rounded |
| Diameter in surface view | (50–) 64–76 (–94) µm | (143–) 248–310 (–365) µm | (71–) 80–88 (–101) µm | (70–) 128–147 (–187) µm |
| Shape and height in transverse section | rectilinear (153–) 161–186 (–200) µm | cushion-shaped (177–) 187–215 (–225) µm | isodiametric (104) 112–123 (126) µm | spherical (113–) 132–147 (–172) µm |
| Plastids in utricles (*in situ*) | present | absent (?) | present | absent |
| Depth range | intertidal to shallow subtidal | ≥ 24 m | ≥ 30 m | 8–40 m (–75 m) |
| Distribution | subtropical Indian Ocean | Caribbean Sea and tropical Atlantic Ocean | South Africa | western Pacific |

And that is what starts to happen in 2007 when they read in the literature that colleagues have described a new species of Pseudocodium from southern Japan because it differs in morphology and genetics from P. floridianum.

Our taxonomists decide to return to the material collected in South Africa and re-judge their identification by comparing the South African material with all the available recently reported Indo-Pacific populations, as well as several additional populations of Pseudocodium species

They discover that the material from South Africa is different, both morphologically and molecularly. They decide they have enough difference and put forward the hypothesis that the material from Natal represents a new species.




**Figs 1–9.** Morphology of *Pseudocodium natalense*.
**Figs 1–3.** Habit of the wet-preserved holotype (KZN-b 2281).
**Figs 4, 5.** Morphology of the truncate and depressed apices.
**Fig. 6.** Surface view of an axis with underlying pigmented medullary siphons.
**Fig. 7.** Surface view of the polygonal and laterally adherent utricles.
**Fig. 8.** Dissected medullary siphons with lateral, broadly clavate reproductive structures (arrows) developing near the base of utricle stipes (arrow heads); note the clear segregation of cytoplasm in the medullary siphons from the densely filled reproductive structure in the stipe of the reproductive structure.
**Fig. 9.** Detail of a medullary siphon showing chloroplasts as well as amyloplasts (darkly staining with Iugol).

Bayesian analyses were performed using a GTR + I + Γ model. The data set was divided in two partitions, corresponding to the first plus second and the third codon positions with all model parameters uncoupled between the partitions. Posterior probabilities were estimated using a Metropolis-coupled Markov chain Monte Carlo approach with sampling according to the Metropolis–Hastings algorithm. The analysis used four chains, one cold and three incrementally heated. Each run consisted of $2 \times 10^6$ generations and was sampled every 100th generation. Burn-in values were set at 500,000 generations.

## RESULTS

### Morphological observations

***Pseudocodium natalense* De Clerck, Coppejans & Verbruggen, *sp. nov.***

Figs 1–9, 10, 14, 20

*Planiae erectae, virides, e basi filamentosa orientes, at 2 cm altae; laminis complanatis, nonconstrictis, 1.0 mm latis et 300–350 µm crassa. Ramificatio dichotoma vel irregularis. Apices truncatus et depressus. Fila medullaria 20–60 µm in diametro, irregulariter constricta et pigmentosa. Utriculus corticales plus minusve isodiametricae, 70–100 × 100–125 µm in diametro, applanatis, cohaerentes, pigmentosa.*

Plants erect, green in color, arising from a filamentous base, up to 2 cm high, consisting of complanate, unconstricted axes, 1 mm wide and 300–350 µm thick. Branching dichotomous to somewhat irregular. Apices truncate and depressed. Medullary filaments or siphons 20–60 µm in diameter, irregularly constricted and pigmented. Cortical utricles more or less isodiametric, 70–100 × 100–125 µm in diameter, flat-topped, coherent and pigmented.

HOLOTYPE: KZN-b 2281 (GENT), collected by H. Verbruggen and T. Schils at −33 m on the slope of Wright Canyon, Sodwana Bay, northern Kwazulu-Natal, South Africa on 7 November 2003. See Coppejans *et al.* (2005, as *P. floridanum*) for an *in situ* photograph of the type specimen.

DESCRIPTION: Thallus upright, to 2 cm high, anchored in sandy substrate by basal, branched, multicellular rhizoids (Figs 1–3), bright green in colour; axes compressed, 1 mm wide and 300–350 µm thick, two to four times dichotomously branched, hardly tapering toward the apices, lacking constrictions; apices truncate with a depressed apical pit (Figs 4, 5, 10). Thalli composed of longitudinally arranged, interwoven, irregularly swollen medullary siphons, 20–60 µm wide, giving rise to a single layer of peripheral utricles (Fig. 6); utricles polygonal in surface view (Figs 5, 7, 14), with a flat apex (Fig. 20), approximately isodiametric in transverse section, (71–) 80–88 (–101) µm in diameter and (104) 112–123 (126) µm high, laterally adhering except at the corners; utricle stipe not eccentric. Chloroplasts and amyloplasts at least in living plants present in the utricles and siphons (Fig. 9). Reproductive structures immersed in the thallus, produced laterally from medullary siphons close to the base of the utricle stipe, variable in morphology, ranging from spherical on a gradually broadening stipe to irregular, broadly clavate structures, 80–90 µm wide and 120–185 µm long, lacking a basal cross wall separating it from the rest of the thallus, opening distally by an undifferentiated pore (Fig. 8).

OTHER SPECIMENS EXAMINED: **South Africa:** Gotham, Sodwana Bay, −30 m (*O. De Clerck, T. Schils, H. Verbruggen & E. Demeulenaere*, 5.xi.2003, KZN-b 2241); Tombstone, 5-Mile Reef, Sodwana Bay, −30 m (*O. De Clerck, T. Schils, H. Verbruggen & E. Demeulenaere*, 6.xi.2003, KZN-b 2250).

DISTRIBUTION AND HABITAT: *Pseudocodium natalense* is thus far only known from Sodwana Bay, South Africa, where it is confined to deep water (below −30 m depth). The species is rather common, growing on coarse sand and coral debris.

***Pseudocodium devriesii* Weber van Bosse, 1896: 209–212, pl. 1.**

Figs 11, 15, 21, 22

DESCRIPTION: Thallus upright, to 5–8 (–14) cm high, attached to rocks by a felt like rhizoidal holdfast, bright green in colour (drying darker); axes compressed or subterete and becoming compressed in the lower portions, 0.9–2.5 mm wide and 0.5–1.0 mm thick, dichotomously branched up to seven times, tapering slightly or not at all toward the apices, often with undulate margins; irregular shallow constrictions of the axes uncommon to prominent; apices truncate with a depressed apical pit (Fig. 11). Structure of longitudinally arranged interwoven medullary siphons, 30–50 µm wide, giving rise to a single layer of peripheral utricles; utricles polygonal in surface view (Fig. 15), distinctively clavate in transverse section, (50–) 64–76 (–94) µm in diameter and (153–) 161–186 (–200) µm high, with a flat apex, closely laterally adhering along the entire length of their faces (Fig. 21); utricle stipe not eccentric, often with a distinctive swelling. Chloroplasts and amyloplasts present in the utricles and siphons. Reproductive structures immersed in the thallus, produced laterally from medullary siphons close to the base of the utricle stipe, ovoid to irregularly shaped, 80–130 µm in diameter (Fig. 22).

TYPE: Isipingo Beach, near Durban, Kwazulu-Natal, South Africa (Weber van Bosse, 1894–1895, L 936.73-447).

DISTRIBUTION AND HABITAT: *Pseudocodium devriesii* is a common to abundant species in South Africa, southern Mozambique and the warm temperate part of Madagascar. It grows in the lower part of the intertidal area, often in tidal pools, as well as in the shallow subtidal area. *Pseudocodium devriesii* is less common in Oman and Western Australia, where only a few populations are known that are moreover confined to the subtidal area (8–15 m depth).

SPECIMENS EXAMINED: **South Africa** (selected): Cape Morgan (*O. De Clerck*, 25.x.1999, KZN 1293); Port Edward (*F. Leliaert*, 24.iii.1997, FL 339); Isipingo, Durban (*E. Coppejans*, 21.xi.1995, HEC 10948); Mission Rocks (*O. De Clerck & F. Leliaert*, 13.vi.2003, KZN 2257); Jesser Point, Sodwana Bay (*O. De Clerck, T. Schils, H. Verbruggen & E. Demeulenaere*, 7.xi.2003, KZN-b 2247); Kosi Bay (*E. Coppejans et al.*, 16.viii.1999, KZN 774). Mozambique, Cabo Inhaca (*E. Coppejans*, 18.xii.2000, HEC 14263). Madagascar, Fort Dauphin (*E. Coppejans, D. Douterlungne, I. Razanakoto*, 30.viii.2002, HEC 15195). **Oman:** Hoon's Bay, Mirbat; Dhofar (*T. Schils*, 9.x.2004, DHO2.274); Shark Island, Mirbat, Dhofar (*T. Schils*, 12.x.2004, DHO2.402 and DHO2.403). **Australia:** Western Australia, Reef off Cottesloe, near Perth, from 8–9 m depth (*D. Mead-Hunter*, 19.iv.2001, PERTH 07259697); Rous Head, near Fremantle, from 8 m depth (*J. Huisman*, 25.iii.2007, PERTH 07561296).

NOTES: Preliminary culture studies of Western Australian plants (Huisman, unpubl. obs.) indicate that basal siphons can extend horizontally for some distance and then produce new upright thalli. Thus the clusters of plants that are often observed may be clonal.

***Pseudocodium floridanum* Dawes & Mathieson, 1972: 273**

Figs 13, 17, 18

DESCRIPTION: Thallus upright, to 10 cm high, anchored in sandy substratum by a well-developed tuft of rhizoids, bright green in colour; axes cylindrical, to 5 mm wide near the base, gradually attenuating toward the apices, dichotomously to somewhat irregularly branched, unconstricted; apices rounded. Thalli composed of longitudinally arranged interwoven and irregularly swollen medullary siphons, 50–110 µm wide, giving rise to a single layer of peripheral utricles; utricles polygonal in surface view, with a broadly rounded apex (Figs 13, 17), distinctively broader than high in transverse section, (143–) 248–310 (–365) µm in diameter and (177–) 187–215 (–225) µm high, adhering laterally to neighbouring utricles except at the corners; utricle stipe eccentric (Fig. 18).

To make sure that their newly recognised taxon, which they name P. natalense, can subsequently be identified by other taxonomists; they make a detailed description whereby they clearly indicate on which reference specimens it was based. Their description gives all the detail they judge needed. They illustrate the material adequately, hereby using staining techniques and different types of microscopes.

Their description clearly is state of the art and gets published in a widely available international journal

Done?

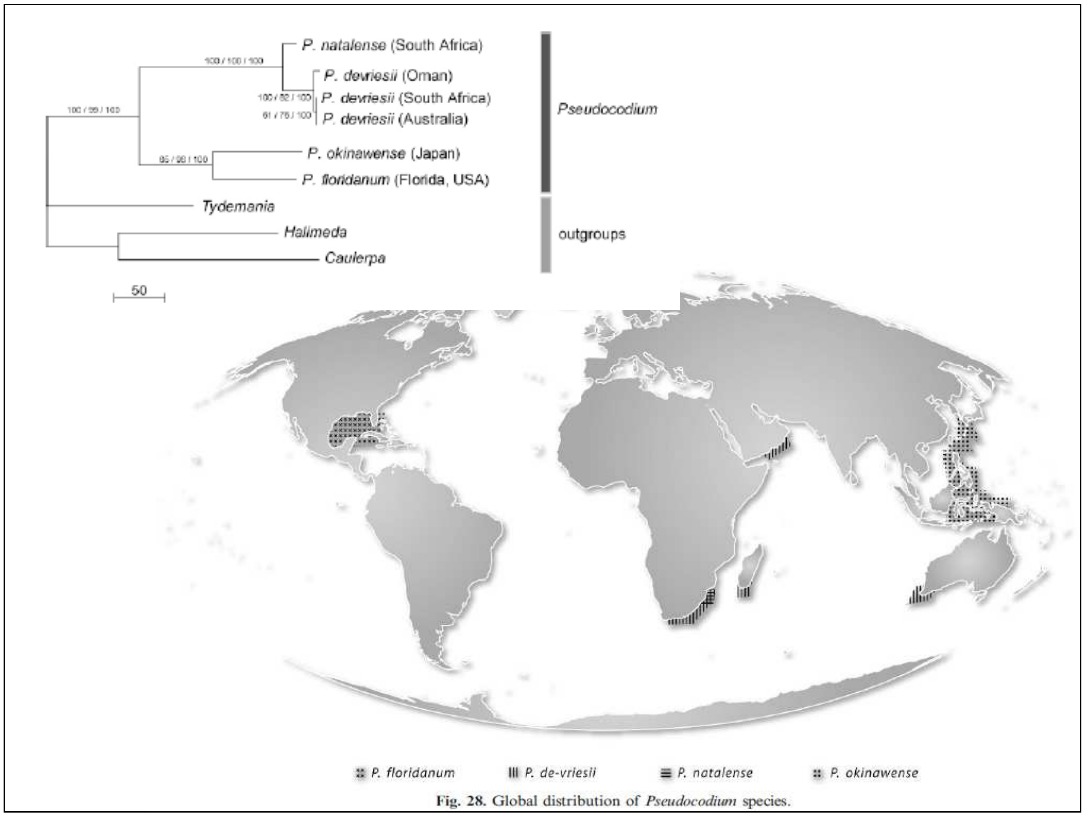


Fig. 28. Global distribution of *Pseudocodium* species.

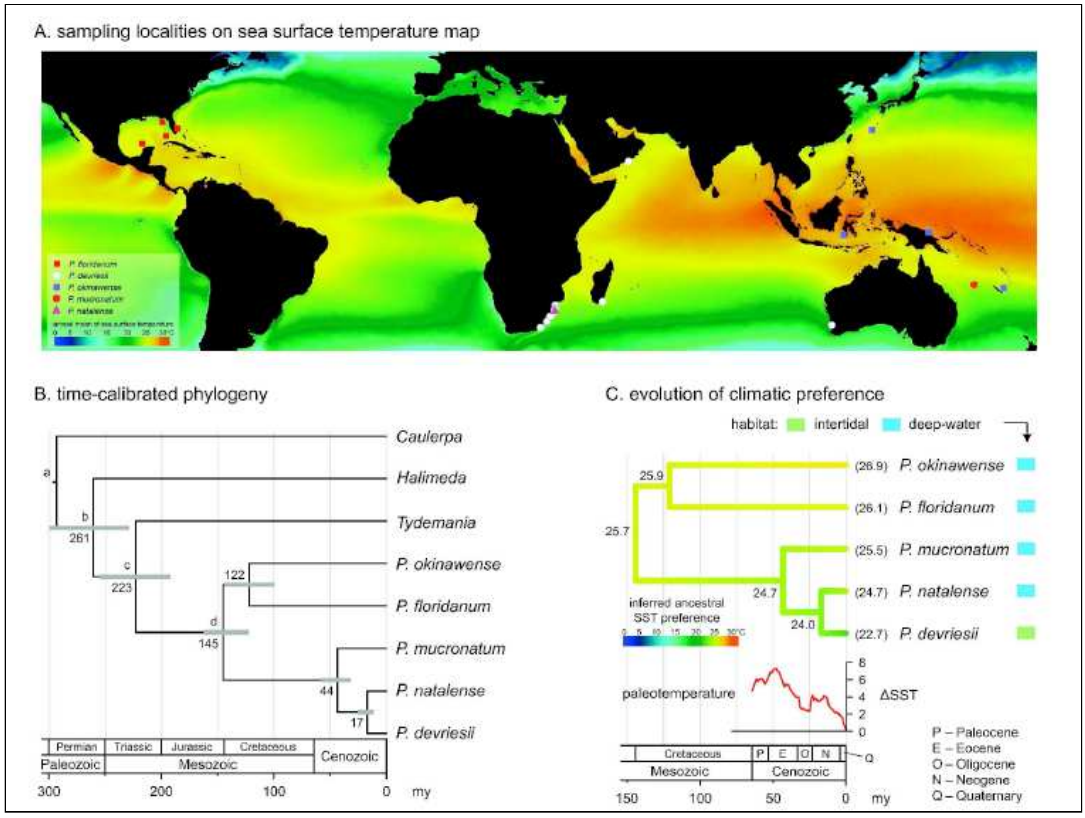
No, the taxonomic process does not stop with the description of taxa. Taxonomists also want to *understand* the observations they make. For instance, what explains the observed biogeographic distribution map of the four Pseudocodium species?

In the phylogenetic tree they see first split that separates the clade P. floridanum – okinawense from P. devriesii – natalense. They note that this split coincides with an ecological differentiation leading to a tropical (floridianum + okinawensis) and a more temperate (natalense + devriesii) lineage.

The sister relationship between P. floridanum and P. okinawense they explain as a vicariant event separating tropical Atlantic and Indo-Pacific lineages and hypothesize that this diversification coincided with the closure of the tropical Tethys Sea. After all they have documented a similar scenario whereby ecological differentiation predates geography-based speciation in the calcified green algal genus Halimeda (Kooistra et al. 2002; Verbruggen et al. 2005).

They further note that the genetic distance between the tropical clade and the temperate clade is 12-13 % whereas the genetic difference between the two Indian Ocean species is only 2 %, indicating a much more recent origin of these two species

They also note that the population of P. devriesii in W. Australia is only small and that it has only been recently detected, in Fremantie Harbour. The populations of P. devriesii in South Madagascar and South Africa on the other hand are well established. Given that they observe no genetic difference between the large S. African and the restricted Western Australian population they conclude that P. devriesi most possibly is recently introduced to W Australia.




And the story goes on when more new data become available.

In a new study that is currently in press, they include new material from New Caledonia. Morphological and molecular evidence again points out conclusively that they are dealing with a new species.

Driven to understand the causal mechanisms that are behind the biogeographical pattern, they map the climatic and ecological preferences in the genus by using an interdisciplinary approach consisting of relaxed molecular clock analysis, extraction of macroecological data from satellite imagery in a GIS framework and ancestral character state estimation. This way they are able to shown that the genus originated in tropical waters during the Early Mesozoic. Their phylogeny shows that the *P. floridanum-okinawense* lineage has remained tropical, whereas the lineage including *P. natalense, P. devriesii and* their new *Pseudocodium* species gradually has invaded more temperate waters during Cenozoic times.

They also find that except for *P. devriesii,* which occurs in shallow and intertidal habitats, all *Pseudocodium species grow in deep-water habitats and this ecological preference appears to* be ancestral.

So what started as an inventory in South Africa grew ‘organically’ to a causal explanation of biodiversity through space and time.

## WHY DO WE NEED TAXONOMIC CAPACITY?

Taxonomists:

- detect taxa
- describe taxa
- identify / name taxa
- classify taxa
- characterize patterns of diversity

Taxonomists deliver:

- Scientific names stored in a natural classification
- tools that facilitate taxonomy (e.g. identification keys, barcodes, databases,…)
- explanations of the patterns of biodiversity through time and across habitats and ecosystems
- data that define the areas and regions with particular importance due to endemism and/or phyletic information content

So taxonomy not only delivers scientific names that are stored in a classification that is based on evolutionary relationship and tools that facilitate the taxonomic process; it also delivers explanations to the observed patterns of biodiversity and this across space and time. It is thus taxonomists that define the areas of particular importance that must be protected.

In the light of the many changes that our planet currently is undergoing, think alone of climate change and the changes in distribution pattern that evokes, this example shows rather neatly that taxonomy provides data and explanations of the patterns of biodiversity, and this through space and through time.

"Without taxonomy to give shape to the bricks, and systematics to tell us how to put them together, the house of biological science is a meaningless jumble"

R.M. May, 1990

Or as Lord Robert May put it now nearly 20 years ago "Without taxonomy to give shape to the bricks, and systematics to tell us how to put them together, the house of biological science is a meaningless jumble"

But where are Lord May's bricks? And who will put them together to get a house?

WHERE ARE THE BRICKS?

But where are the bricks?

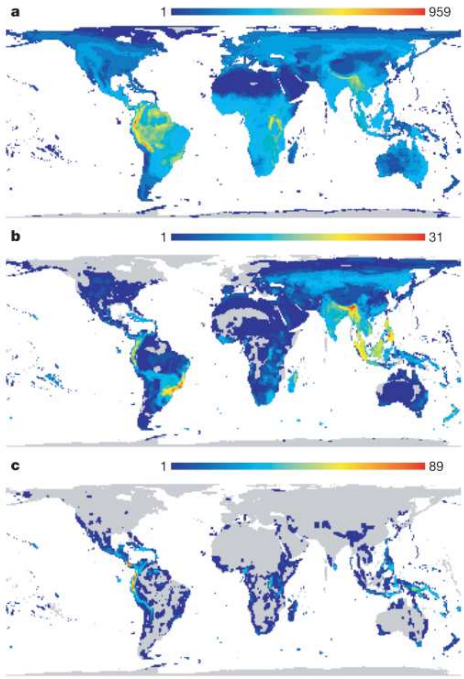



**Figure 1 | Geographical distribution of three aspects of diversity.** **a**, Total species richness. **b**, Threatened species richness. **c**, Endemic species richness. The bars above the maps show the corresponding colour scale, which is linear in terms of numbers of species.

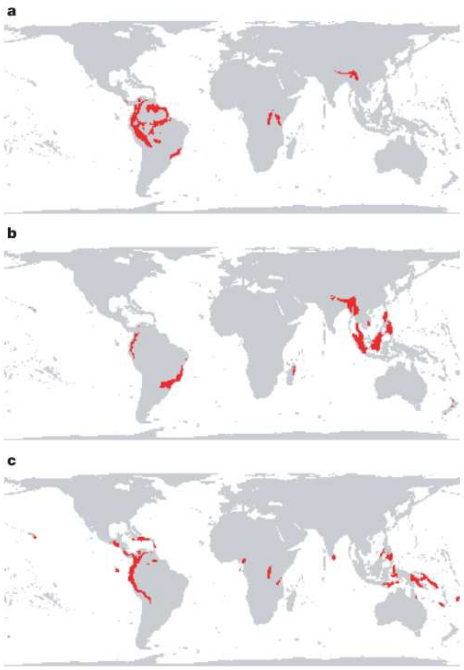
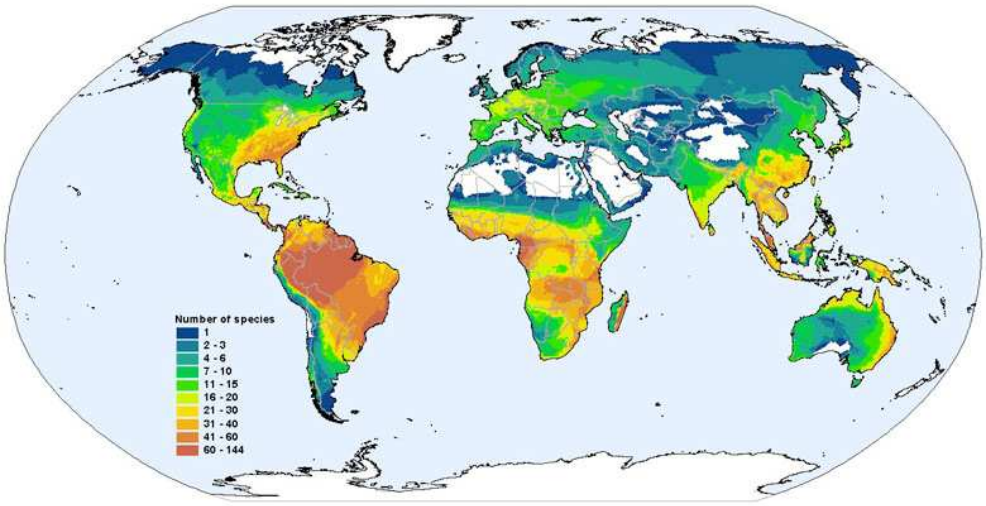



**Figure 2 | Biodiversity hotspots for three aspects of diversity.** **a**, Hotspots of species richness. **b**, Hotspots of threatened species. **c**, Hotspots of endemic species. For each measure of diversity, hotspots are defined as the richest 2.5% of grid cells. Hotspots are shown in red.

Source: Orme et al 2005

These charts are based on data derived from a database with breeding distribution of all known birds. They show the latitudinal gradient in species richness, whereby richness is highest in the circumtrpical belt; threatened and endemic species are also indicated. Source: Orme et al 2005

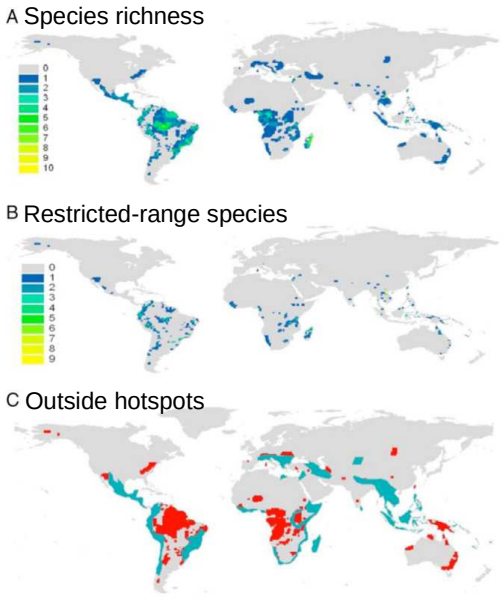
AMPHIBIANS OF THE WORLD




(Source: Global Amphibian Assessment)

More or less the same trend with amphibians; highest diversity is in the circumtropical belt

## TAXONOMIC KNOWLEDGE - still very incomplete, even for the best studied groups…




(Source: Ceballos & Ehlrich, 2009)

But it is clear that the state of our taxonomic knowledge remains very poor, even for the best studied groups. For instance in a recent study that appeared in the Proceedings of the National Academy of Sciences Ceballos & Ehlrich demonstrated that since 1993, 408 new mammalian species have been described, which represents 10% of the previously known fauna. Some 60% of these are ‘‘cryptic’’ species, but 40% are large and distinctive.

