



## Biodiversity & Human Innovation

Paul Oldham

One World Analytics & IAS UNU

Image: GBIF sample distribution data for species appearing in the United States Patent Collection

# Biodiversity and Innovation

Human societies around the world depend on biodiversity for their livelihoods and welfare. In many cases their identities as people are tied up with their understandings of their relationship with the environment.

This slide shows members of the Piaroa from the mid-Orinoco River Basin next to the Autana tepui.

Biodiversity is thus central to human innovation. But, the question is how do we make this visible?





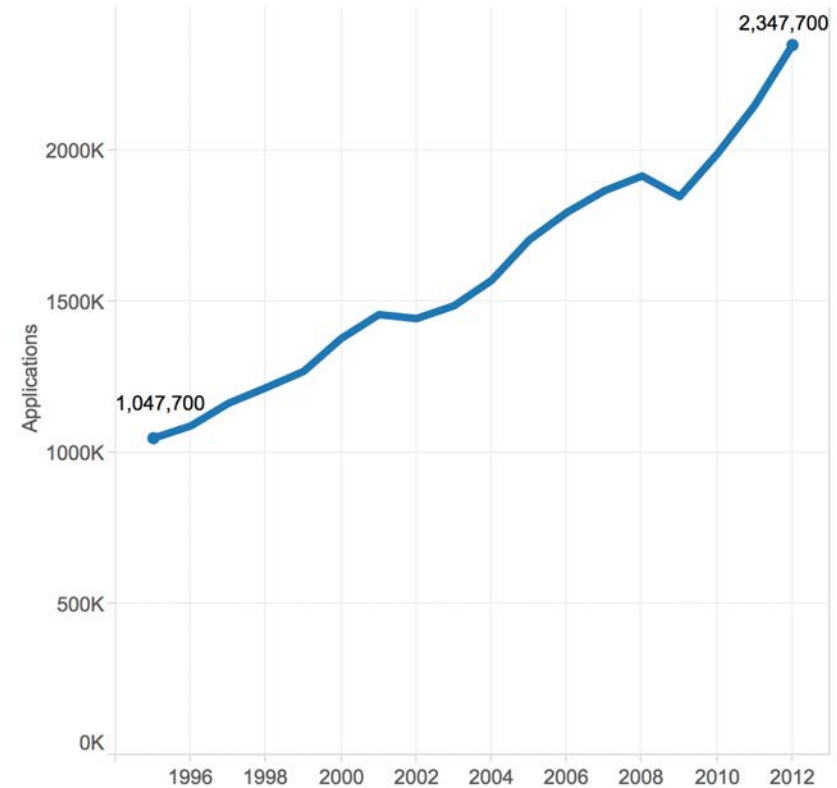
# Biodiversity and Intellectual Property

The last 20 years have witnessed growing awareness of the importance of biodiversity for indigenous and local communities and of traditional knowledge for the conservation of biodiversity and for sustainable development.

However, the wider role of biodiversity and traditional knowledge in the formal innovation system represented by intellectual property and patents has remained opaque and controversial.

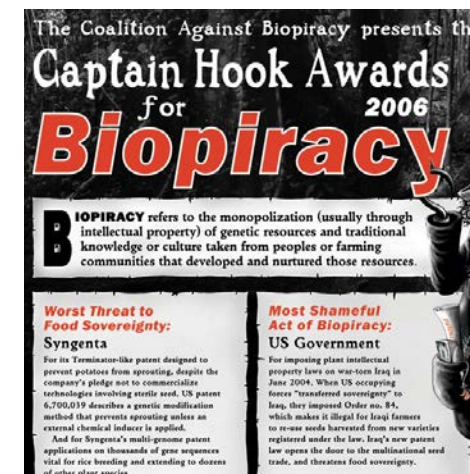
Using GBIF, EOL and CoL data we set out to identify biodiversity and traditional knowledge in the global patent system.