On the right you can see the patterns of distribution in new species of mammals. (*A) Species richness, n$408. (B) Restricted-range species, n$221. (C) Cells (in red) with new species* located outside hotspots [in blue, *sensu Myers (13)].*

Among currently accepted species of vascular plants in Madagascar, a staggering **17.5% are currently known only from the type locality, and about half of these are only known from the type specimen**. A project a few years ago to target a number of these and recollect them at the type locality or from similar nearby habitats, established that many of these really are very local endemics and that others are **likely exinct** since the localities where they once occured are now devoid of natural vegetation.

It is fortunate that earlier generations of botanists saw fit to describe these species on the basis of the limited herbarium material available, thereby drawing our attention to them, and it is surely for us and for subsequent generations to improve on the descriptions in terms of accounting for species variability and for other properties, and to provide threat analyses for all of them that still survive. I see no reason why the present generation of biologists shouldn't describe distinct entities as new taxa and provide work for future generations too!

_____

Peter B. Phillipson Africa and Madagascar Department Missouri Botanical Garden *(posted on TAXACOM on 1 October 2008)*

But for most groups, knowledge is very very restricted. Here for instance a recent posting on Taxacom that shows that for many groups we only know the type locality and a couple of specimens.

PERSPECTIVES

PLANT SCIENCE

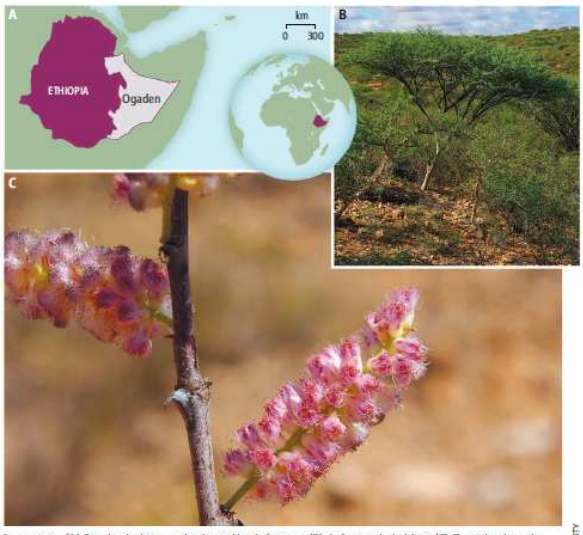
# Exploring Terra Incognita

A tree new to science dominates the vegetation over an area of at least 8000 km$^2$ in an African war zone.

David J. Mabberley

During visits in May 2006 and February 2007 to Ogaden (or the Somali National Regional State of Ethiopia, as it is formally called), the botanist Mats Thulin and his team encountered a tree previously unknown to science on limestone hills southeast of the town Kebri Dehar. The researchers soon found that it dominates the vegetation over large areas in southeastern Ogaden, covering an area of at least 8000 km$^2$ (see the figure, panel A). For comparison, the Greek island of Crete has an area of 8379 km$^2$. Hundreds of the trees were inspected on the ground, and tens or probably hundreds of thousands were seen with binoculars; the total number must be in the millions. The tree, a species of *Senegalia* (Leguminosae), is about 6 m tall, with a canopy 8 to 10 m in diameter. It flowers when leafless during the dry season (see the figure, panel C). Thulin has recently formally described it as *Acacia fumosa* (*1*). It differs from its relatives by having, among other things, a gray, smooth bark and pink flowers (see the figure, panels B and C).

About 10,000 new species across all groups of organisms are described each year (*2*). Some 2350 of these are flowering plants (*3*). From Africa alone, around 300 new species of flowering plants are described each year; in the past two decades, one of the African countries with the most newly described species has been Somalia. The high figure for that country, which has a long bor-




**A new tree.** (**A**) Ogaden is the area dominated by *A. fumosa*. (**B**) *A. fumosa* in habitat. (**C**) Flowering branch.

There are unusual cases, such as *Com-*

One may ask what else can be found in a

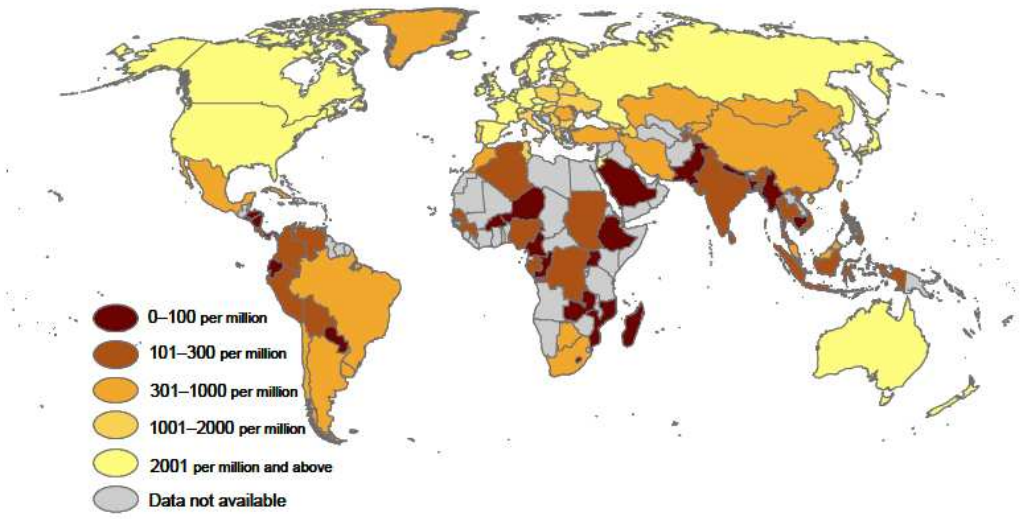


And sometimes new discoveries almost seem absurb. Here, the reporting of a new species of tree which dominates the vegetation in an area of at least 8,000 square km, roughly the area of the Greek Island Crete.

WHERE ARE THE BRICK-LAYERS?

So there’s clearly a lot of work that is yet to be done; but where are the bricklayers?

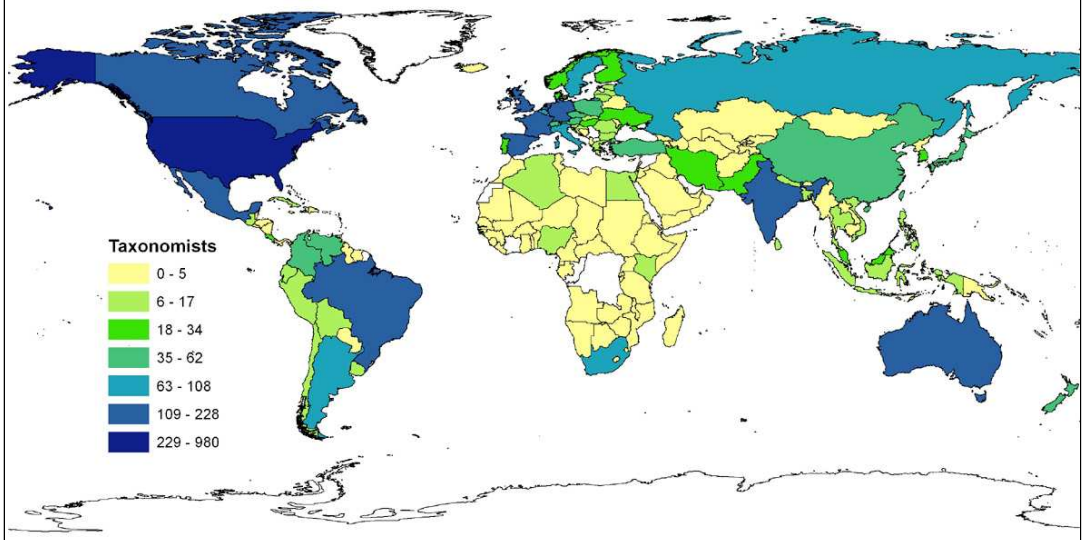
**Figure 1: How many researchers are there?**
*Researchers per million inhabitants, 2005 or latest available year*




(Source: UNESCO, 2005)

This chart I took from a recent UNESCO report; it shows the number of researchers per million inhabitants. Clearly, there are more researcher in the richer countries.

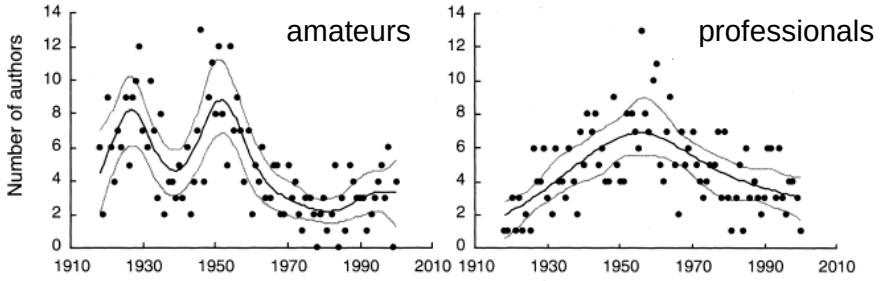
## GLOBAL DISTRIBUTION OF TAXONOMISTS




The world distribution of taxonomists according to ETI's World Taxonomist Database (November 2005)
(taken from: http://www.gti-kontaktstelle.de/taxonomy_E.html)

For taxonomists more or less the same pattern emerges as can be seen on this chart that I took from the German GTI NFP site and that in turn is derived from the Expert Centre for Taxonomic Information

## …and declining (here situation in UK)




(Source: Hopkins & Frecleton, 2002)

And several studies suggest that the amount of active taxonomists lowers. Here an analysis for the United Kingdom as made by Hopkins and Frecleton in 2002 where we see a significant decline of both amateurs and professionals from the 1950's onwards.

## SOME MORE NUMBERS…

Blackwelder & Blackwelder (1961): *9,000 zoological taxonomists*

GTI Diversitas (2000): *roughly 18,000 professional taxonomists*

All Species Org: *10,000 taxonomists*

Japanese National Focal Point: *± 1,000 taxonomists in Asia*

Wilson (2003): *6,000 professional taxonomists*

Costello *et al* (2006): *roughly 300 taxonomists for European marine biodiversity (roughly 30,000 species)*

Some more numbers…

Countries accounting for 80% of the named species have only 6% of the world's specialists

(Source: Wilson, 2003)

Figures thus vary quite a bit, but Wilson's observation that countries accounting for 80 % of the named species have only 6% of the world's taxonomists.

PERSPECTIVES

PLANT SCIENCE

# Exploring Terra Incognita

A tree new to science dominates the vegetation over an area of at least 8000 km$^2$ in an African war zone.

David J. Mabberley

During visits in May 2006 and February 2007 to Ogaden (or the Somali National Regional State of Ethiopia, as it is formally called), the botanist Mats Thulin and his team encountered a tree previously unknown to science on limestone hills southeast of the town Kebri Dehar. The researchers soon found that it dominates the vegetation over large areas in southeastern Ogaden, covering an area of at least 8000 km$^2$ (see the figure, panel A). For comparison, the Greek island of Crete has an area of 8379 km$^2$. Hundreds of the trees were inspected on the ground, and tens or probably hundreds of thousands were seen with binoculars; the total number must be in the millions. The tree, a species of *Senegalia* (Leguminosae), is about 6 m tall, with a canopy 8 to 10 m in diameter. It flowers when leafless during the dry season (see the figure, panel C). Thulin has recently formally described it as *Acacia fumosa* (*1*). It differs from its relatives by having, among other things, a gray, smooth bark and pink flowers (see the figure, panels B and C).

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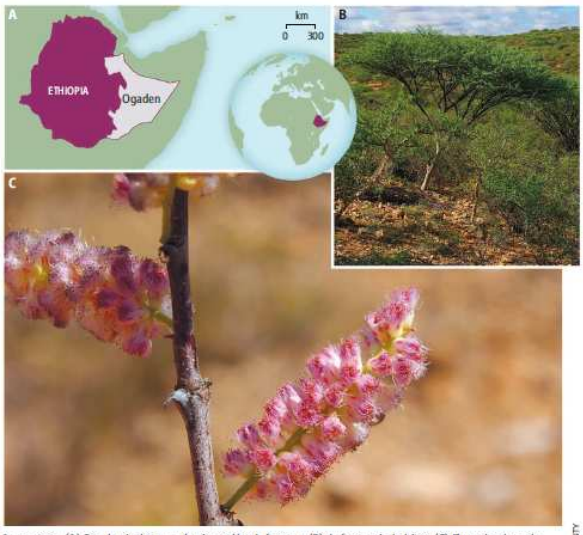



**A new tree.** (**A**) Ogaden is the area dominated by *A. fumosa*. (**B**) *A. fumosa* in habitat. (**C**) Flowering branch.

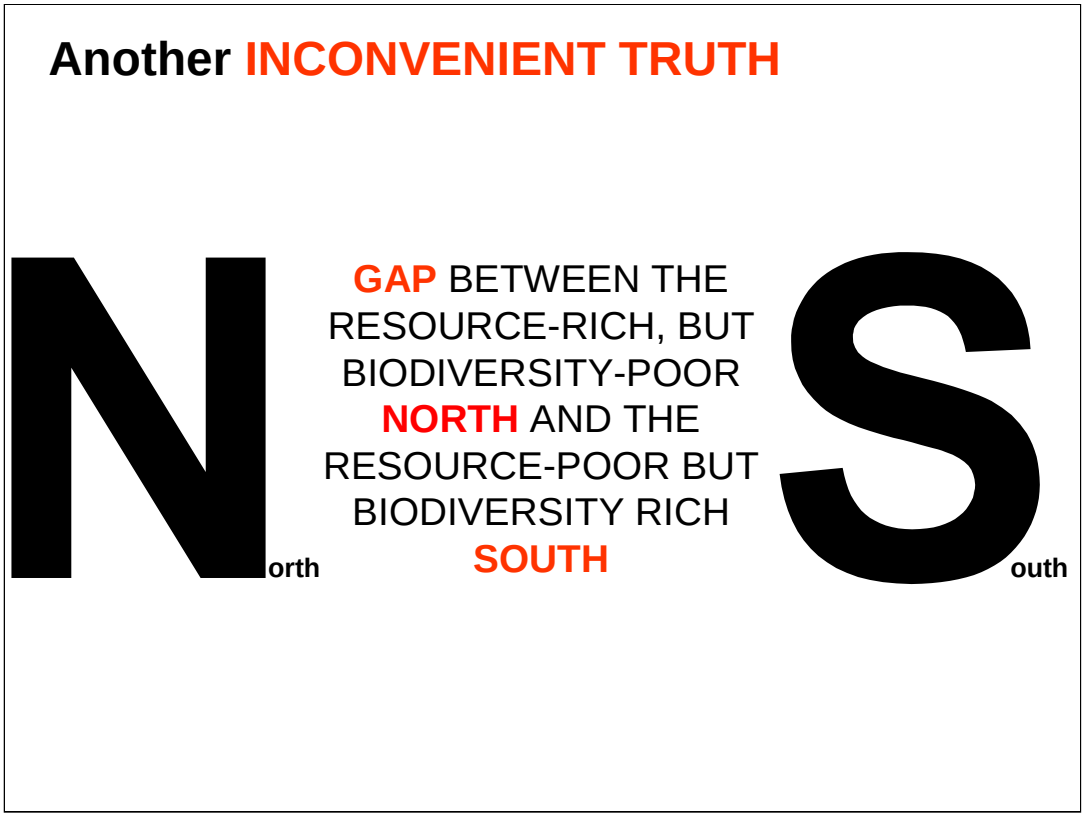
SMA UNIVERSITY

There are unusual cases, such as *Com-*

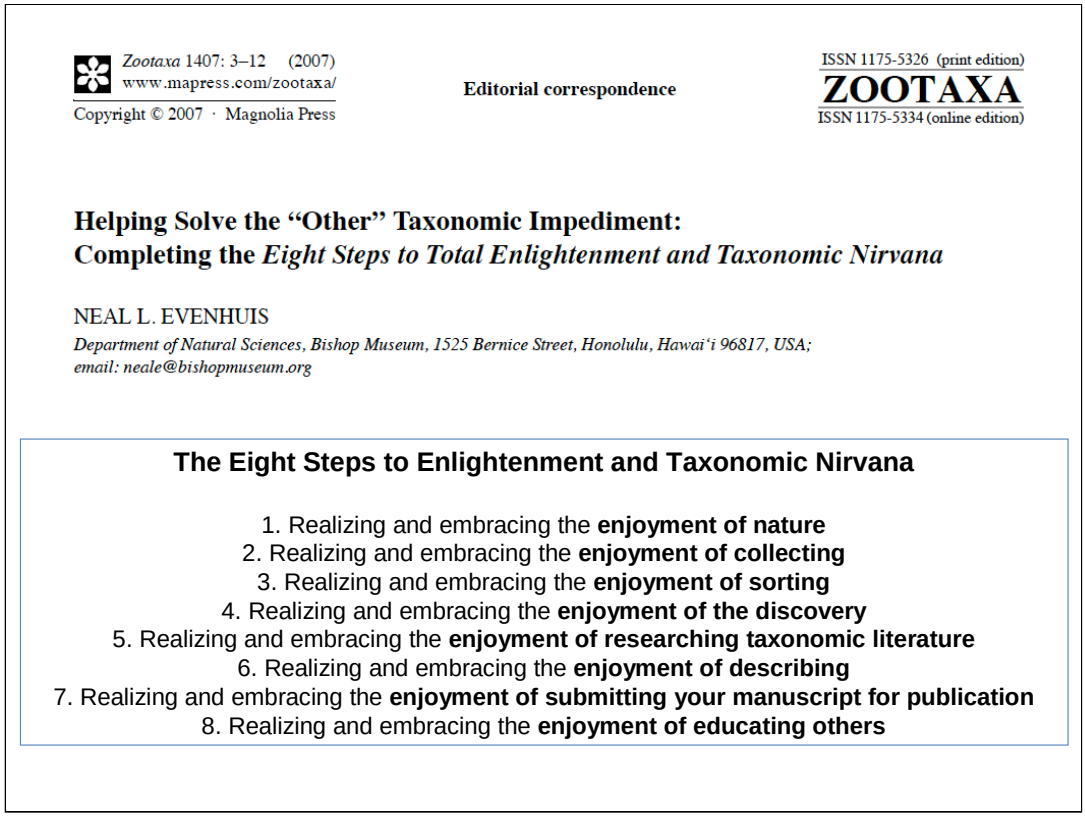
One may ask what else can be found in a



It is thus not so very surprising that even this dominant species was discovered and named by…Mats Thulin, a Swede working for Kew Botanical Gardens.




So there is clearly a gap between the North relatively rich in taxonomic capacity, but poor in biodiversity and the South where the reverse is the case.



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**Helping Solve the "Other" Taxonomic Impediment:**
**Completing the *Eight Steps to Total Enlightenment and Taxonomic Nirvana***

NEAL L. EVENHUIS
*Department of Natural Sciences, Bishop Museum, 1525 Bernice Street, Honolulu, Hawai'i 96817, USA;*
*email: neale@bishopmuseum.org*

**The Eight Steps to Enlightenment and Taxonomic Nirvana**

1. Realizing and embracing the **enjoyment of nature**
2. Realizing and embracing the **enjoyment of collecting**
3. Realizing and embracing the **enjoyment of sorting**
4. Realizing and embracing the **enjoyment of the discovery**
5. Realizing and embracing the **enjoyment of researching taxonomic literature**
6. Realizing and embracing the **enjoyment of describing**
7. Realizing and embracing the **enjoyment of submitting your manuscript for publication**
8. Realizing and embracing the **enjoyment of educating others**

But how to close this divide whereby we should strive for 'taxonomic Nirvana' as Neil Evenhuis called it in a recent editorial in *Zootaxa*: that is; having motivated, fully-operational, actively publishing and tutoring taxonomists in the South and in the North

## TAXONOMY IN THE 21ST CENTURY

amphibiaweb

FishBase

algaeBASE

LepIndex

MycoBank
Fungal Databases
Nomenclature and Species Banks
Online Taxonomic Novelties Submission
Administered by the International Mycological Association

antbase.org

Avibase - the world bird database

Hexacorallians of the World
Sea anemones, Corals,
and their allies
(orders Actiniaria, Antipatharia, Ceriantharia, Corallimorpharia, Ptychodactiaria, Scleractinia, and Zoanthidea)

Biodiversity Heritage Library

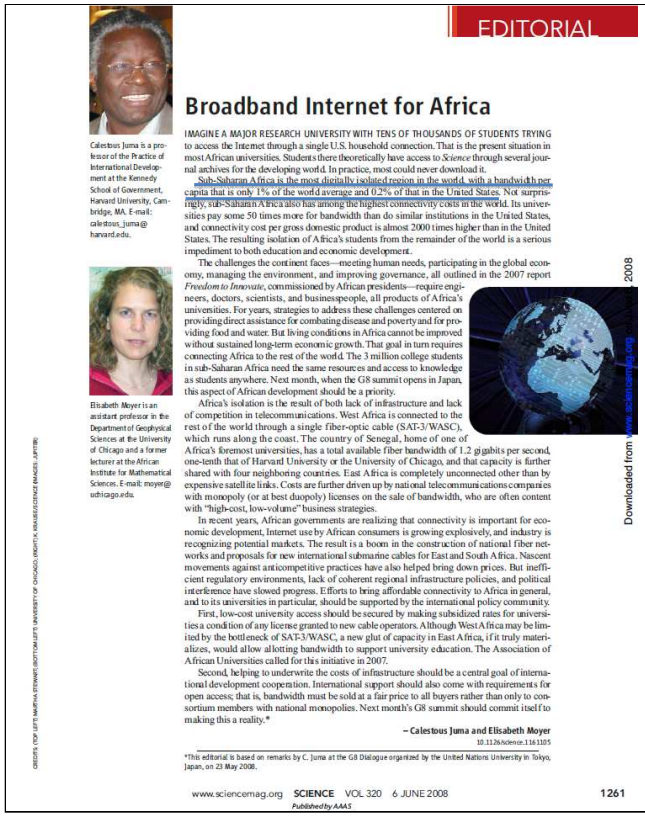
PLAZI
taking care of freedom

Biodiversity Information Standards
TDWG
(http://www.tdwg.org/biodiv-projects/)

Digital Taxonomy
(http://digitaltaxonomy.infobio.net/)

Giving open access to taxonomic data and metadata through the internet through collaborative biodiversity information projects and databases is the answer one most often hears these days. And indeed such projects significantly improve the accessibility of taxonomic data, worldwide.


Or as this man would say; ‘Change has come to taxonomy’



EDITORIAL

## Broadband Internet for Africa

Calestous Juma is a professor of the Practice of International Development at the Kennedy School of Government, Harvard University, Cambridge, MA. E-mail: calestous_juma@harvard.edu.

Elisabeth Moyer is an assistant professor in the Department of Geophysical Sciences at the University of Chicago and a former lecturer at the African Institute for Mathematical Sciences. E-mail: moyer@uchicago.edu.

IMAGINE A MAJOR RESEARCH UNIVERSITY WITH TENS OF THOUSANDS OF STUDENTS TRYING to access the Internet through a single U.S. household connection. That is the present situation in most African universities. Students there theoretically have access to *Science* through several journal archives for the developing world. In practice, most could never download it.

Sub-Saharan Africa is the most digitally isolated region in the world, with a bandwidth per capita that is only 1% of the world average and 0.2% of that in the United States. Not surprisingly, sub-Saharan Africa also has among the highest connectivity costs in the world. Its universities pay some 50 times more for bandwidth than do similar institutions in the United States, and connectivity cost per gross domestic product is almost 2000 times higher than in the United States. The resulting isolation of Africa's students from the remainder of the world is a serious impediment to both education and economic development.

The challenges the continent faces—meeting human needs, participating in the global economy, managing the environment, and improving governance, all outlined in the 2007 report *Freedom to Innovate*, commissioned by African presidents—require engineers, doctors, scientists, and businesspeople, all products of Africa's universities. For years, strategies to address these challenges centered on providing direct assistance for combating disease and poverty and for providing food and water. But living conditions in Africa cannot be improved without sustained long-term economic growth. That goal in turn requires connecting Africa to the rest of the world. The 3 million college students in sub-Saharan Africa need the same resources and access to knowledge as students anywhere. Next month, when the G8 summit opens in Japan, this aspect of African development should be a priority.

Africa's isolation is the result of both lack of infrastructure and lack of competition in telecommunications. West Africa is connected to the rest of the world through a single fiber-optic cable (SAT-3/WASC), which runs along the coast. The country of Senegal, home of one of Africa's foremost universities, has a total available fiber bandwidth of 1.2 gigabits per second, one-tenth that of Harvard University or the University of Chicago, and that capacity is further shared with four neighboring countries. East Africa is completely unconnected other than by expensive satellite links. Costs are further driven up by national telecommunications companies with monopoly (or at best duopoly) licenses on the sale of bandwidth, who are often content with "high-cost, low-volume" business strategies.

In recent years, African governments are realizing that connectivity is important for economic development, Internet use by African consumers is growing explosively, and industry is recognizing potential markets. The result is a boom in the construction of national fiber networks and proposals for new international submarine cables for East and South Africa. Nascent movements against anticompetitive practices have also helped bring down prices. But inefficient regulatory environments, lack of coherent regional infrastructure policies, and political interference have slowed progress. Efforts to bring affordable connectivity to Africa in general, and to its universities in particular, should be supported by the international policy community.

First, low-cost university access should be secured by making subsidized rates for universities a condition of any license granted to new cable operators. Although West Africa may be limited by the bottleneck of SAT-3/WASC, a new glut of capacity in East Africa, if it truly materializes, would allow allotting bandwidth to support university education. The Association of African Universities called for this initiative in 2007.

Second, helping to underwrite the costs of infrastructure should be a central goal of international development cooperation. International support should also come with requirements for open access; that is, bandwidth must be sold at a fair price to all buyers rather than only to consortium members with national monopolies. Next month's G8 summit should commit itself to making this a reality.*

– Calestous Juma and Elisabeth Moyer

10.1126/science.1161105

*This editorial is based on remarks by C. Juma at the G8 Dialogue organized by the United Nations University in Tokyo, Japan, on 23 May 2008.



Published by AAAS



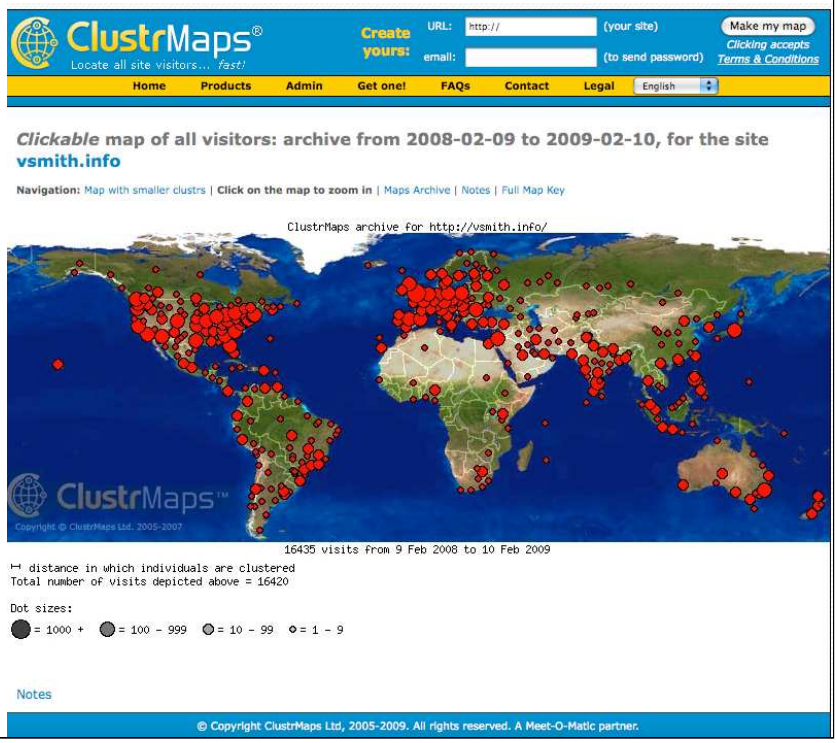


Sub-Saharan Africa is the most digitally isolated region in the world with bandwith per capita that is only 1 % of the world average and 0,2 % of that of the US

But has it? And has it for everybody?

If we consider these figures taken from a recent editorial in Science…access to digital data will remain difficult for many, especially in Africa where internet connection is very limited and where computers are not as available as here, and where computer skills are not as developed as here, and where political instability makes scientific work difficult, etc…

Vince Smith
Cybertaxonomist
@ NHM, London




And this chart marks the point. It is the clustermap for the last year of the website of Vince Smith, Cybertaxonomist in London,…clearly most visitors come from outside Africa

CAPACITY BUILDING AND PARTNERSHIPS

So, in order to resolve this divide we'll need to establish capacity building programs that effectuate taxonomy through partnerships.


Exactly as what is asked by the CBD.

## THE BELGIAN GTI PROGRAM

**2001**: the Royal Belgian Institute of Natural Sciences (Brussels) is designated as Belgian National Focal Point to the GTI

**2003**: the Belgian Development Cooperation (DGDC) and the RBINS sign a five year specific convention, with as focus area, *i.a.*, CBD's GTI programme
**2008**: second five year framework convention running

**Close cooperation** agreed with:

- Royal Museum for Central Africa (Tervuren)
- National Botanic Garden (Meise)

… but also interaction with other competent taxonomic institutions

How does Belgium come to aid?

In 2001 the Royal Belgian Institute of Natural Sciences in Brussels was designated National Focal point to the Global Taxonomy Initiative. The GTI is one of the cross-cutting issues of the Convention on Biological Diversity. It's mission is to tackle the before mentionned taxonomic impediment.

In 2003 the Belgian Development Cooperation (DGDC) and the RBINS signed a five year specific convention, with the GTI as one of the focus areas. In 2008 the RBINS signed its second framework convention

The GTI NFP works closely together with other Belgian centers of taxonomic expertise; most importantly with the Royal Museum for Central Africa in Tervuren and the National Botanic Garden of Belgium in Meise.

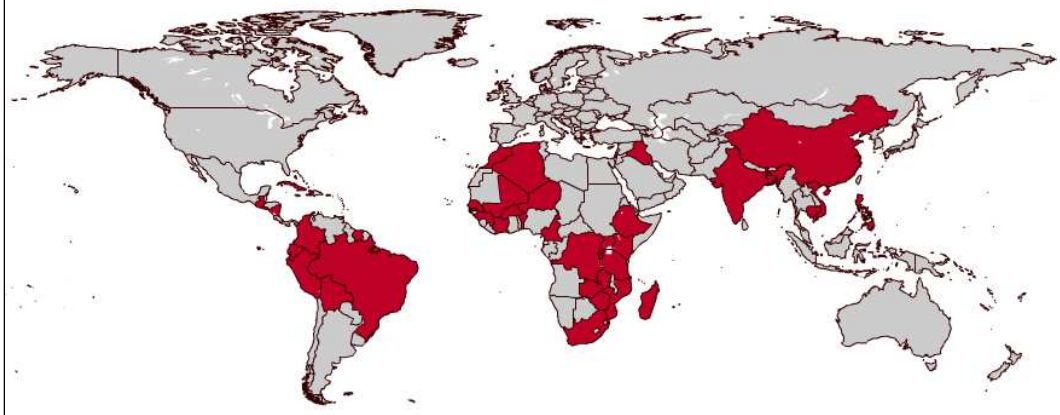
# ULTIMATE GOAL!

arm the developing world with sufficient taxonomic capacity to enable them to inventor, monitor and sustainably manage their biodiversity

The ultimate goal of the Belgian GTI program is to build taxonomic capacity in the biodiversity-rich but economically poorer countries so that these countries can (fairly and equiatbly) inventor, monitor and manage their own biodiversity.

To achieve this we have developed several actions.

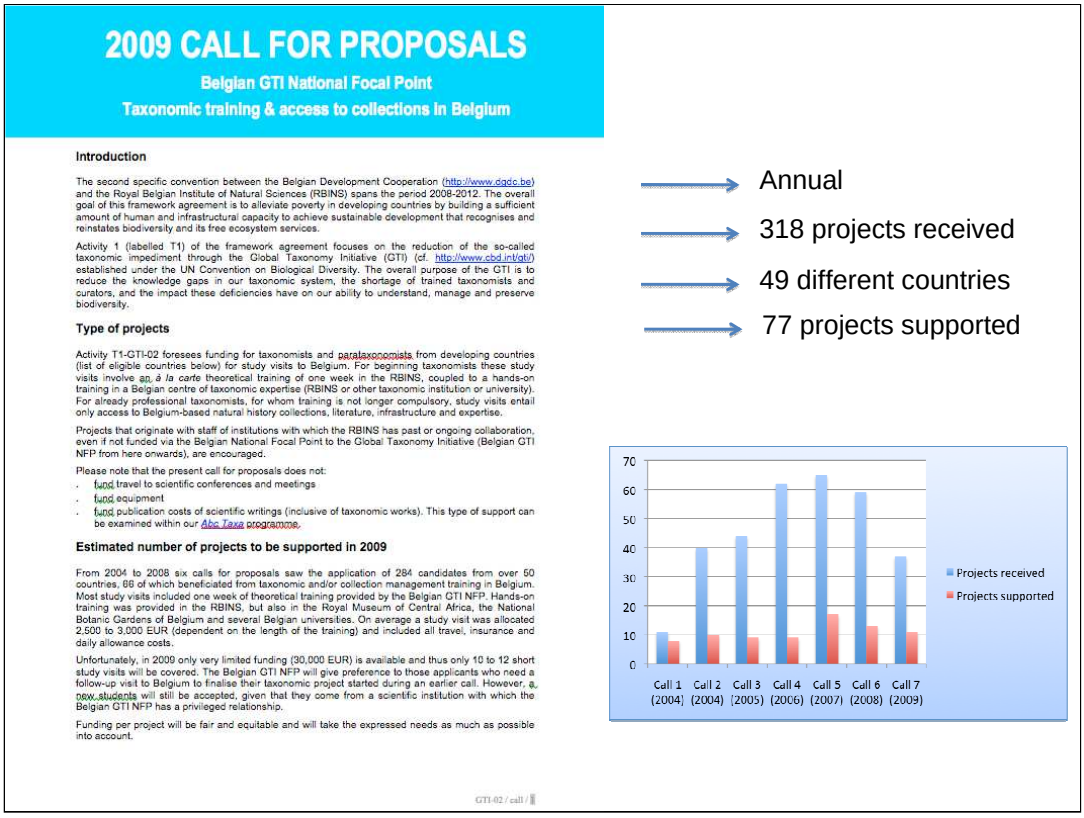
## ELIGIBLE COUNTRIES SINCE 2008



Algeria – Bangladesh – Benin – Bolivia – Brazil - Burkina Faso – Burundi – Cambodia – Cameroon – China – Colombia - Côte d'Ivoire – Cuba - D.R. Congo – Ecuador – Ethiopia – Guatemala – Guinea – Haiti – India – Indonesia – Kenya - Madagascar – Mali – Morocco – Mozambique – Nicaragua – Niger – Palestine – Peru – Philippines – Rwanda – Salvador – Senegal - South Africa – Suriname – Tanzania – Uganda – Vietnam – Zambia - Zimbabwe

However, before I detail our program

CAPACITY BUILDING IN BELGIUM

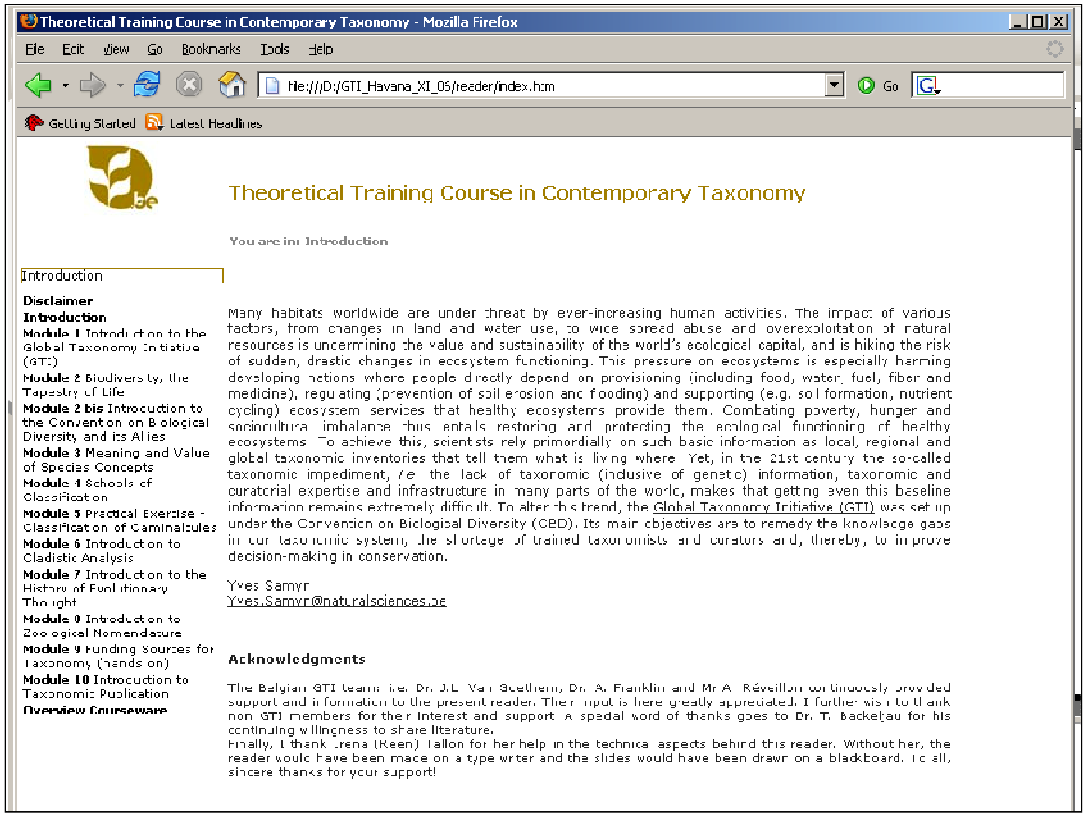



Through annual calls for proposals we capture taxonomic needs of individuals and/or institutions.

Our response to these needs is always dependent of the expertise and collections as available in Belgium.

The first general response to the calls is the provision of a short (4-5 days), basic, training in good practices in taxonomic research.

The next slides show you some screenshots from a course that was given to + 40 students, last year in Havana, Cuba



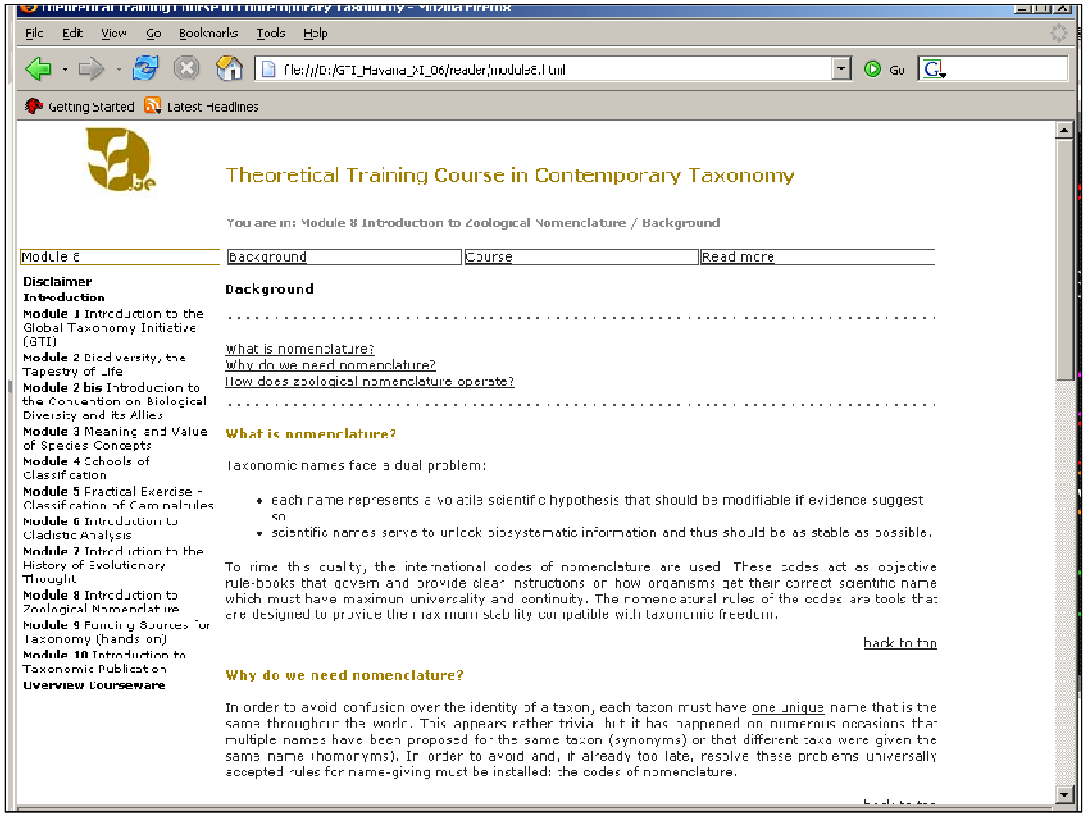

The course presents itself in a browser application.

Here the introductionary slide

…

To the left the different training modules are visible

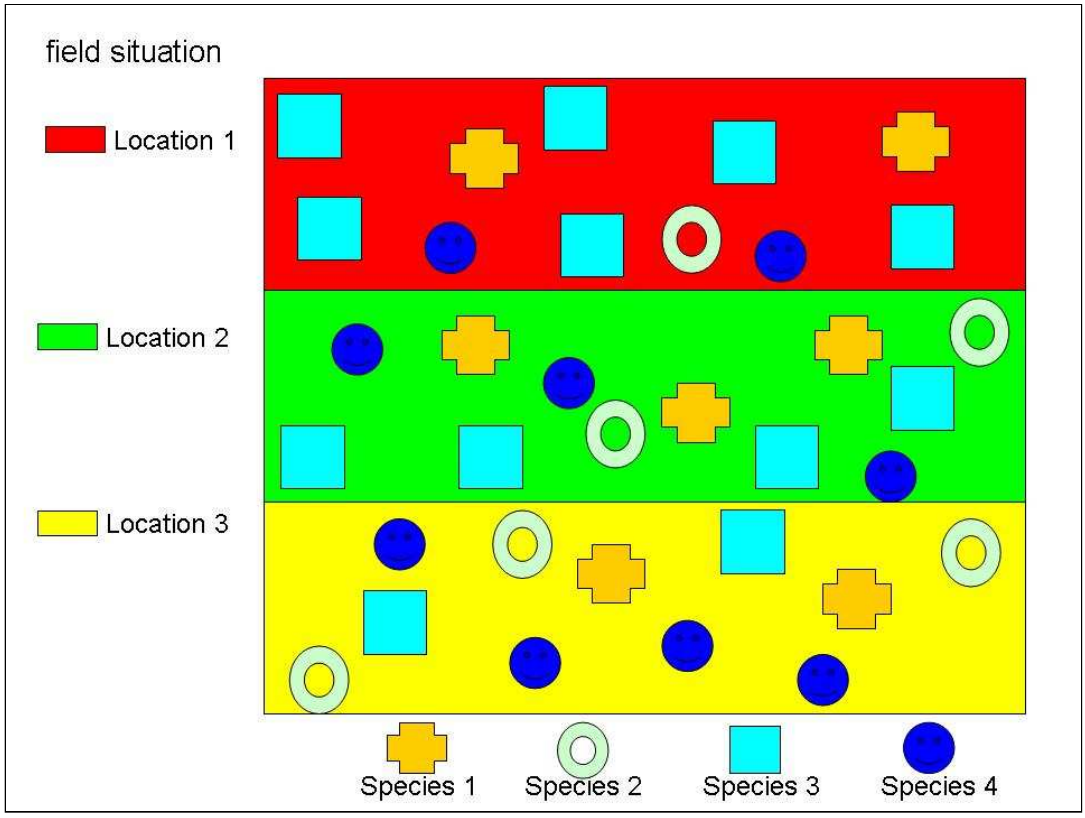
Let's have a look at one of them




We're in module 8: Zoological nomenclature

Three sections are 'browsable': background to the topic (each time What? Why? And How? are briefly discussed; the course an sich and supplementary reference material (pdf's of papers and websites of interest to the topic)

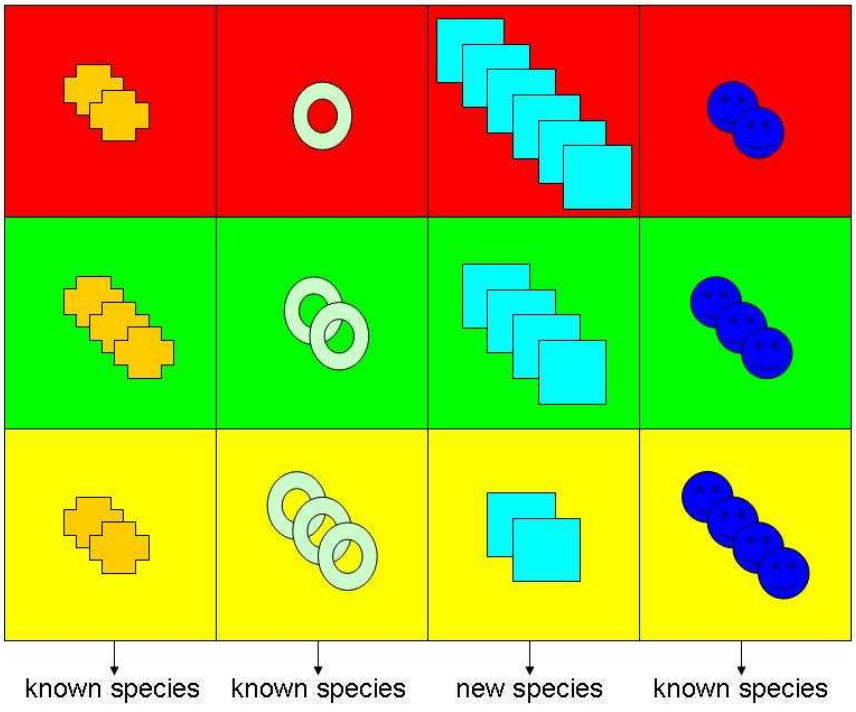
Let's view one slide



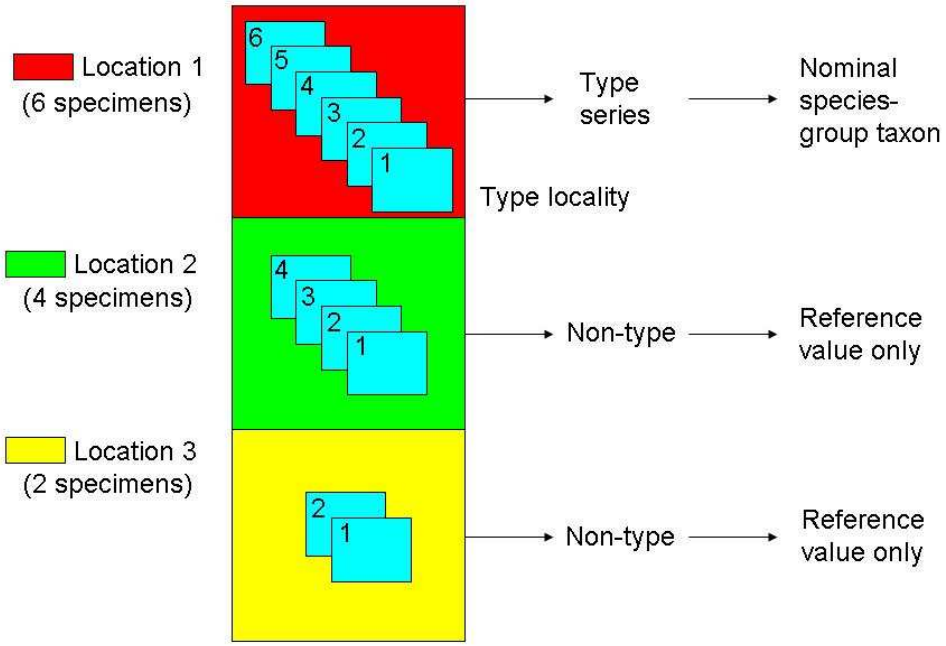

Discussing the sorts of types as commonly used in zoological taxonomy.