Global Trends in Patent Applications (WIPO 2013)



## About the ICBG Program

The ICBG Program addresses the interdependent issues of drug discovery, biodiversity conservation, and sustainable economic growth. Efforts to examine the medicinal value of the earth's biodiversity, including plants, animals and microorganisms are underway, since enduring habitat destruction and the resulting diminishment of



Bioprospecting

Biopiracy

metatetranychus ulmi:EP0000014A1//19781220:des  
 tetranychus urticae:EP0000014A1//19781220:des  
 tetranychus urticae:EP0000014A1//19781220:des  
 fusarium dendriticum:EP0000017A1//19781220:des  
 erysiphe graminis:EP0000017A1//19781220:des  
 erysiphe graminis:EP0000017A1//19781220:des  
 erysiphe graminis:EP0000017A1//19781220:des  
 podosphaera leucotricha:EP0000018A1//19781220:des  
 podosphaera leucotricha:EP0000018A1//19781220:des  
 alternaria mali:EP0000019A1//19781220:des  
 alternaria solani:EP0000019A1//19781220:des  
 alternaria kikuchiana:EP0000019A1//19781220:des  
 botrytis cinerea:EP0000019A1//19781220:des  
 cochliobolus miyabeanus:EP0000019A1//19781220:des  
 colletotrichum lagenarium:EP0000019A1//19781220:des  
 erwinia aroideae:EP0000019A1//19781220:des  
 glomerella cingulata:EP0000019A1//19781220:des  
 diaportha citri:EP0000019A1//19781220:des  
 mycosphaerella musicola:EP0000019A1//19781220:des  
 pellicularia sasakii:EP0000019A1//19781220:des  
 pellicularia filamentosa:EP0000019A1//19781220:des  
 plasmopara viticola:EP0000019A1//19781220:des  
 podosphaera leucotricha:EP0000019A1//19781220:des

**Species  
Match**

**Patent  
Identifier**

Index Repositories Name Parser

**gni** Global Names Index BETA  
 Scientific Names Exchange (about)

**Index of Scientific Names**  
 Index of scientific names provided by all Name Repositories (17,275,622 name strings total)

ABCDEFGHIJKLMNOPQRSTUVWXYZ



Lancaster High End Computing (HEC) facility



# Biological Diversity in the Patent System

Paul Oldham , Stephen Hall, Oscar Forero

Published: November 12, 2013 • DOI: 10.1371/journal.pone.0078737 • Featured in PLOS Collections

## Article

## About the Authors

## Metrics

## Comments

## Related Content

## Download PDF

## Print

## Share



Included in the  
Following Collection

Text Mining

## Subject Areas

Biodiversity

Conservation science

Genetic engineering

Health services rese...

Human genetics

Intellectual property

## Abstract

### Introduction

### Methods

### Results

### Discussion

### Conclusion

### Supporting Information

### Acknowledgments

### Author Contributions

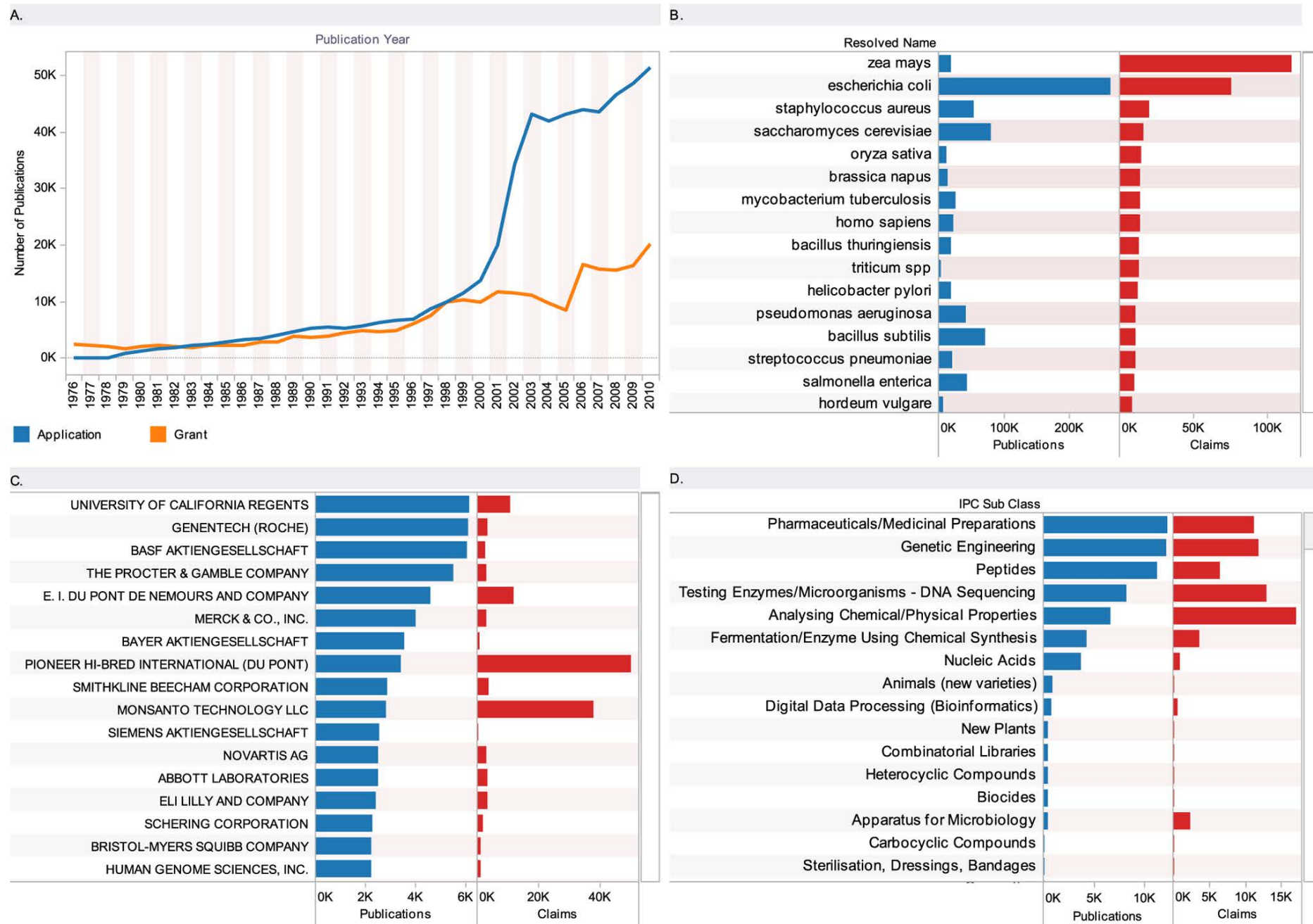
### References

## Reader Comments (0)

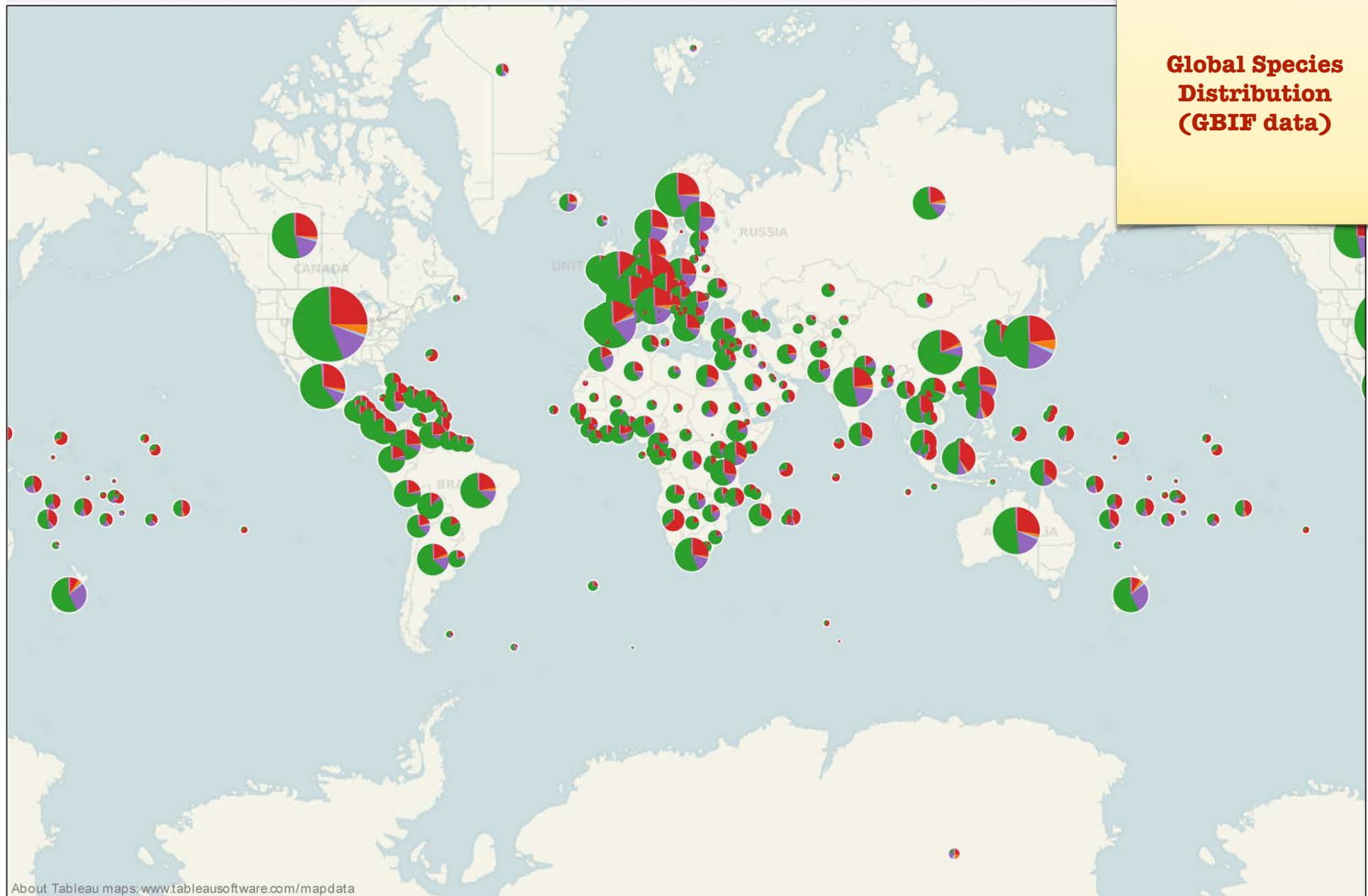
## Figures

## Abstract

Biological diversity in the patent system is an enduring focus of controversy but empirical analysis of the presence of biodiversity in the patent system has been limited. To address this problem we text mined 11 million patent documents for 6 million Latin species names from the *Global Names Index* (GNI) established by the Global Biodiversity Information Facility (GBIF) and Encyclopedia of Life (EOL). We identified 76,274 full Latin species names from 23,882 genera in 767,955 patent documents. 25,595 species appeared in the claims section of 136,880 patent documents. This reveals that human innovative activity involving biodiversity in the patent system focuses on approximately 4% of taxonomically described species and between 0.8–1% of