The lesson is later made as interactive as possible by presenting some concrete examples

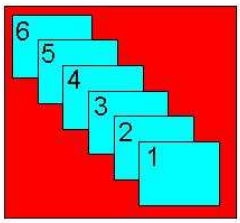
taxonomic identification



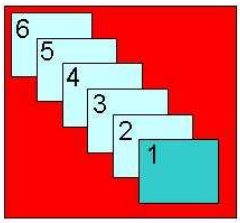
typification provides objective standard for scientific name of new species



original designation
(fixed in the original publication)



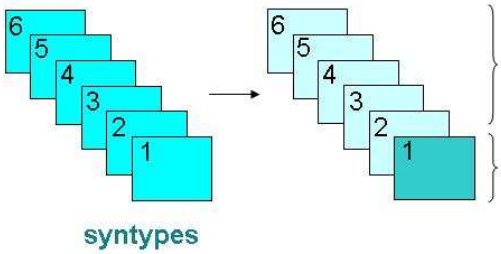

**Syntypes**: specimens that collectively constitute the name-bearing type. All have equal status.




**Paratypes**: remaining specimens of the original type series (see also allotype, isotype)

**Holotype**: the single specimen upon which a new species-group taxon is based in the original publication

subsequent designation
(fixed in a subsequent publication)

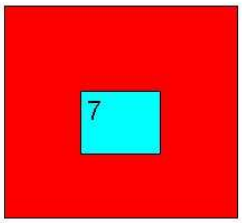



syntypes

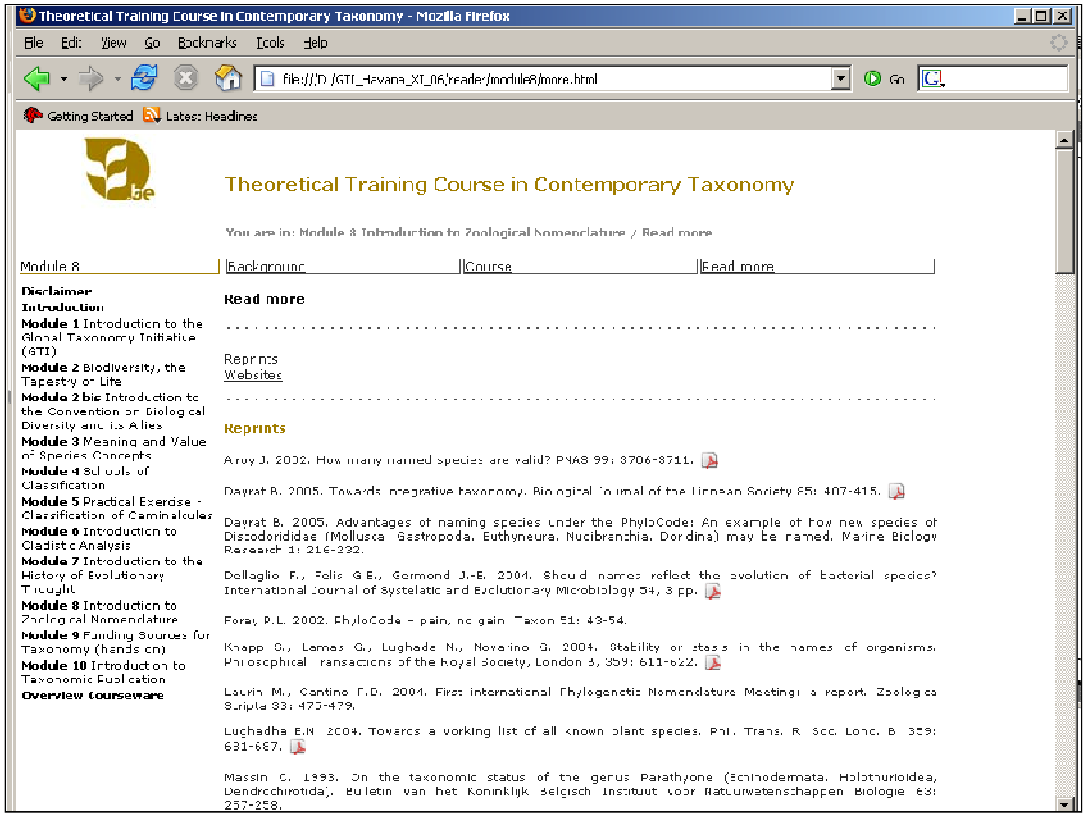
**Paralectotypes**: each specimen of the former syntype series remaining after lectotype designation

**Lectotype**: one of the syntypes designated as the single-name bearing type specimen

**all syntypes lost**

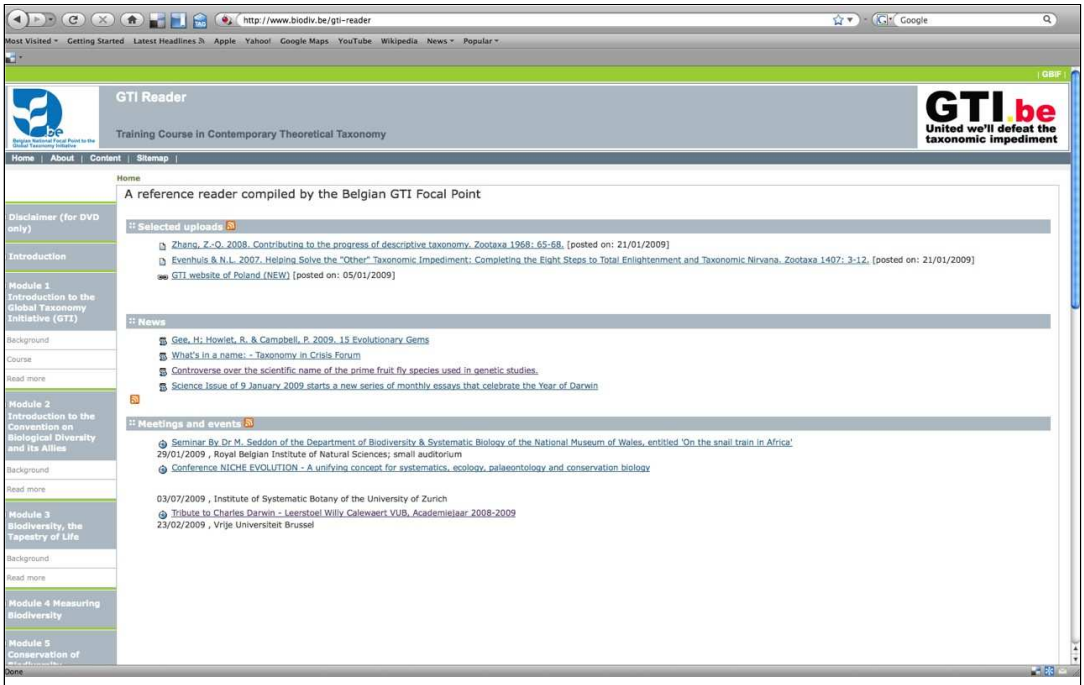



**Neotype**: the single specimen designated as the name-bearing type when no name-bearing type specimen (i.e. holotype, lectotype, syntype or prior neotype) remains. Specimen as near as possible from type locality.




All is complemented by reference material…much of which rather 'illegal' because derived from institutional and personal subscriptions. Students don't mind;-)

We nevertheless strictly ask them NOT to diffuse the here assembled pdf's too openly.




GTI-reader (http://www.biodiv.be/gti-reader) currently re-developed and expanded in English and in French

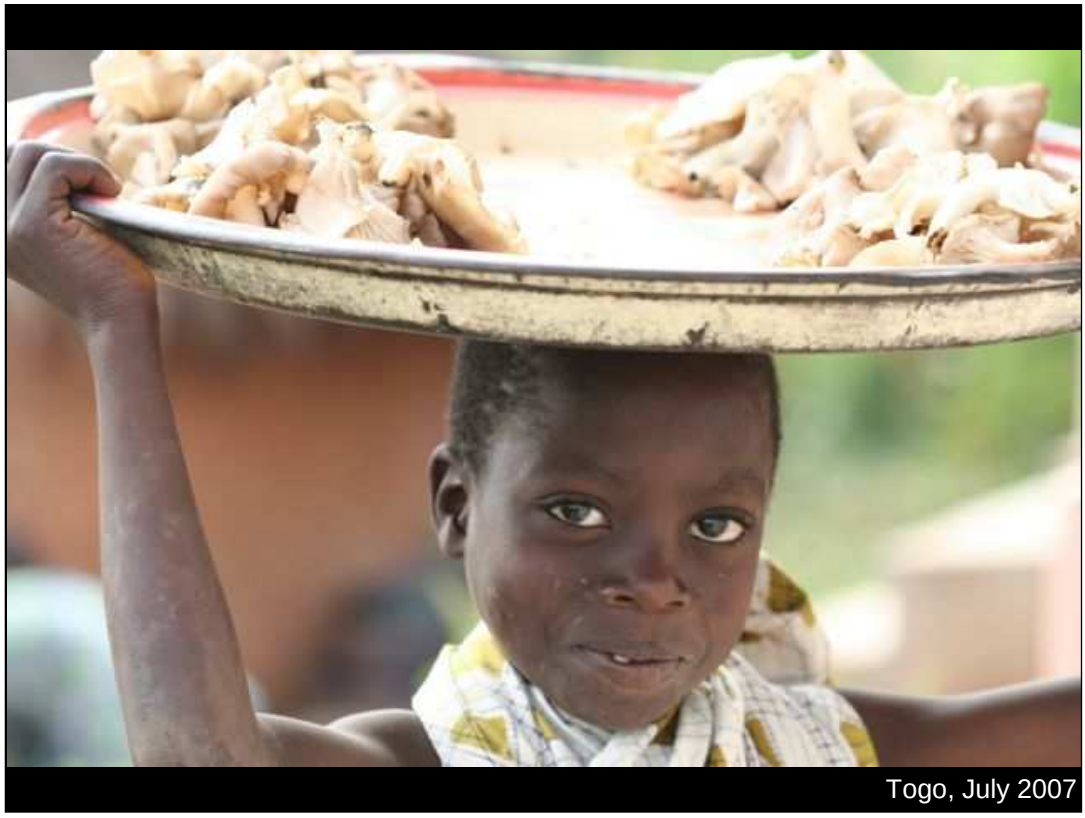

Next to the general training in taxonomy and biodiversity, we also make sure that students receive taxon-specific and guidance; guidance that goes hand in hand with having access to know-how, collections, infrastructure and literature. Several groups have been tackled; underground freshwater oligochaetes, tropical landsnails and slug, acarians  fungi, sea cucumbers , etc.

Access was given to the needed literature, the needed infrastructure (from optical microscope to SEM), including molecular ystematics.

# CAPACITY BUILDING IN PARTNER COUNTRIES

Next to the training we give in Belgium, we also foresee training in the developing country.


This can again take the form of a general training in contemporary taxonomy like here in Havana when more then 40 students from 10 different Cuban institutions attended




Or the general training is linked to taxon-specific training like here in Togo where a Belgian specialist linked up with budding local taxonomists to inventor the fungi of Togo.

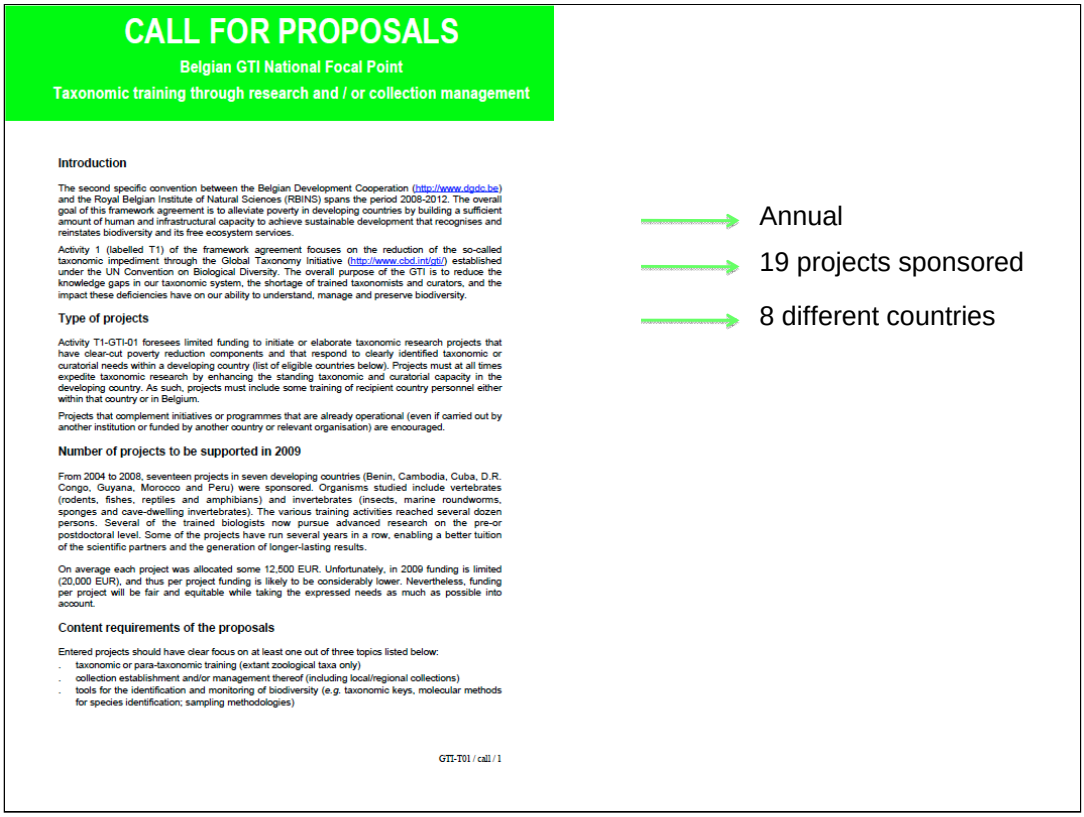

Participants to the course present data and by doing so liberate their needs

After the theoretical training it is time to hit the field; with a small but dedicated group of mycologists.


Mushrooms are detected, photographed, described, tentatively identified, dried and made ready for the herbarium.

The project has raised human capacity, but has also left behind an important voucher collection, the needed literature and infrastructure that will allow further effort.

Infrastructure includes a drier but also an optical microscope that allows the study of the spore; fundamental taxonomic characters that otherwise could not be assessed.



# CALL FOR PROPOSALS

**Belgian GTI National Focal Point**

**Taxonomic training through research and / or collection management**

### Introduction

The second specific convention between the Belgian Development Cooperation (http://www.dgdc.be) and the Royal Belgian Institute of Natural Sciences (RBINS) spans the period 2008-2012. The overall goal of this framework agreement is to alleviate poverty in developing countries by building a sufficient amount of human and infrastructural capacity to achieve sustainable development that recognises and reinstates biodiversity and its free ecosystem services.

Activity 1 (labelled T1) of the framework agreement focuses on the reduction of the so-called taxonomic impediment through the Global Taxonomy Initiative (http://www.cbd.int/gti/) established under the UN Convention on Biological Diversity. The overall purpose of the GTI is to reduce the knowledge gaps in our taxonomic system, the shortage of trained taxonomists and curators, and the impact these deficiencies have on our ability to understand, manage and preserve biodiversity.

### Type of projects

Activity T1-GTI-01 foresees limited funding to initiate or elaborate taxonomic research projects that have clear-cut poverty reduction components and that respond to clearly identified taxonomic or curatorial needs within a developing country (list of eligible countries below). Projects must at all times expedite taxonomic research by enhancing the standing taxonomic and curatorial capacity in the developing country. As such, projects must include some training of recipient country personnel either within that country or in Belgium.

Projects that complement initiatives or programmes that are already operational (even if carried out by another institution or funded by another country or relevant organisation) are encouraged.

### Number of projects to be supported in 2009

From 2004 to 2008, seventeen projects in seven developing countries (Benin, Cambodia, Cuba, D.R. Congo, Guyana, Morocco and Peru) were sponsored. Organisms studied include vertebrates (rodents, fishes, reptiles and amphibians) and invertebrates (insects, marine roundworms, sponges and cave-dwelling invertebrates). The various training activities reached several dozen persons. Several of the trained biologists now pursue advanced research on the pre-or postdoctoral level. Some of the projects have run several years in a row, enabling a better tuition of the scientific partners and the generation of longer-lasting results.

On average each project was allocated some 12,500 EUR. Unfortunately, in 2009 funding is limited (20,000 EUR), and thus per project funding is likely to be considerably lower. Nevertheless, funding per project will be fair and equitable while taking the expressed needs as much as possible into account.

### Content requirements of the proposals

Entered projects should have clear focus on at least one out of three topics listed below:

- taxonomic or para-taxonomic training (extant zoological taxa only)
- collection establishment and/or management thereof (including local/regional collections)
- tools for the identification and monitoring of biodiversity (*e.g.* taxonomic keys, molecular methods for species identification; sampling methodologies)

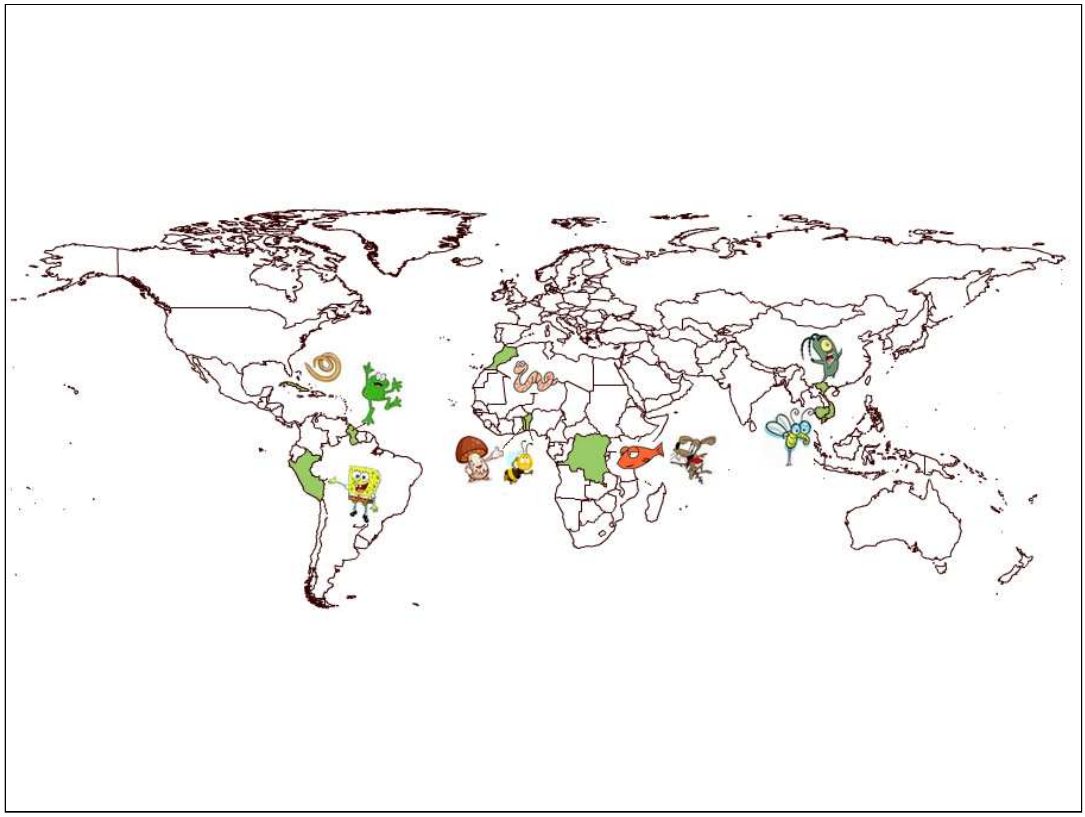
GTI-T01 / call / 1

→ Annual

→ 19 projects sponsored

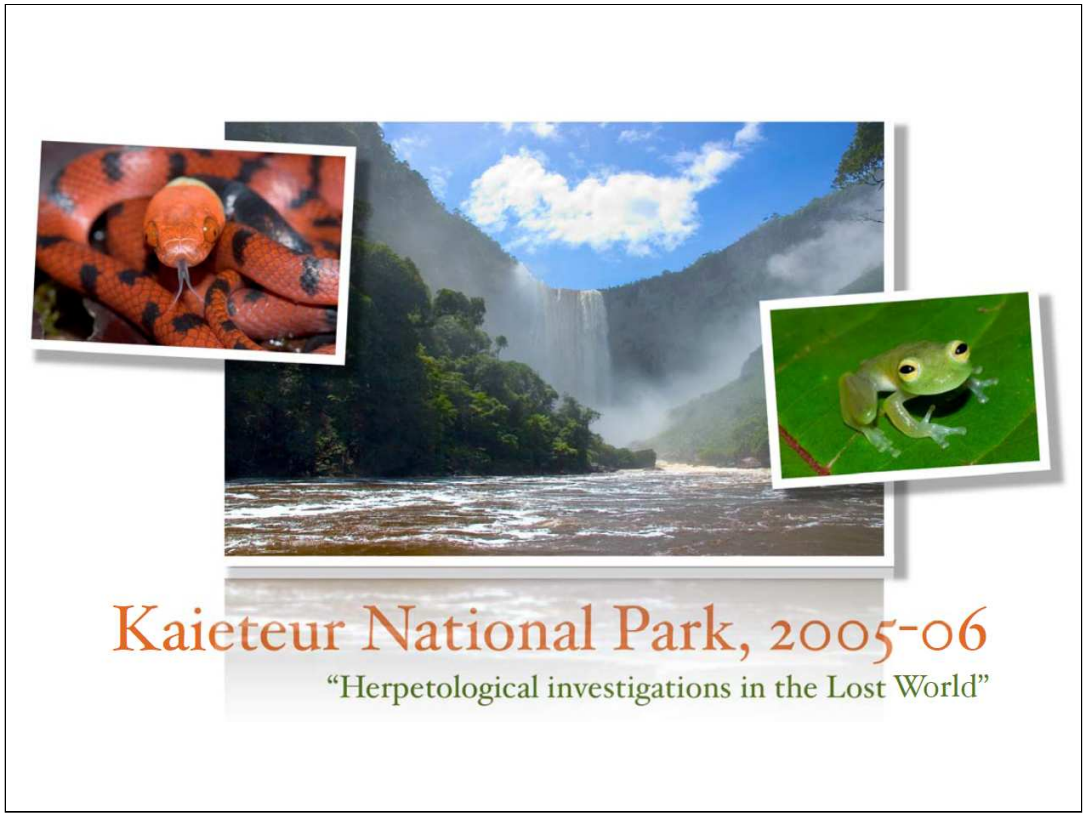
→ 8 different countries

Next to such projects that are carried out because a local researcher or institution requested help, the Belgian program also foresees that Belgian specialists enter projects. Here again, we launch an annual call. Since 2004 we've sponsored 19 different projects in 8 different countries

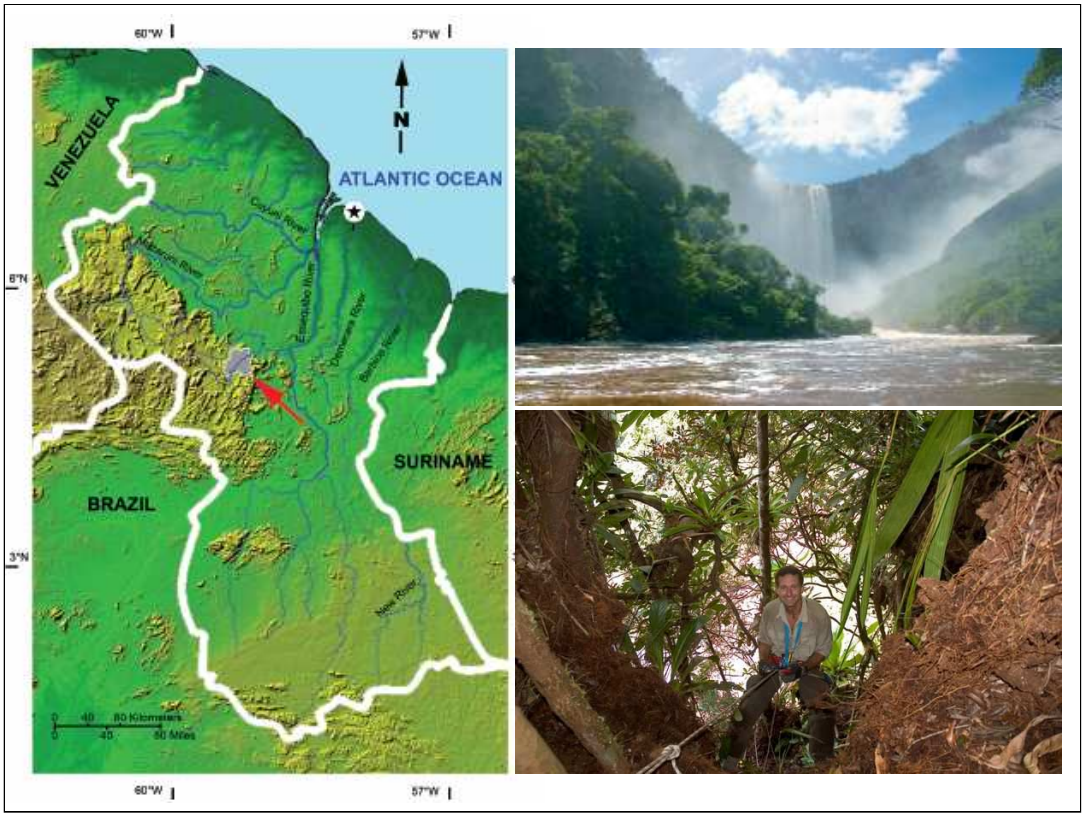


Here they are

Guyana: 2004, 05, 06, 07 (herpetology)
Cambodia: 2004, 05, 06 (entomology)
DRCongo: 2004, 05, 06 (rodents + fish)
Cuba: 2006 (nematodes)
Benin: 2006 (pollinators)
Morocco: 2006, 07, 08 (worms)
Peru: 2007, 08, 09 (marine sponges)
VietNam: 2009 (rotifers
Togo: 2007, 08, partim (Fungi)




I'll show you three of these in a bit more detail




Taxonomic inventory of the herpetofauna of Kaieteur National Park in Guyana. A Park characterized by its spectacular Kaieteur Falls of +225 m and its abundant, but largely unknown, fauna and flora.

A Belgian herpetologist has in the last four years made a detailed inventory of the herpetofauna.


Whereby no chance is left unattended to teach on the importance of taxonomy and herpetology

**Prior to KNP surveys (2005-2006-2007-2008):**

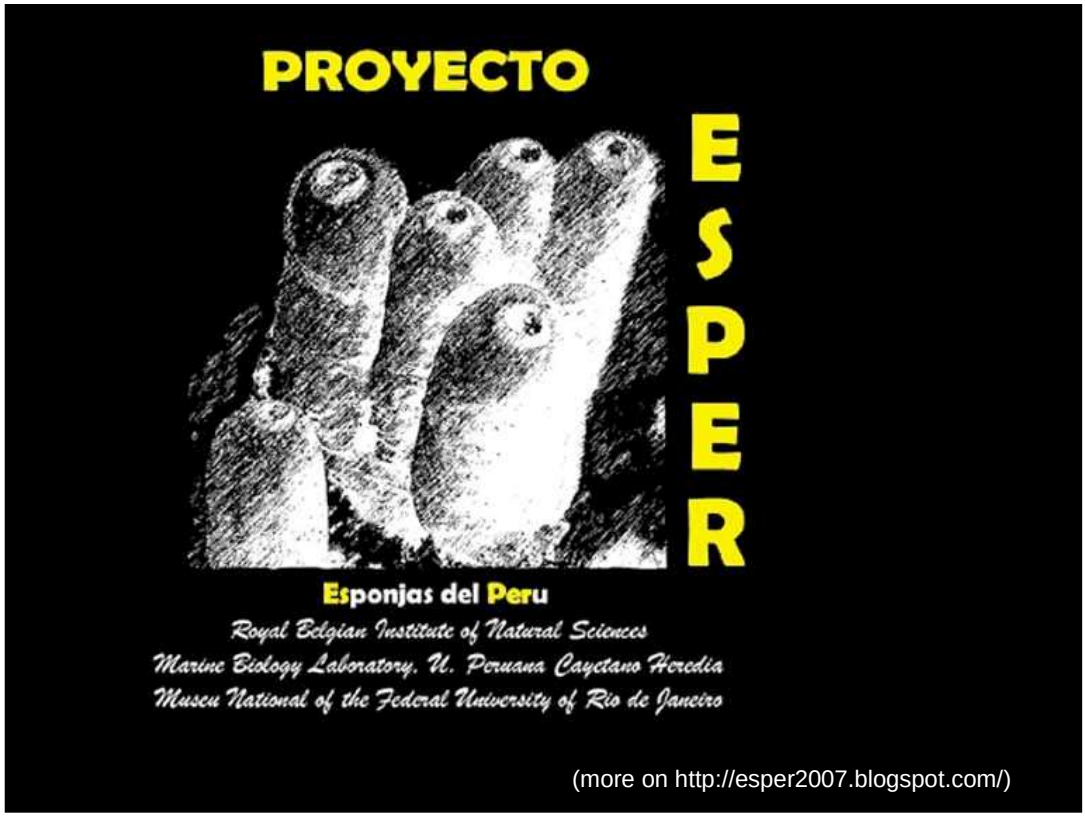
29 species, belonging to 21 genera and 14 families were known (note: many dubious to erroneous records!).

**After surveys:**

115 species, belonging to 94 genera and 28 families of which 8 species and 1 genus new to science."

Some results:

- Number of known species quadrupled
- several new vertebrates described
- local awareness for herpetology significantly higher
- Guyanese Government better armed to ask UNESCO to designate the KNP as World Heritage Site

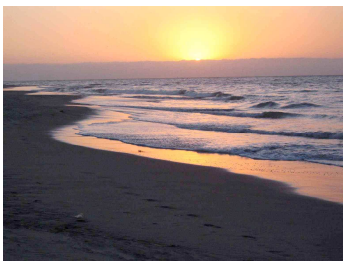



Another project that we fund for more then two years now is the inventory of the shallow-water sponges of Peru.

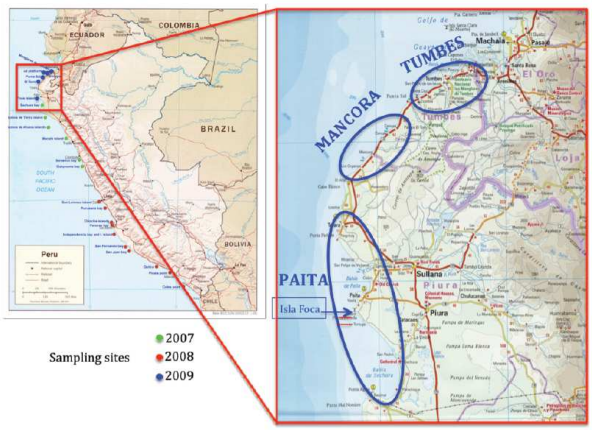
This project is a joint undertaking by the RBINS, the University of Rio de Janeiro, the University of Peruana Cayetano Heredia and the Muséum d'Histoire naturelle de Geneve.

This project was set up because despite the almost 2.500 km long coast line of Peru, the number of sponges reported in the literature is very low (26 species, a large majority of which are deep sea Hexactinellids collected at the end of the 19$^{th}$ Century). Surprisingly, no detailed inventory of the sponge fauna of the rocky shore of Peru had ever been conducted before we initiated this study in collaboration with the *Universidad Peruana Cayetano Heredia* (UPCH). Our first expedition along the North coast, in 2007, revealed a great variability of the sponge fauna from Lima to the North, with a larger diversity and abundance in the North.

The participants to the project are: Philippe WILLENZ (Project Coordinator): Royal Belgian Institute of Natural Sciences - Eduardo HAJDU: Museu Nacional, Universidade Federal do Rio de Janeiro - Yuri HOOKER MANTILLA: Universidad Peruana Cayetano Heredia - Ruth DESQUEYROUX-FAUNDEZ: Museum d'histoire naturelle de Genève

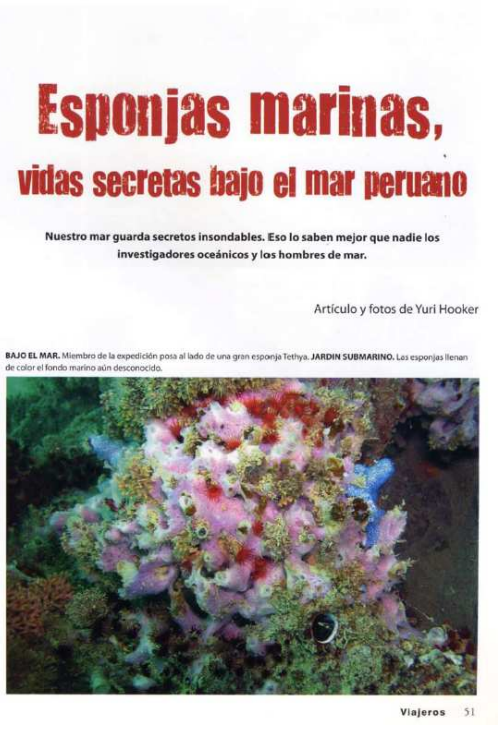


Appendix 1: Sampling sites for 2009




The Belgian, Peruvian-Brazilian team sampled the shallow-waters of the nearly 300 km long Peruvian coast. On each expedition they take with them local students and researchers whom they train in inventory techniques applicable to sponges. The Peruvian partner from the University receives additional expert training in taxonomy of sponges, both in Belgium and in Peru


Some results.

# Esponjas marinas,

## vidas secretas bajo el mar peruano

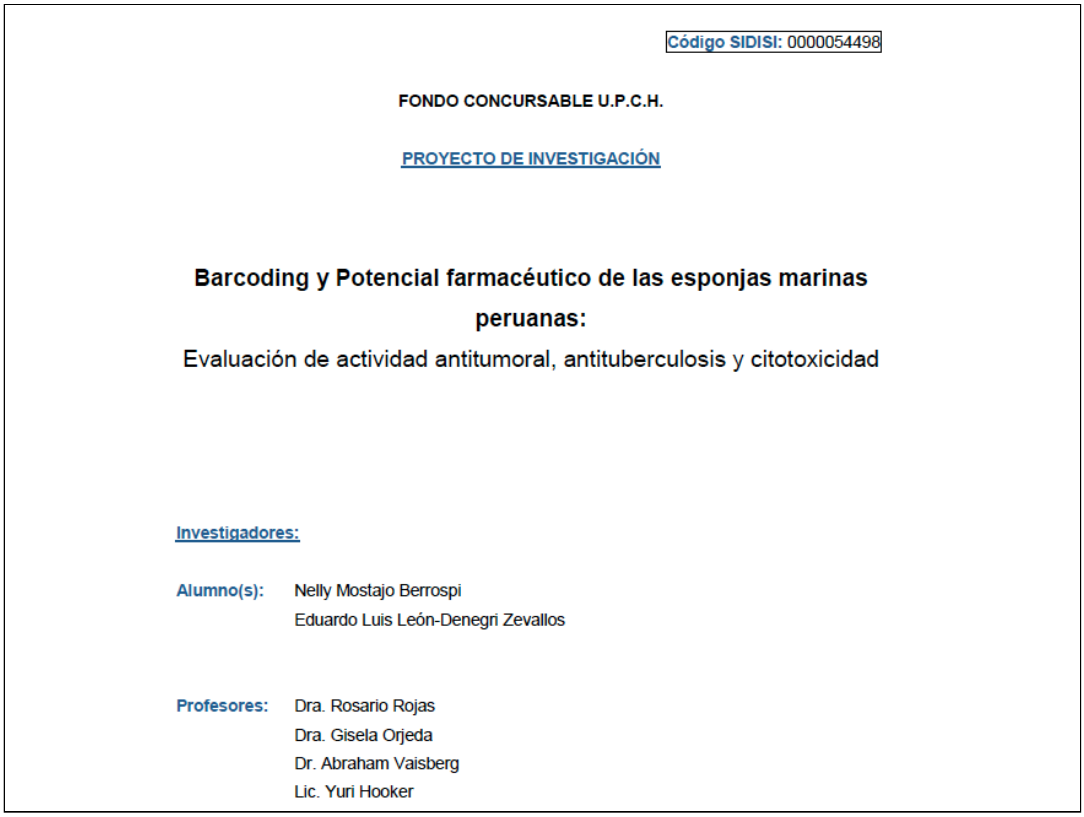
**Nuestro mar guarda secretos insondables. Eso lo saben mejor que nadie los investigadores oceánicos y los hombres de mar.**

Artículo y fotos de Yuri Hooker

**BAJO EL MAR.** Miembro de la expedición posa al lado de una gran esponja Tethya. **JARDIN SUBMARINO.** Las esponjas llenan de color el fondo marino aún desconocido.



No forum is left unattended to flag the importance of the taxonomic work acrried out



Código SIDISI: 0000054498

FONDO CONCURSABLE U.P.C.H.

PROYECTO DE INVESTIGACIÓN

**Barcoding y Potencial farmacéutico de las esponjas marinas peruanas:**

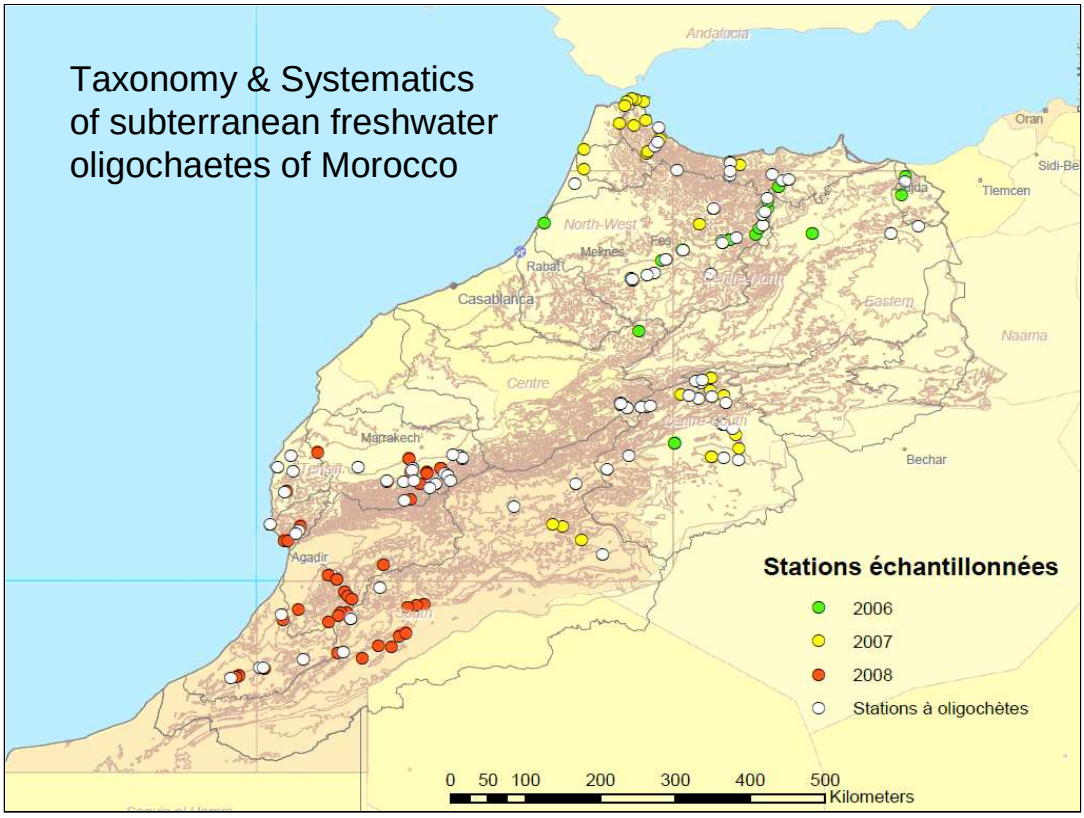
Evaluación de actividad antitumoral, antituberculosis y citotoxicidad

Investigadores:

Alumno(s): Nelly Mostajo Berrospi
Eduardo Luis León-Denegri Zevallos

Profesores: Dra. Rosario Rojas
Dra. Gisela Orjeda
Dr. Abraham Vaisberg
Lic. Yuri Hooker

And with sponges that's easy, as they comprise the richest natural source of new chemical structures, most of which present varied biological activities, and are currently under pharmaceutical screening for new drug leads against several human diseases. One of the students who participated to the "ESPER Proyecto 2008" is starting a thesis in this topic (See appendix 3).




A last project that I want to mention is the inventory and monitoring of the subterranean freshwater oligochaetes of Morocco. During three years a large part of morocco has been extensively sampled


And this across habitats

**Prior to GTI projects (2006-2008-2009)**

32 species in 6 families known to RBINS specialist

53 species in 6 families know when having access to ‘local’ literature

**After three years of inventory**

54 species in 6 families, but with a much finer resolution of distribution

Complex of cryptic species detected

The results show a much more accurate distribution and indicate that each water bassin has a distinct oligochaete fauna.

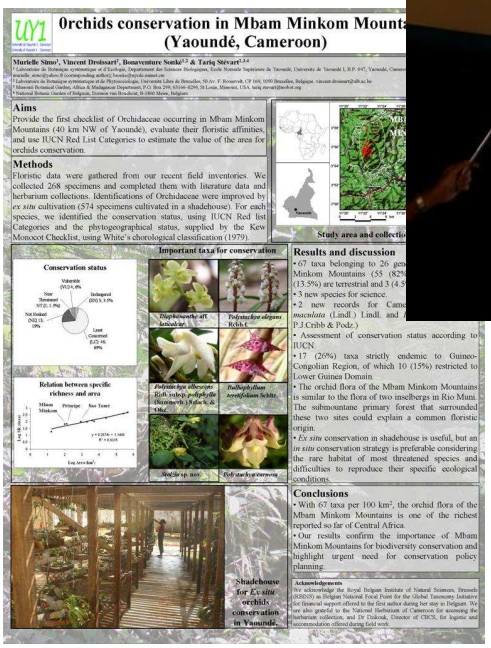
Now that the fauna is morphologically well characterised it can be barcoded. This would allow faster identification and monitoring and thus better management of the scarce water resources of Morocco. In the face of climate change that makes water the most valuable resource this project contributed directly to poverty reduction.

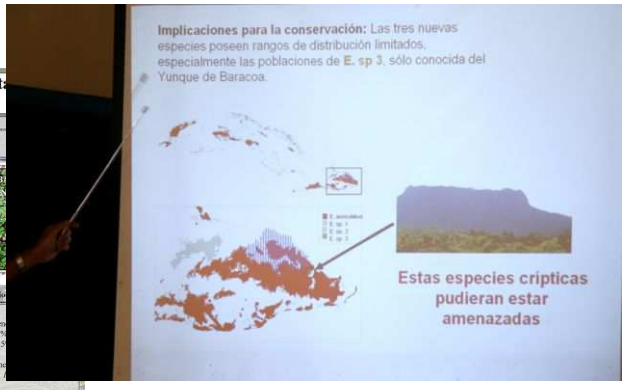
# IMPACT?

Publications
Projects
Jobs

Now, what is the impact of all these efforts?

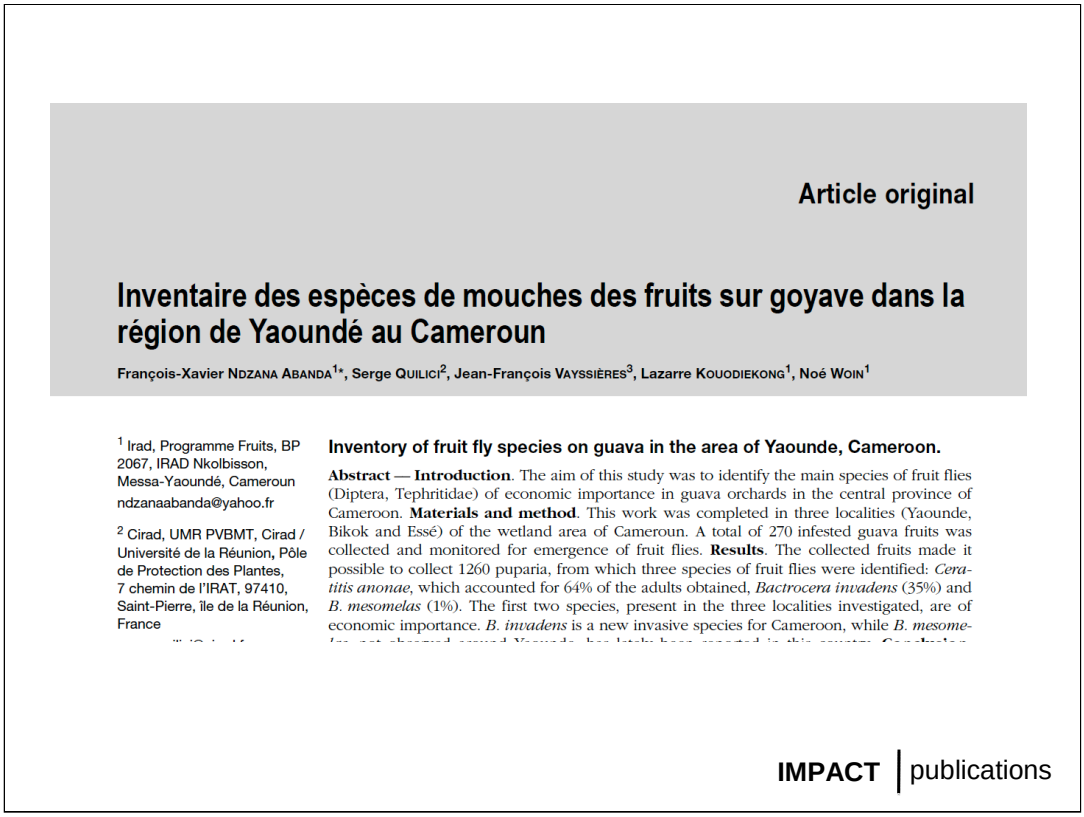
Let me give you some examples of publications, of projects and of created jobs.




**IMPACT** | Posters and presentations

Obviously our students present posters and presentations on national and international symposia



Article original

# Inventaire des espèces de mouches des fruits sur goyave dans la région de Yaoundé au Cameroun

François-Xavier NDZANA ABANDA[1]*, Serge QUILICI[2], Jean-François VAYSSIÈRES[3], Lazarre KOUODIEKONG[1], Noé WOIN[1]

[1] Irad, Programme Fruits, BP 2067, IRAD Nkolbisson, Messa-Yaoundé, Cameroun
ndzanaabanda@yahoo.fr

[2] Cirad, UMR PVBMT, Cirad / Université de la Réunion, Pôle de Protection des Plantes, 7 chemin de l'IRAT, 97410, Saint-Pierre, île de la Réunion, France

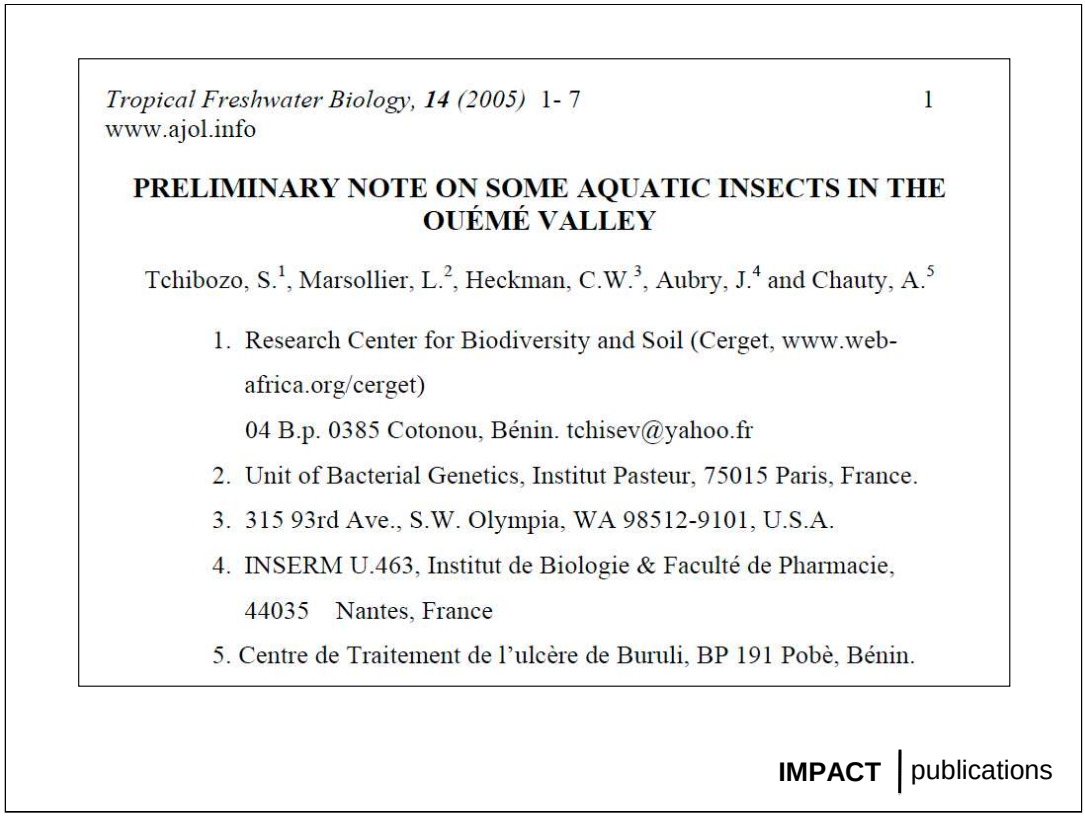
**Inventory of fruit fly species on guava in the area of Yaounde, Cameroon.**

**Abstract — Introduction**. The aim of this study was to identify the main species of fruit flies (Diptera, Tephritidae) of economic importance in guava orchards in the central province of Cameroon. **Materials and method**. This work was completed in three localities (Yaounde, Bikok and Essé) of the wetland area of Cameroun. A total of 270 infested guava fruits was collected and monitored for emergence of fruit flies. **Results**. The collected fruits made it possible to collect 1260 puparia, from which three species of fruit flies were identified: *Ceratitis anonae*, which accounted for 64% of the adults obtained, *Bactrocera invadens* (35%) and *B. mesomelas* (1%). The first two species, present in the three localities investigated, are of economic importance. *B. invadens* is a new invasive species for Cameroon, while *B. mesome-*

IMPACT | publications

Also publications

Ranging from simple inventories as here on fruitflies



*Tropical Freshwater Biology, **14** (2005)* 1- 7 1
www.ajol.info

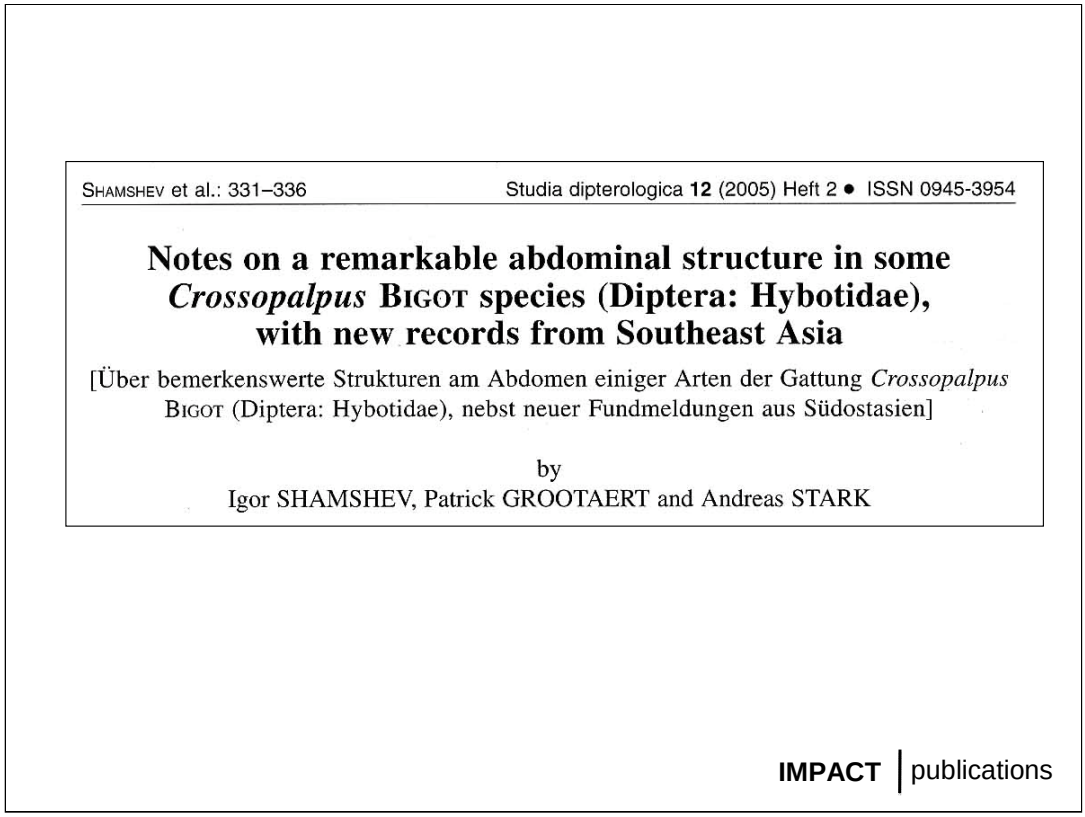
**PRELIMINARY NOTE ON SOME AQUATIC INSECTS IN THE OUÉMÉ VALLEY**

Tchibozo, S.[1], Marsollier, L.[2], Heckman, C.W.[3], Aubry, J.[4] and Chauty, A.[5]

1. Research Center for Biodiversity and Soil (Cerget, www.web-africa.org/cerget)
   04 B.p. 0385 Cotonou, Bénin. tchisev@yahoo.fr
2. Unit of Bacterial Genetics, Institut Pasteur, 75015 Paris, France.
3. 315 93rd Ave., S.W. Olympia, WA 98512-9101, U.S.A.
4. INSERM U.463, Institut de Biologie & Faculté de Pharmacie, 44035 Nantes, France
5. Centre de Traitement de l'ulcère de Buruli, BP 191 Pobè, Bénin.



Or insects in general



SHAMSHEV et al.: 331–336 Studia dipterologica **12** (2005) Heft 2 • ISSN 0945-3954

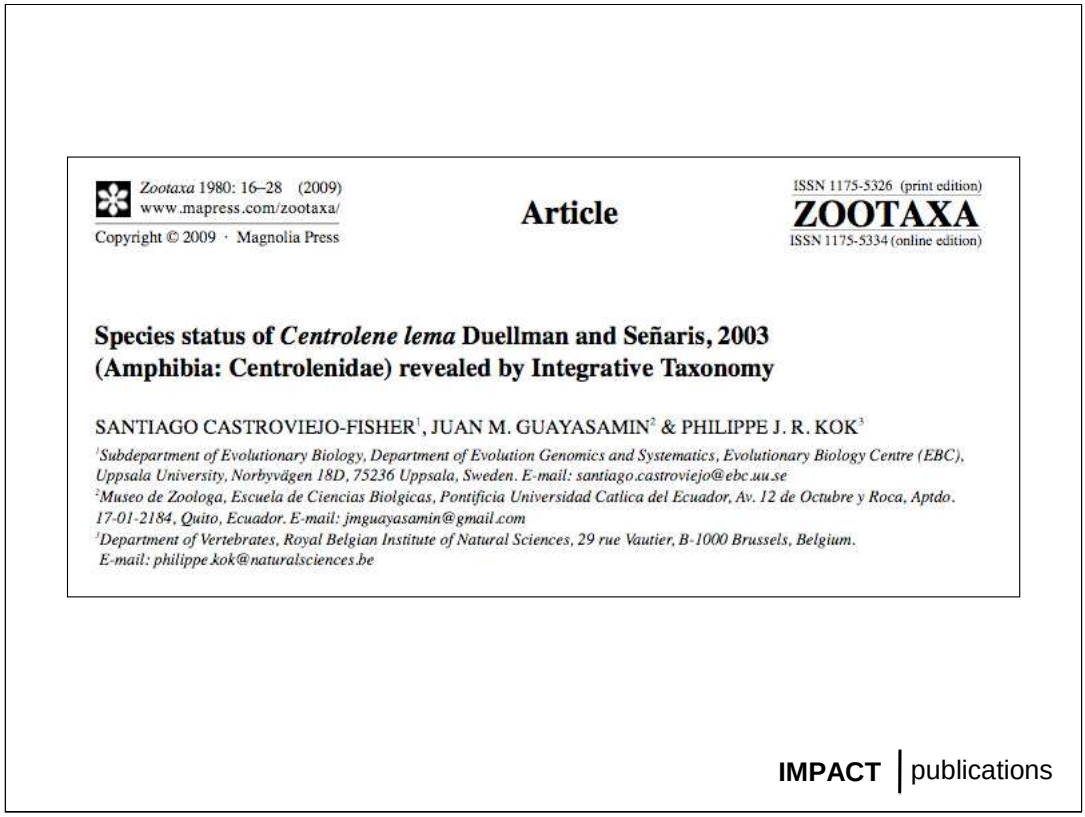
**Notes on a remarkable abdominal structure in some *Crossopalpus* BIGOT species (Diptera: Hybotidae), with new records from Southeast Asia**

[Über bemerkenswerte Strukturen am Abdomen einiger Arten der Gattung *Crossopalpus* BIGOT (Diptera: Hybotidae), nebst neuer Fundmeldungen aus Südostasien]

by
Igor SHAMSHEV, Patrick GROOTAERT and Andreas STARK

**IMPACT** | publications

But also the documentation of remarkable structures



*Zootaxa* 1980: 16–28 (2009)
www.mapress.com/zootaxa/


**Article**

ISSN 1175-5326 (print edition)
**ZOOTAXA**
ISSN 1175-5334 (online edition)

**Species status of *Centrolene lema* Duellman and Señaris, 2003 (Amphibia: Centrolenidae) revealed by Integrative Taxonomy**

SANTIAGO CASTROVIEJO-FISHER[1], JUAN M. GUAYASAMIN[2] & PHILIPPE J. R. KOK[3]

[1]*Subdepartment of Evolutionary Biology, Department of Evolution Genomics and Systematics, Evolutionary Biology Centre (EBC), Uppsala University, Norbyvägen 18D, 75236 Uppsala, Sweden. E-mail: santiago.castroviejo@ebc.uu.se*
[2]*Museo de Zoologa, Escuela de Ciencias Biolgicas, Pontificia Universidad Catlica del Ecuador, Av. 12 de Octubre y Roca, Aptdo. 17-01-2184, Quito, Ecuador. E-mail: jmguayasamin@gmail.com*
[3]*Department of Vertebrates, Royal Belgian Institute of Natural Sciences, 29 rue Vautier, B-1000 Brussels, Belgium. E-mail: philippe.kok@naturalsciences.be*

**IMPACT** | publications

Or the clarification of the taxonomic status of species

*Zootaxa* 1242: 1–20 (2006)
www.mapress.com/zootaxa/


ISSN 1175-5326 (print edition)
**ZOOTAXA**
ISSN 1175-5334 (online edition)

1242

**A review of the gekkotan lizards of Bénin, with the description of a new species of *Hemidactylus* (Squamata: Gekkonidae)**

AARON M. BAUER[1]*, SÉVÉRIN TCHIBOZO[2], OLIVIER S.G. PAUWELS[3] & GEORGES LENGLET[3]

[1]*Department of Biology, Villanova University, 800 Lancaster Avenue, Villanova, Pennsylvania 19085, USA*
[2]*Centre de Recherche pour la Gestion de la Biodiversité et du Terroir 04 B.p. 0385 Cotonou, BÉNIN*
[3]*Department of Recent Vertebrates, Institut Royal des Sciences Naturelles de Belgique Rue Vautier 29, B-1000 Bruxelles, BELGIUM*
**Corresponding author*



And obviously also the revision and erection of species new to science.
Here a new lizzard from West Africa

ZooKeys 7: 75-81 (2009)
doi: 10.3897/zookeys.7.106
www.pensoftonline.net/zookeys

RESEARCH ARTICLE

ZooKeys

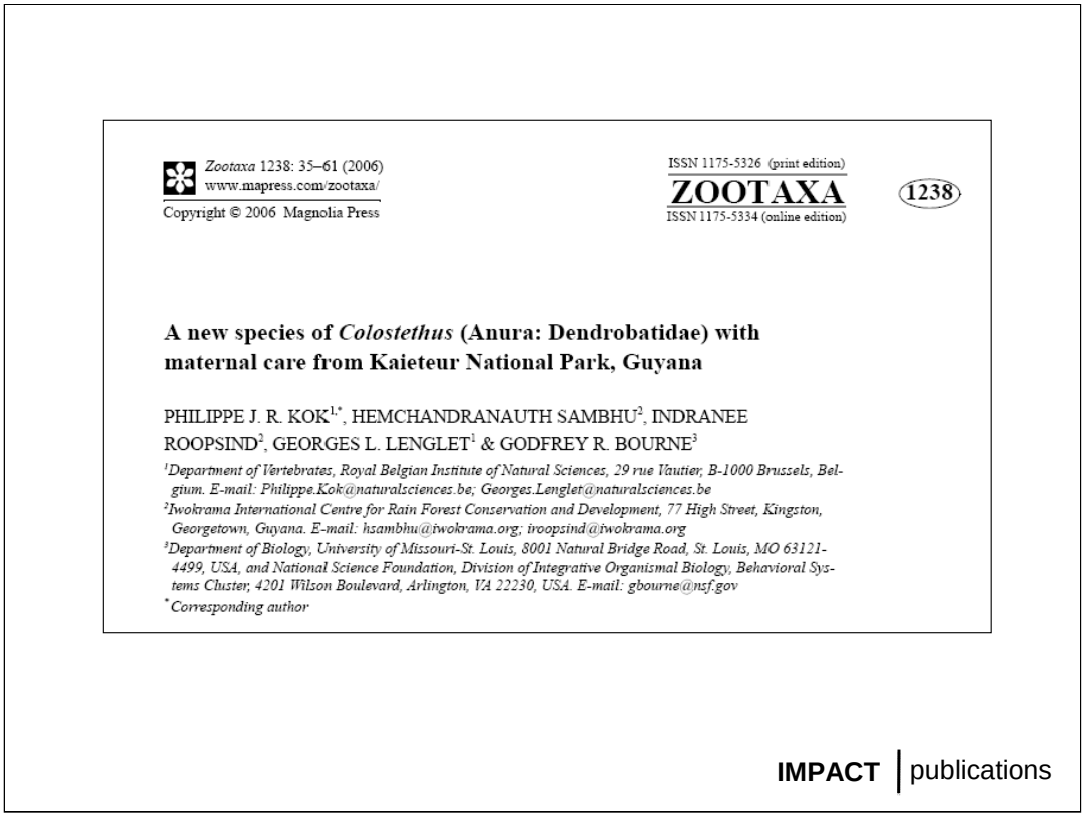
# A new species of *Bicoxidens* Attems, 1928 (Diplopoda, Spirostreptida, Spirostreptidae) species from northern Zimbabwe

Tarombera Mwabvu [1,†], Michelle Hamer [1,2,†], Robert Slotow [1,§]

1 *School of Biological & Conservation Sciences, University of KwaZulu-Natal, Westville Campus, PBX54001, Durban 4000, South Africa* **2** *South African National Biodiversity Institute, PBX 101, Pretoria 0001, South Africa*

**IMPACT** | publications

Here a new diplopod from Zimbabwe



*Zootaxa* 1238: 35–61 (2006)
www.mapress.com/zootaxa/


ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

1238

**A new species of *Colostethus* (Anura: Dendrobatidae) with maternal care from Kaieteur National Park, Guyana**

PHILIPPE J. R. KOK[1,*], HEMCHANDRANAUTH SAMBHU[2], INDRANEE ROOPSIND[2], GEORGES L. LENGLET[1] & GODFREY R. BOURNE[3]

[1]*Department of Vertebrates, Royal Belgian Institute of Natural Sciences, 29 rue Vautier, B-1000 Brussels, Belgium. E-mail: Philippe.Kok@naturalsciences.be; Georges.Lenglet@naturalsciences.be*
[2]*Iwokrama International Centre for Rain Forest Conservation and Development, 77 High Street, Kingston, Georgetown, Guyana. E-mail: hsambhu@iwokrama.org; iroopsind@iwokrama.org*
[3]*Department of Biology, University of Missouri-St. Louis, 8001 Natural Bridge Road, St. Louis, MO 63121-4499, USA, and National Science Foundation, Division of Integrative Organismal Biology, Behavioral Systems Cluster, 4201 Wilson Boulevard, Arlington, VA 22230, USA. E-mail: gbourne@nsf.gov*
[*]*Corresponding author*

**IMPACT** | publications

Or a new species of frog from S. America (note that local authors are also included)

# The discovery of eight new mouse species!


**IMPACT** | publications

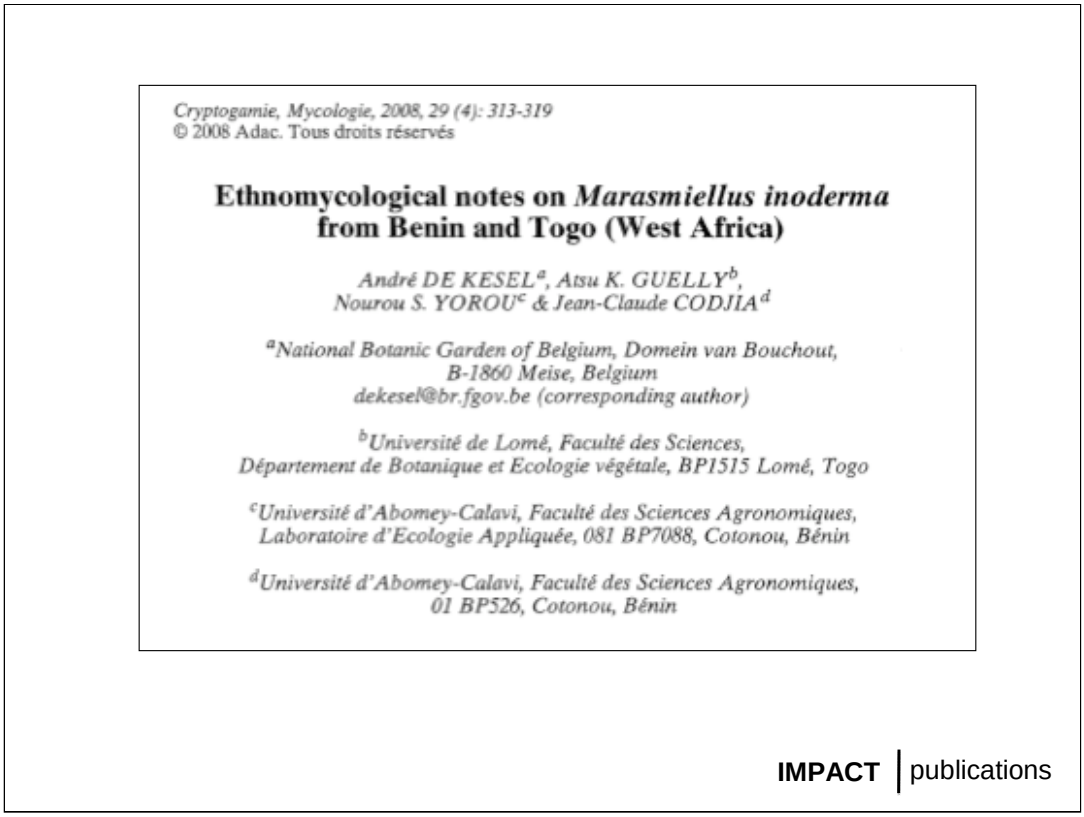
# Lectotypification of names of Brazilian species of *Cryptocarya* (*Lauraceae*)

**Pedro Luís Rodrigues de Moraes**

*PRODOC/CAPES Scholarship. Departamento de Botânica, IB, UNICAMP, P.O. Box 6109, 13083-970, Campinas, S.P., Brazil. pmoraes@unicamp.br*

In a forthcoming systematic treatment of Brazilian species of *Cryptocarya*, almost all known herbarium collections were examined, and as a result, eight validly published species names are recognized. Types are cited for accepted names and synonyms. Several lectotypes and an epitype are newly designated. One new combination is proposed.

KEYWORDS: Brazil, *Cryptocarya*, *Lauraceae*, nomenclature, taxonomy.



*Cryptogamie, Mycologie, 2008, 29 (4): 313-319*


**Ethnomycological notes on *Marasmiellus inoderma* from Benin and Togo (West Africa)**

*André DE KESEL[a], Atsu K. GUELLY[b], Nourou S. YOROU[c] & Jean-Claude CODJIA[d]*

*[a]National Botanic Garden of Belgium, Domein van Bouchout, B-1860 Meise, Belgium*
*dekesel@br.fgov.be (corresponding author)*

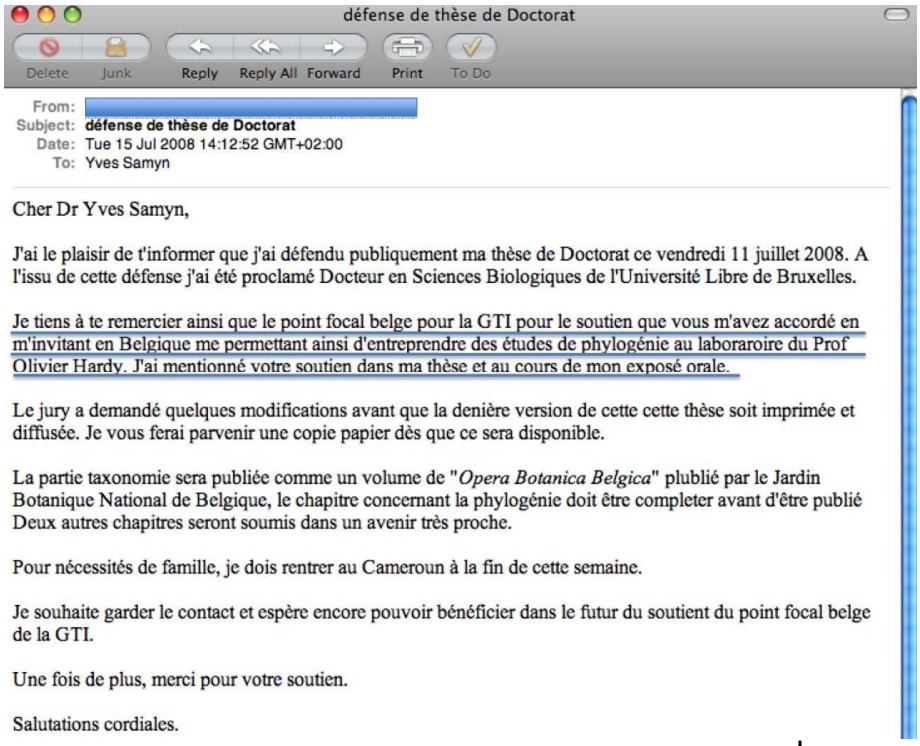
*[b]Université de Lomé, Faculté des Sciences, Département de Botanique et Ecologie végétale, BP1515 Lomé, Togo*

*[c]Université d'Abomey-Calavi, Faculté des Sciences Agronomiques, Laboratoire d'Ecologie Appliquée, 081 BP7088, Cotonou, Bénin*

*[d]Université d'Abomey-Calavi, Faculté des Sciences Agronomiques, 01 BP526, Cotonou, Bénin*

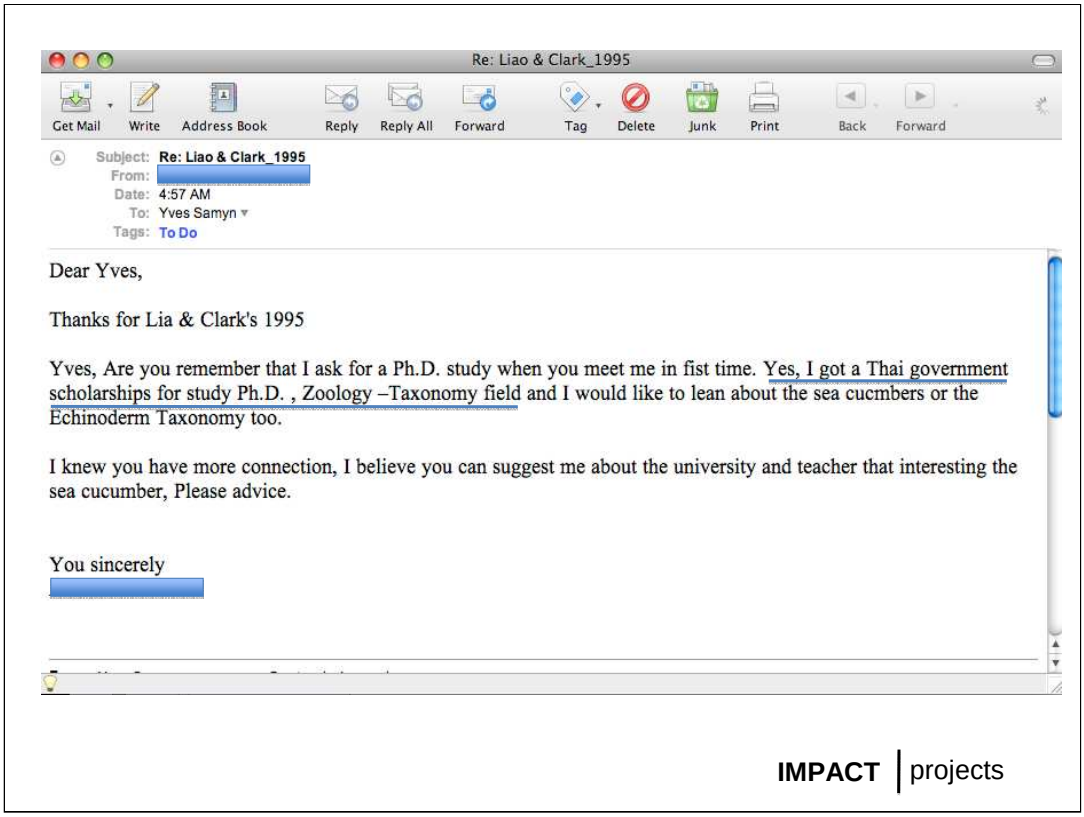
**IMPACT** | publications

Or the release of important ethnological knowledge….here on fungi (note again the authors!)

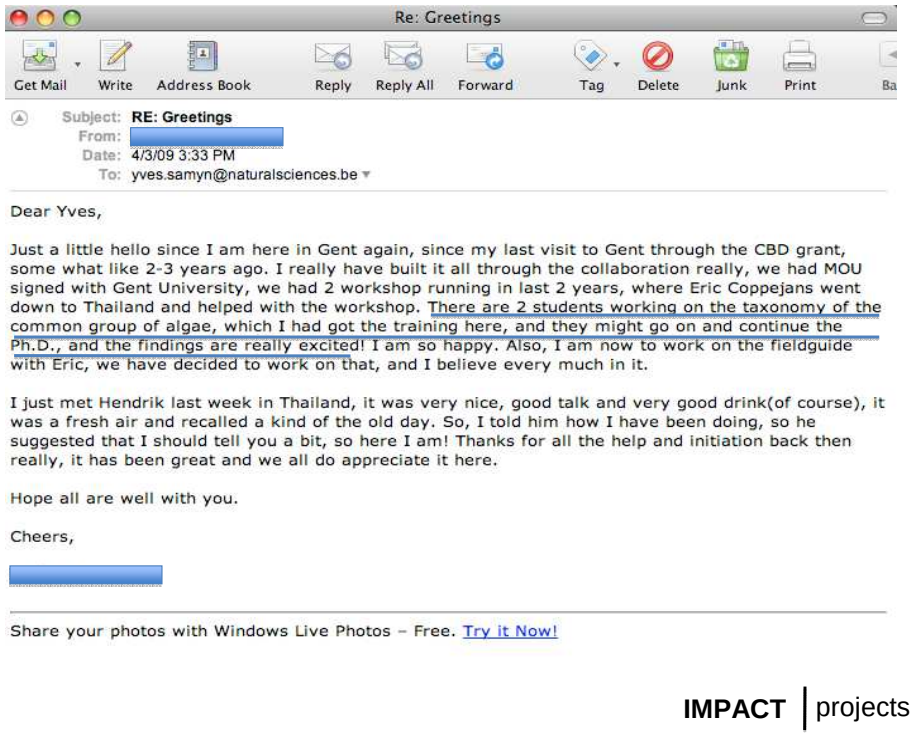



Also in terms of projects our program delivers results.

Here for instance a student from W. Africa notices us that he has been able to end and defend his PhD thesis, i.a., because the Belgian GTI granted him a bursary to do molecular systematics in Belgium




Or this one coming from a student in Tahialnd trained now 4 years ago. After successfully publishing a couple of taxonomic papers, she has managed to secure a PhD scholarship to perform echinoderm taxonomy.



Re: Greetings

Get Mail | Write | Address Book | Reply | Reply All | Forward | Tag | Delete | Junk | Print

Subject: **RE: Greetings**
From: [redacted]
Date: 4/3/09 3:33 PM
To: yves.samyn@naturalsciences.be

Dear Yves,

Just a little hello since I am here in Gent again, since my last visit to Gent through the CBD grant, some what like 2-3 years ago. I really have built it all through the collaboration really, we had MOU signed with Gent University, we had 2 workshop running in last 2 years, where Eric Coppejans went down to Thailand and helped with the workshop. There are 2 students working on the taxonomy of the common group of algae, which I had got the training here, and they might go on and continue the Ph.D., and the findings are really excited! I am so happy. Also, I am now to work on the fieldguide with Eric, we have decided to work on that, and I believe every much in it.

I just met Hendrik last week in Thailand, it was very nice, good talk and very good drink(of course), it was a fresh air and recalled a kind of the old day. So, I told him how I have been doing, so he suggested that I should tell you a bit, so here I am! Thanks for all the help and initiation back then really, it has been great and we all do appreciate it here.

Hope all are well with you.

Cheers,

[redacted]

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Another Thai student; this person has established a far-going partnership with the University of Ghent and now is stating o ave enough capacity to attract PhD students herself.

COOPÉRATION TECHNIQUE BELGE • BELGIAN TECHNICAL COOPERATION

Monsieur [redacted]
Université Officielle de Bukavu

BTC CTB EMPOWERING DEVELOPMENT

REPRESENTATION EN
REPUBLIQUE DEMOCRATIQUE DU CONGO
AVENUE COLONEL EBEYA 15/17
KINSHASA/GOMBE
T 081846011

DATE: 29 avril 2009
NOTRE REF. | OUR REF.: Bourses/jck/kma/09/0469
VOTRE RÉF. | YOUR REF.:

CONTACT: Jean-Claude KAKUDJI; Angèle KAPUNDU MOWA
E-MAIL CONTACT: jean-claude.kakudji@btcctb.org; mowa.kapundu@btcctb.org
TÉL. CONTACT | TEL. CONTACT: 081 715 01 21; 081 367 98 31

OBJET | RE: **Votre bourse de doctorat mixte.-**

Je vous informe que vous êtes attributaire d'une Bourse de doctorat mixte en Ecologie et Taxonomie des plantes de la part de l'Etat belge, à charge du programme 2009, sous réserve d'une confirmation de votre admission dans une université en Belgique par la Coopération Technique Belge(CTB) / Bruxelles.

Je vous prie d'entrer en contact avec la Coopération Technique Belge (CTB) / Kinshasa, dont vous trouverez les coordonnées ci-dessous, pour les formalités pratiques à cet effet :

- Monsieur Jean-Claude KAKUDJI
- Téléphone : 081 715 01 21
- E-mail : Jean-claude.kakudji@btcctb.org
- Adresse : 15/17, avenue Colonel EBEYA, KINSHASA/GOMBE

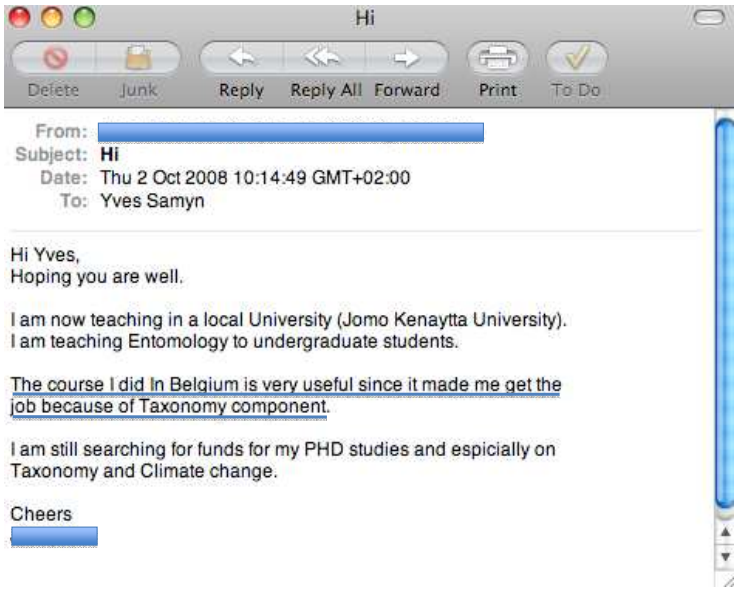
Je vous prie d'agréer, Madame, Monsieur, l'assurance de ma considération distinguée.

Manolo DEMEURE
Représentant Résident
**CTB/RDC**

ANNEXE(S) :

**IMPACT** | projects

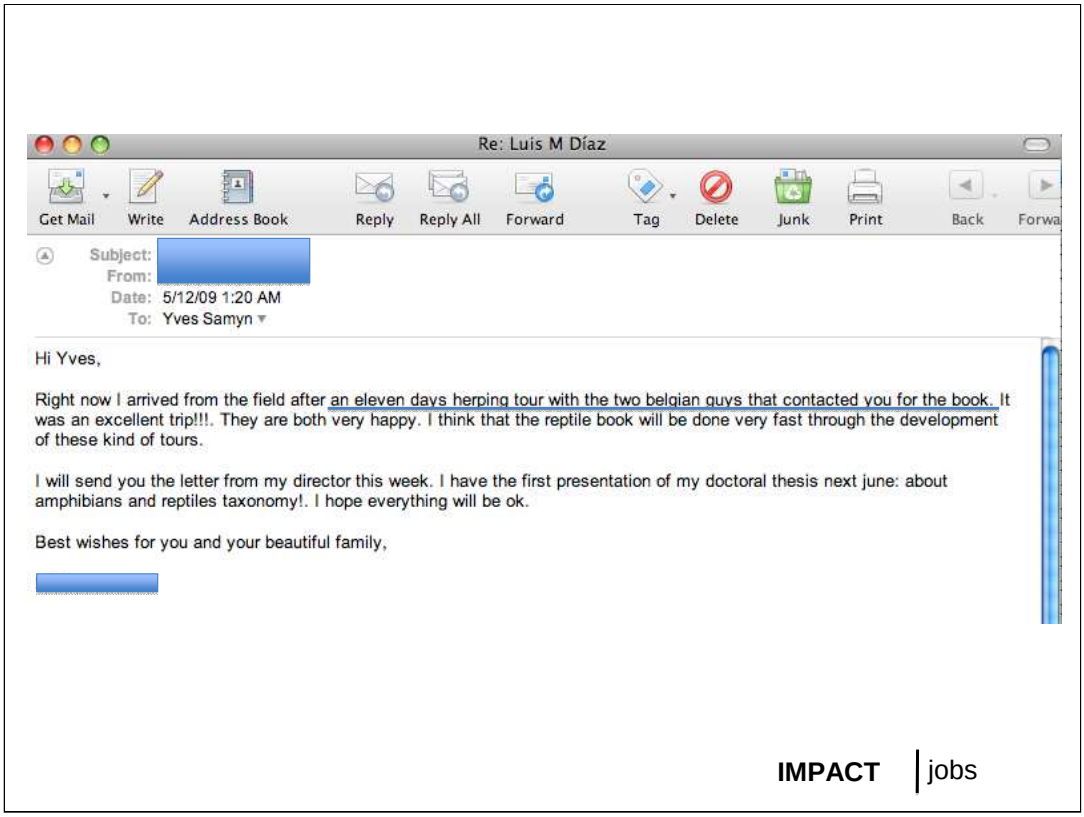
Or this PhD scholarship for a Congolese student; the Belgian GTI will cover a large part of the taxonomic part of the PhD project so as to achieve maximum complementarity.




**IMPACT** | jobs

Which brings us to jobs

For instance this Kenyan student who notifies us that he has been able to secure an academic position, ia, thanks to the taxonomic training he received from us.




Or this Cuban herpetologist who is now in contact with Belgian amateur taxonomists who want to use his expertise to take a so called herpetological tour


Here's for instance the announcement folder of such tours.


Or for birds.

But how did these amateur taxonomists get into contact with the Cuban specialist?


Well via Abc Taxa; our series of manuals that is dedicated to capacity building in taxonomy and collection management.

We have established this series  to make sure that the constructed taxonomic know how remains available to future generations, the Belgian GTI NFP has decided to start with a new series of manuals devoted to capacity building in taxonomy and collection management: *AbcTaxa*

There's this Chinese proverb that says that pictures tell more than 1000 words, so let's have a look…

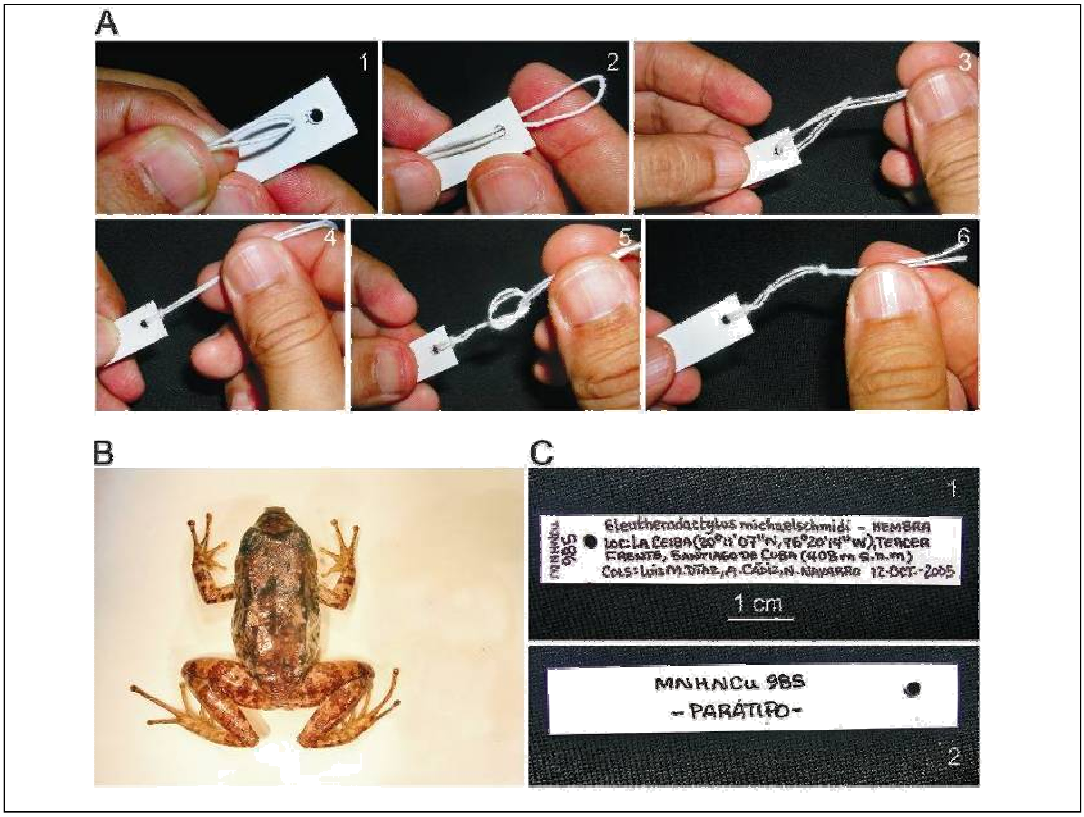

As Abc Taxa aims to accelerate taxonomic capacity building by clearing existing taxonomic know-how, each volume strives to provide a detailed state of the art needed to embark on the taxonomy of a particular living taxon. As such, each manuscript must at least include the following, preferably didactically illustrated, sections:

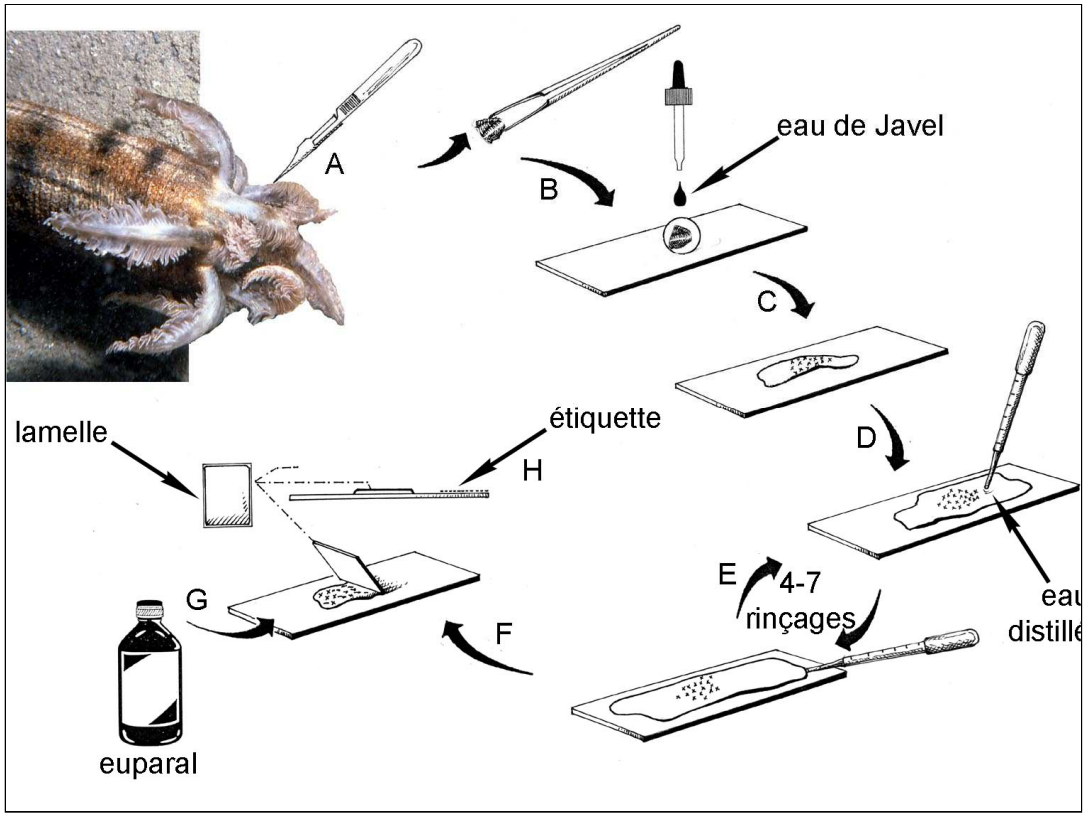
* an introduction to the general biology of the taxon;
* a description of the collecting methodologies commonly used for the taxon;
* a description of the curatorial methodologies commonly used for the taxon;
* a description of the characters employed in the taxonomy of the group;
* an outline of the current classification of the taxon;
* a guide to the identification of the members of the taxon in the region under study;
* a short list of key-references.


**Fig. 19.** Base camps. A. Basic base camp for short-time stays; B-C. Solid base camps for longer stays, note the separated "field lab" on photograph C (front); D. Tents on the summit of a tepui, note solar panels and 12 volts battery to provide electric power. (Photos by P. J. R. Kok).


**Búsqueda y Observación**

Cómo buscarlos?
Qué equipamiento usar?
Cómo transportarlos?
Cómo manipularlos?


A
1
2
3
4
5
6
B
C
MNHNCu 985
Eleutherodactylos michaelschmidi - HEMBRA
loc: La Cesba (20°11'07"N, 76°20'19"W), TENIENTE
CREMATE, SANTIAGO DE CUBA (408 m s.n.m.)
Cols: Luis M. Díaz, A. Cádiz, N. Navarro 12-OCT-2005
1 cm
MNHNCu 985
- PARÁTIPO -
1
2




Explicitation of taxonomical methodologies. Here how to isolate ossicles for microscopy from sea cucumber tissue.

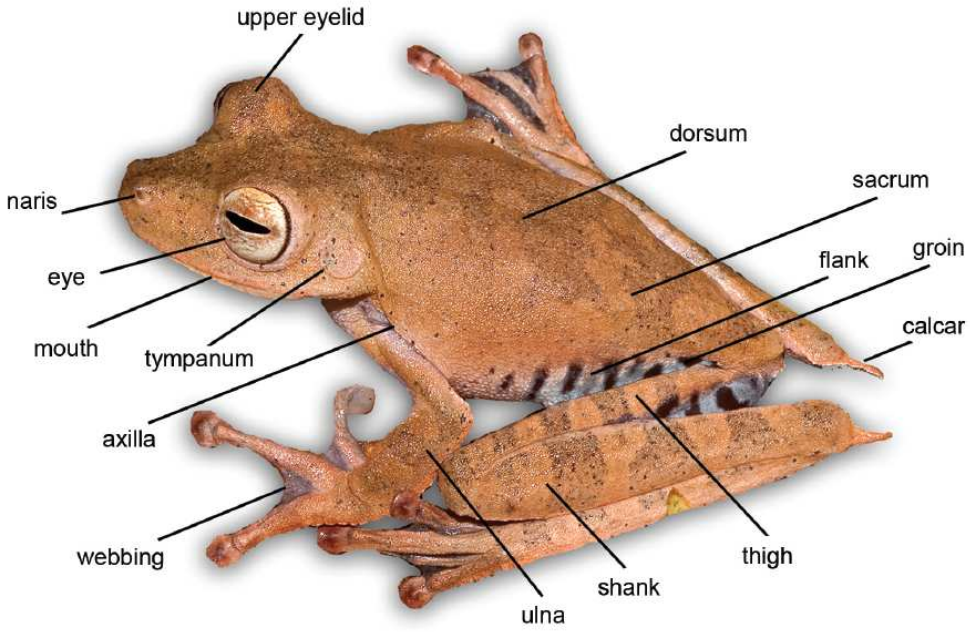



**Fig. 37.** An adult frog (*Hypsiboas calcaratus*, Hylidae) showing general morphology and features. (Photo by P. J. R. Kok).

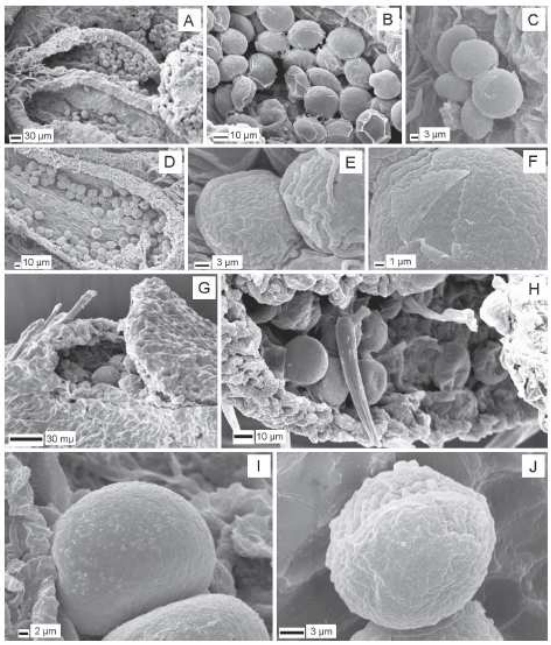
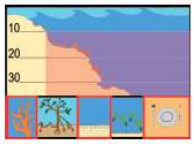



**Fig. 14** SEM micrographs of pollen grains. *Cryptocarya aschersoniana* Mez: A-B. *Klein 3960* (HBR); C, F. *Smith & Reitz 13266* (HBR); D-E. *Barbosa & Abe 397* (MBM). *Cryptocarya guianensis* Meissner: G. *Pires & Silva 1388* (Herbário Jari). *Cryptocarya mandioccana* Meissner: H. *Santos* 2811 (CEPEC); I. *Hatschbach 5175* (MBM). *Cryptocarya moschata* Nees & Martius: J. *Hoehne s.n.* (HB-53855). (Ridges – < – are due to shrivelled exine surface when dry). (Photomicrographs by author).


Correctly packing biological specimens for transport is crucial to avoid damage or loss of the material.

## *Holothuria (Microthele)* cf. *fuscogilva* Cherbonnier

1980 : 628, fig. 7A-L, pl IC.




Nom commercial: White teatfish, holothurie blanche à mammelles.

Nom local: Pain blanc.

Références: Cherbonnier, 1980: 628, fig. 7A-L (description en français), pl. 1C (photo noir et blanc); Massin, 1999: 33, figs 24a-e, 25a-k, 26a-d (description en anglais sous le nom de *H. (Microthele) nobilis*), 110g-h (photos couleur).

**Morphologie** - Holothurie de taille moyenne et en forme de pain. Tégument très épais, très dur et rugueux; bouche ventrale, entourée de 20 tentacules courts qui à leur tour sont entourés d'un cercle de papilles modifiées; anus terminal armé de 5 dents anales jaunâtres et relativement petites. De chaque côté du corps, 5-6 verrucosités portant chacune une papille distincte. Bivium avec de très petits podia et des papilles coniques, trivium uniformément couvert de podia bruns à jaunâtres. Organe de Cuvier absent.

**Coloration** - Couleur de fond blanchâtre piqueté de petits points foncés avec sur le dos de larges plages brunes. Le trivium a une couleur grisâtre sur lequel se détache les podia. Le pourtour de l'anus est généralement jaunâtre à brun. Les verrucosités des flancs blanches avec l'extrémité parfois brunes ou noires.

**Types de spicules** - Tégument avec tourelles basses et massives coiffées d'une couronne très épineuse; ellipsoïdes fenestrés; podia dorsaux et ventraux avec bâtonnets, plaques perforées, tourelles et ellipsoïdes.

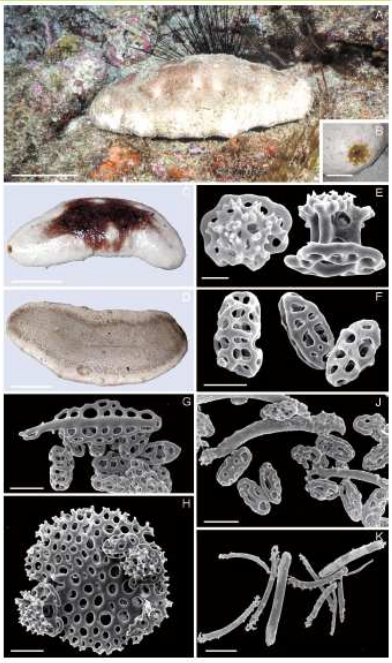
**Ecologie** - Cette espèce vit généralement entre 10 et 60 mètres de profondeur sur fond de sable grossier. Aux Comores, on ne la trouve quasi plus à des profondeurs inférieures à 20 m. Elle a été observée au voisinage d'Itsandra, et est présente partout où la pêche est peu importante.

**Distribution géographique** - Il est difficile de donner une répartition précise de cette espèce mais elle a été observée dans tout l'Archipel des Comores, au Kenya et en Afrique du Sud.

**Fig. 65.** *Holothuria (Microthele)* cf. *fuscogilva* Cherbonnier, 1980. A. Vue *in situ* d'un spécimen d' Afrique du sud; B. Détail des dents anales; C. Vue dorsale d'un spécimen des Comores photographié en aquarium; D. Vue ventrale d'un spécimen des Comores photographié en aquarium; E. Tourelles du tégument dorsal; F. Ellipsoïdes du tégument ventral; G. Plaque perforée et ellipsoïdes de la paroi d'un podion ventral; H. Plaque terminale, tourelles et un ellipsoïde de la paroi d'un podion; J. Bâtonnets et ellipsoïdes de la paroi d'un podion ventral; K. Bâtonnets des tentacules. Echelle A, C et D = 10 cm; B = 3 cm; E= 20 µm; F = 30 µm; G-J = 50 µm; K = 100 µm. (Photo A de Bruno Van Bogaert; B-D de Yves Samyn, E-J de Didier VandenSpiegel)





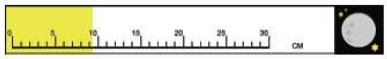





The last part holds easy to use, very visual  field-like guide, identification sheets of the fauna encountered in that location.

## *Trachycephalus resinifictrix* (Goeldi, 1907)

1907: 135, figs 56-57.



ENGLISH NAME: Kunawalu casque-headed treefrog.

LOCAL NAME (PATAMONA): Kunawa.

TYPE LOCALITY: "Mission of San Antonio do Prata, at the River Macaraná" [Brazil].

SELECTED REFERENCES: Zimmerman & Hödl, 1983 (call description, natural history, colour patterns, B&W drawing, distinction from *Trachycephalus venulosus*, in English); Lescure *et al.*, 1996 (description, natural history, colour photos, in French); Lescure & Marty, 2001 (brief description, natural history, colour photo, in French).

**Field identification** - Males reach 83.8 mm SVL, females 93.7 mm.

- Dorsal ground colour dark brown, with one large whitish, tan or greenish brown blotch narrowly outlined with a creamy border on the flank and another on the top of the head, the latter often having the shape of a triangle; skin on dorsum tuberculate (tubercles usually with white tip), thick, glandular.
- Ventral surface granular, greenish white to light brown.
- Supratympanic glandular fold not covering the upper part of the tympanum.
- Skin on flanks tuberculate, never areolate.
- No black spot at arm insertion.
- Iris golden with four radiating black lines (a black "Maltese cross").
- Fingers half-webbed, finger webbing greenish blue.
- Toes 3/4 webbed, toe webbing greenish blue.

**Life history** - Nocturnal, arboreal. Observed only in primary forest. Males call exclusively from water-filled cavities in hollow trunks or branches, at heights between 2.2-32 m (usually between 10-20 m). Eggs are deposited as a gelatinous mass in water-filled treeholes; tadpoles feed on conspecific eggs and detritus.

**Call** - First described by Zimmerman & Hödl (1983: 343), who provided spectrograms. It consists of 3-4 loud barklike notes, produced at a rate of about 4 calls/min according to Lescure & Marty (2001).

**Tadpole** - First described by Hero (1990: 239); see also Grillitsch (1992: 53) and Schiesari *et al.* (1996: 115). Exotroph, arboreal; dark olive; LTRF = 2(2)/3-5.

**Abundance and distribution in KNP** - Common, heard around main sampling localities # 5, 8, 9, 10, 11, 12 and 13 (see Fig. 3).

**Geographic range** - Widespread from eastern Ecuador, Peru and northern Bolivia through the Amazon Basin to the Guiana Shield.

**Remark** - Photos in figure 132 are of a specimen from Manaus, Brazil.





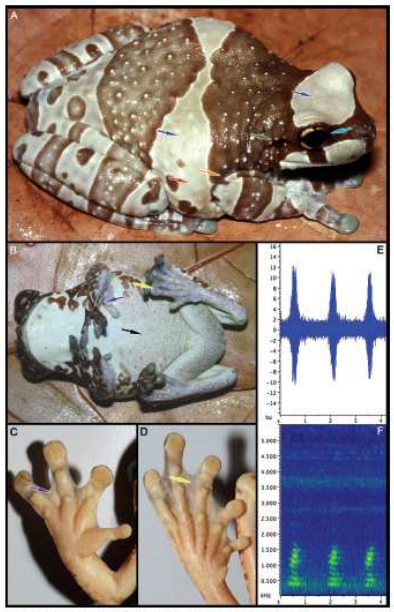



**Fig. 132**. *Trachycephalus resinifictrix* (Goeldi, 1907). A. Dorsolateral view. B. Ventral surface in life. C. Palm (preserved specimen). D. Sole (preserved specimen). E. Call, oscillogram. F. Call, spectrogram. (Photos by K. H. Jungfer).


More on: www.abctaxa.be


The first volume is already out; the second volume is currently with the printer; the third volume is being edited as we speak; many other volumes (on amphibians, on worms, on algae,…) are in preparation

***More volumes in preparation:***

Marine Algae from Sri Lanka

Worms from Morocco

Bee genera from Africa

Terrestrial molluscs from East Africa

Sponges from Peru

Mushrooms from DR Congo

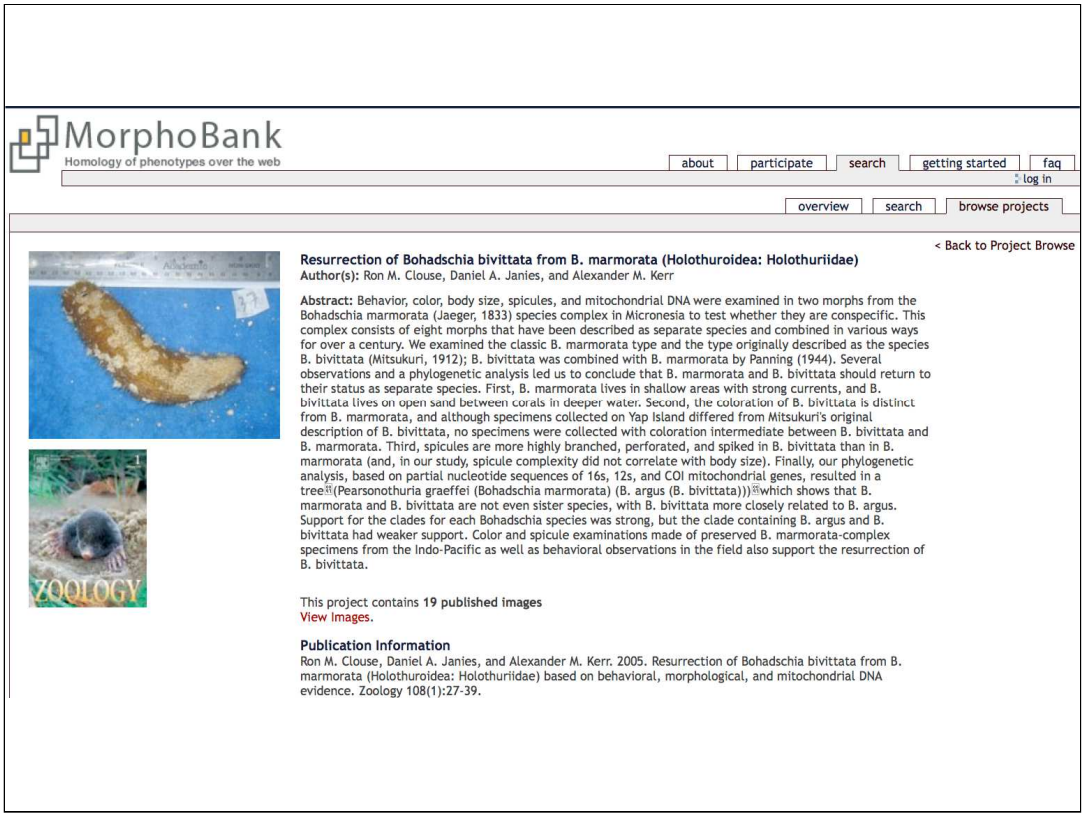
Reptiles from Cuba

…

Good practices in ATBI

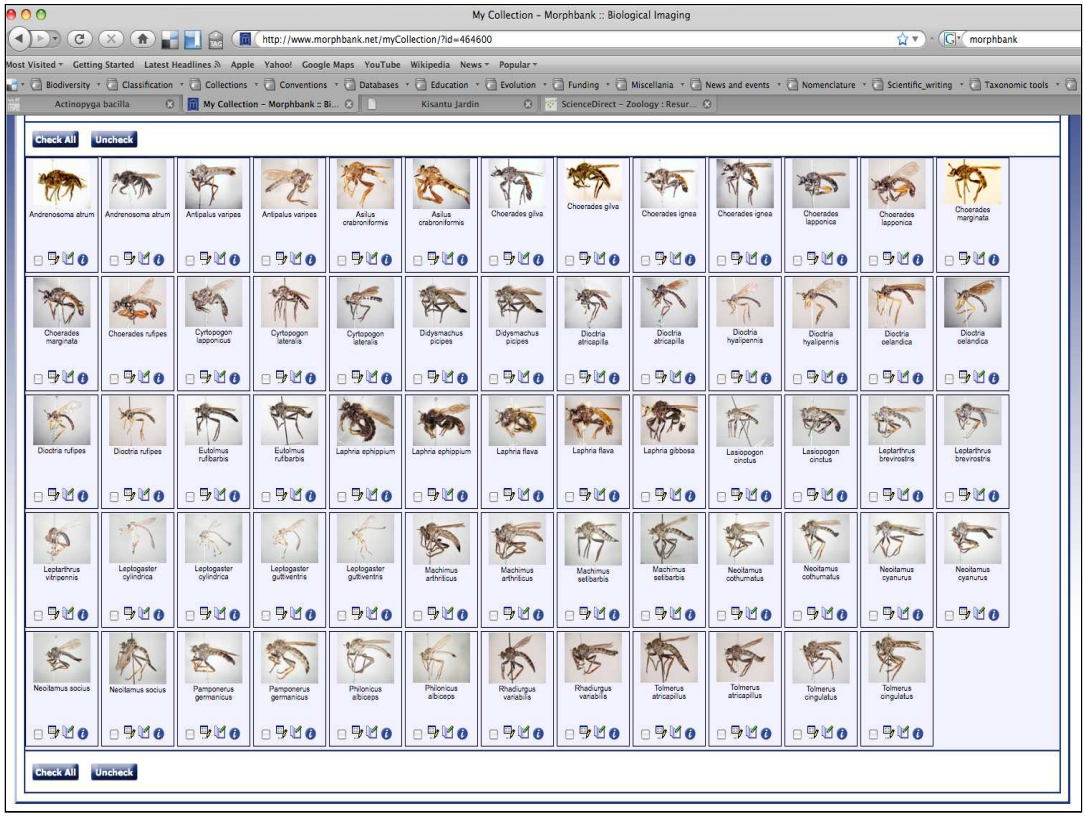
More volumes are in preparation…

a.o. one jointly funded by the Belgian GTI and EDIT

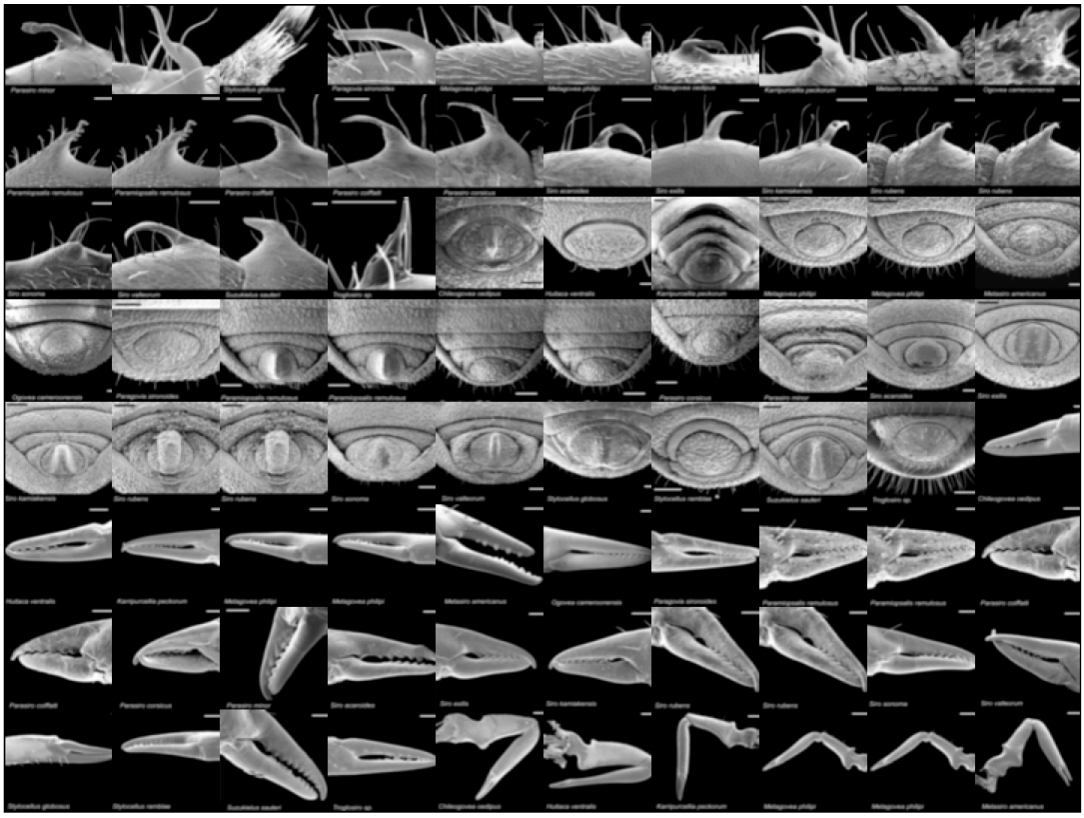



Abc Taxa intends to be largely complementary with specialists initiatives as Morphobank, an online database to store images (including films and CT scans) submitted by scientists, and allows contributors to label anatomical structures on the images. MorphoBank records information on the author of the submission, related publications, critical commentary and species names.

MorphoBank's most important innovation is that it is a web application for conducting phylogenetics or cladistics research on morphology. It enables teams of scientists who use anatomy to study the Tree of Life (phylogeny) to work over the web - in real time - and to do research they could not easily do using desktop programs alone. MorphoBank displays - over the web - dynamic phylogenetic matrices of morphological characters with labeled images demonstrating homology statements, and implements the data editing functions of widely used desktop programs (e.g., Mesquite, Nexus Data Editor) over the web in a password protected environment. It is an environment for virtual collaboration by teams of researchers building phylogenetic matrices with affiliated image data. MorphoBank can also draw on images in existing 2D and 3D digital libraries.




Or Morphbank which is a continuously growing database of images that scientists use for international collaboration, research and education. Images deposited in Morphbank document a wide variety of research including: specimen-based research in comparative anatomy, morphological phylogenetics, taxonomy and related fields focused on increasing our knowledge about biodiversity. The project receives its main funding from

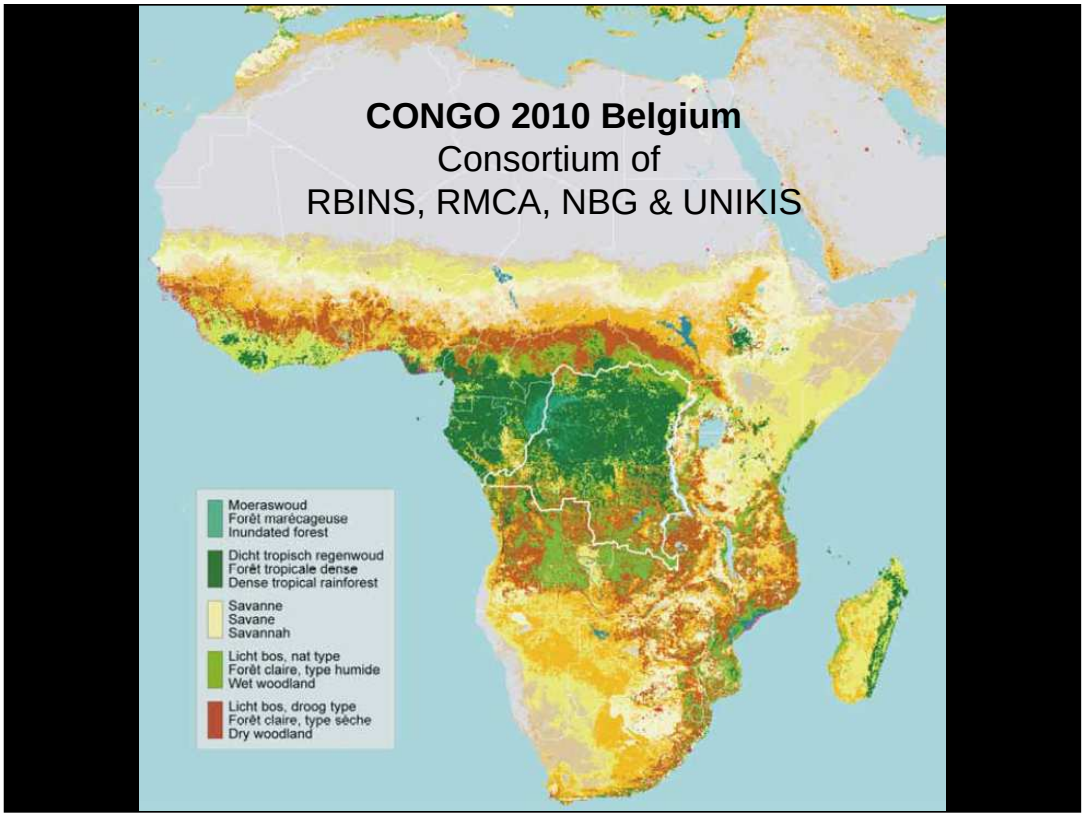


Another picture set

SOME OTHER FLAGSHIP BELGIAN CAPACITY BUILDING INITIATIVES IN THE FIELD OF TAXONOMY & COLLECTION MANAGEMENT




To end with this presenation, I will detail a couple of other Belgian capacity building initiatives as carried out by the three main taxonomic institutions in Belgium




Perhaps the most visible is the Congo 2010 Belgium project.

Congo 2010 Belgium is a consortium of Belgium's three main natural history museums and the University of Kisangani.

The aim is to make an up to date inventory of the fauna and the flora of the Congo river in 2010; 2010 being the international year of biodiversity and the year in which Congo celebrates its 50 years of independence.


The expedition would sample from Kisangani to Kinshasa.

The team doing the research will be not only biologists, but also geologists, antropologists and other scientific

## PART ONE

### *Biodiversity Training Component*

Training in Belgium
Training in Kisangani
Preliminary expedition

### *Sponsoring:*

Belgian Development Cooperation
Flanders-UNESCO Science Trust Fund
Other isolated sponsors

**PART TWO**

***Congo 2010 Expedition***

Belgian experts
Congolese experts
Full-scale multidisciplinary expedition

***Sponsoring:***

Belgian Development Cooperation
Foreign Policy Office (pending)
Other (negociating)

**PART THREE**

***Establishment of the***
**Centre de recherche de la biodiversité**
***in UNIKIS***

Collections
Expertise
Collaborations

***Sponsoring****:*

Belgian Development Cooperation
Foreign Policy Office (pending)
Other (negociating)

African Biodiversity Information Center (ABIC)

- zoological collection
- xylarium

http://www.metafro.be

Training in Fish Taxonomy and Fishbase

Training in fruitfly taxonomy and collection management

The scientific research institute of the Royal Museum for Central Africa in Tervuren, a federal institution that employs around 75 scientists in the fields of cultural anthropology, zoology, geology, history and agriculture and forest economy, has several capacity building initiatives running.

The African Zoology Department with its unique zoological collection of more than 10 million specimens from central Africa (more than 80% from Congo, Rwanda and Burundi) each year issues scholarships to facillitate access to these collections and dissiminate collection-based information through the internet (http://www.metafro.be/).

The RMCA also is home to the second most important wood collection of the world with more than 60.000 wood specimens and 14.000 different types of wood. It is an essential reference center with a huge amount of documentation on wood and tropical trees. The specimens are used for taxonomic research as well as for research on the ecological indicators which can be found in their anatomic characteristics. The collections contain an enormous wealth of biodiversity information and their historic component allows the study of changes in biodiversity (age structure of tree populations, link between growth and climate,…).

The Ichthyology department of the RMCVA each year torganises a training session on "fish taxonomy and the use of FishBase" for 5 African scientists, alternately in French and English. This training consists of three main parts: Fish Taxonomy, FishBase and a Case Study.

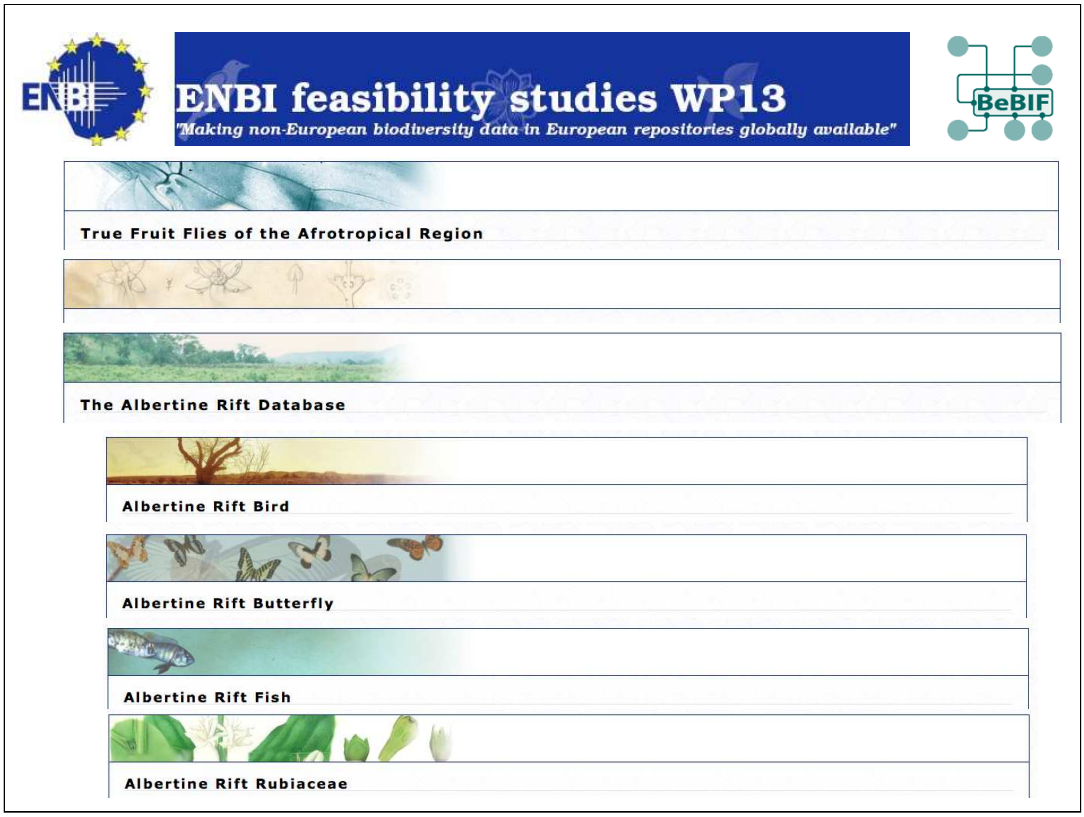
The Entomology Department finally offers a two-yearly two-week training in fruitfly taxonomy and collecion management for 10 African students

botanicgarden.be

Restoration of the botanic gardens of Kisantu and Kinshasa (DR Congo)

Rehabilitation and digitization of the herbaria of Kinshasa, Bujumbura and Yangambi (DR Congo)

Digitization of the *Flore d'Afrique Centrale*

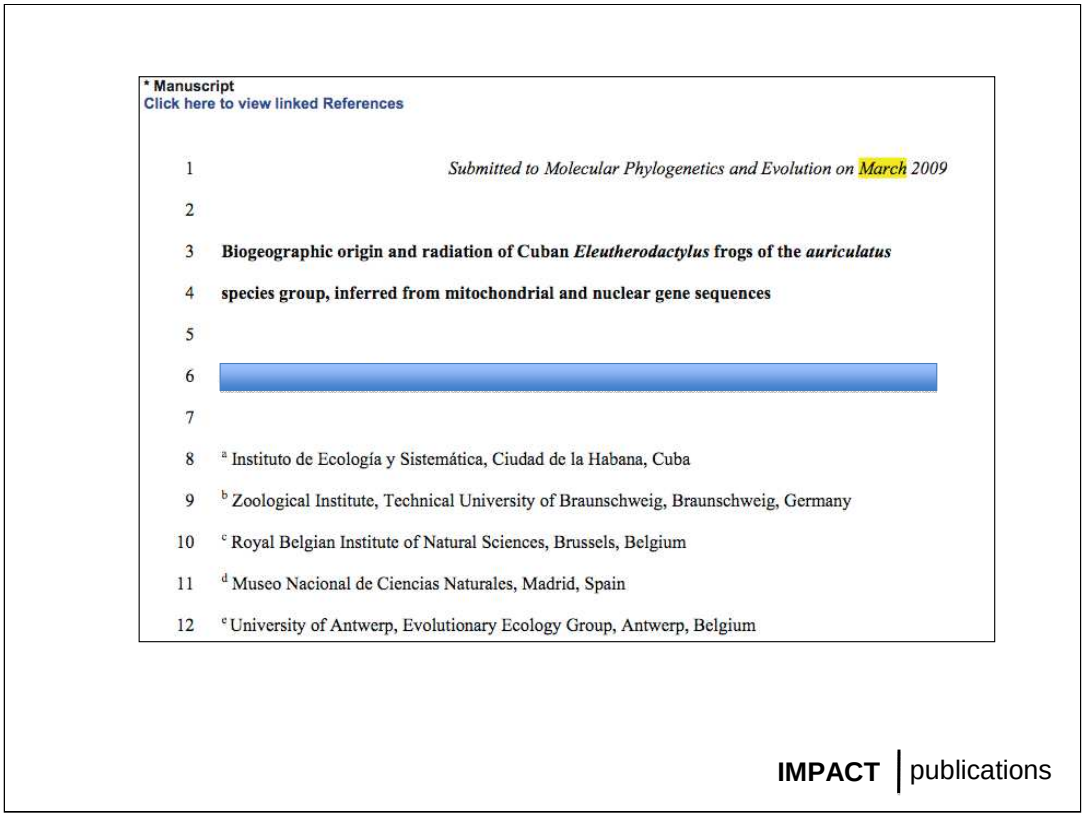



The Belgian Node to the GBIF successfully participated to ENBI WP13 on making non-European biodiversity data in European repositories globally available


BeBif is since a couple of years part of the Belgian Biodiversity Platform which continues the efforts to make primary biodiversity data and biodiversity research information available of the net. It supports small projects of digitization of biodiversity related collections/observational data; for instance:

- Biodiversity information on the Paraguyan Ants from the Dry Chaco


And finally we have some other initiatives…some more modest in scale, like JEMU (the joint Experimental Molecular Unit) of the RBINS and the RMCA. In this project staff members of RBINS and RMCA can get logistic and financial support to carry out molecular systematics, eventually in partnership with researcher from developing countries.



* Manuscript
Click here to view linked References

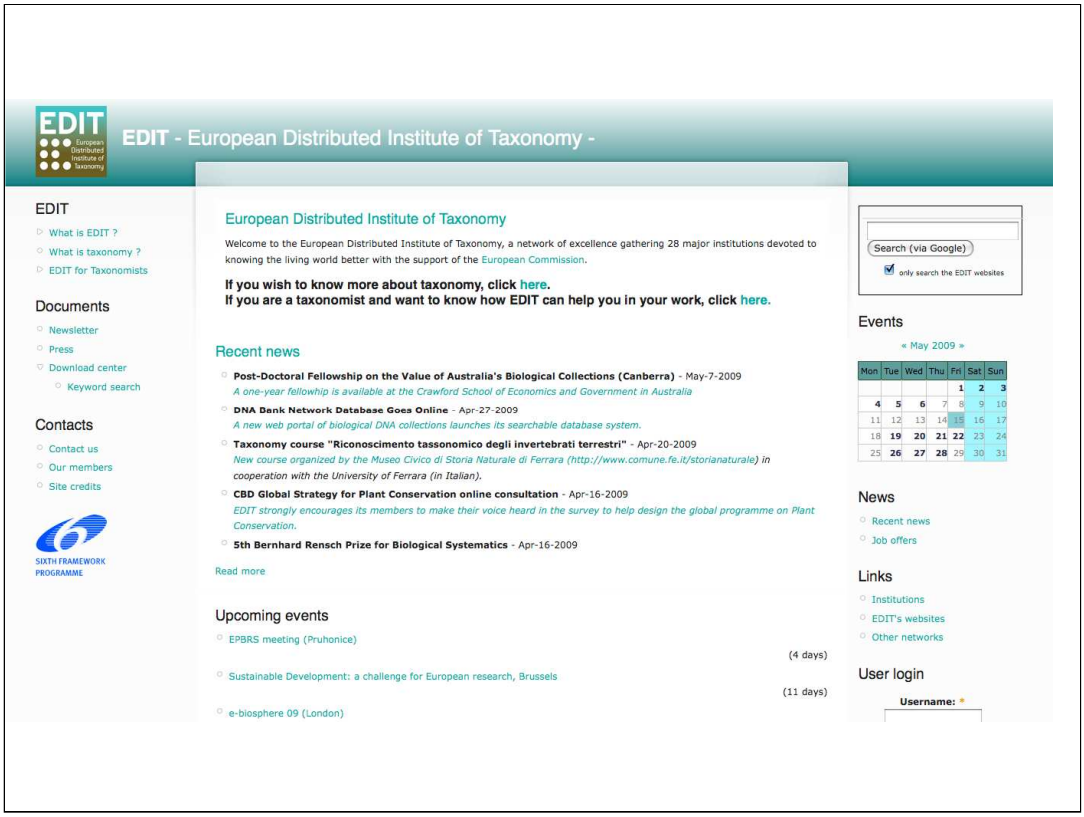
*Submitted to Molecular Phylogenetics and Evolution on March 2009*

**Biogeographic origin and radiation of Cuban *Eleutherodactylus* frogs of the *auriculatus* species group, inferred from mitochondrial and nuclear gene sequences**

[a] Instituto de Ecología y Sistemática, Ciudad de la Habana, Cuba
[b] Zoological Institute, Technical University of Braunschweig, Braunschweig, Germany
[c] Royal Belgian Institute of Natural Sciences, Brussels, Belgium
[d] Museo Nacional de Ciencias Naturales, Madrid, Spain
[e] University of Antwerp, Evolutionary Ecology Group, Antwerp, Belgium



Such was for instance the case with the first author of this paper




And finally, I briefly want to mention that the BE-TAF is also involved in EDIT, and this for WP 8: training and public awareness

# RECOMMENDATIONS

- Mainstream taxonomic capacity building in biodiversity research & conservation projects
- Enhance sustainability in taxonomic capacity building
- Push to attain taxonomic Nirvana


JUST DO IT.

Photo credits

P. Martin, E. Verheyen, Ph Kok, Ph. Willenz, Y. Hooker, D. VandenSpiegel, Y. Samyn, L. Diaz, P. de Moraes, E. Coppejans, A. de Kesel, RMCA, NBGB, RBINS