predicted global species. In this article we identify the major features of the patent landscape for biological diversity by focusing on key areas including pharmaceuticals, neglected diseases, traditional medicines, genetic engineering, foods, biocides, marine genetic resources and Antarctica. We conclude that the narrow focus of human innovative activity and ownership of genetic resources is unlikely to be in the long term interest of humanity. We argue that a broader spectrum of biodiversity needs to be opened up to research and development based on the principles of equitable benefit-sharing, respect for the objectives of the Convention on Biological Diversity, human rights and ethics. Finally, we argue that alternative models of innovation, such as open source and commons models, are required to open up biodiversity for research that addresses actual and neglected areas of human need. The



**Global Species  
Distribution  
(GBIF data)**

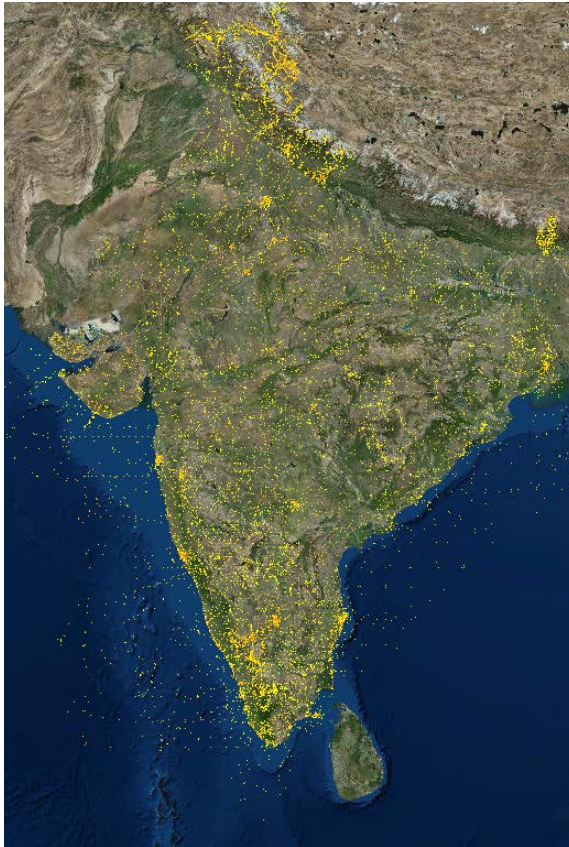


Key

Animalia	Archaea	Bacteria	Chromista	Fungi	Plantae	Protozoa	Unknown
----------	---------	----------	-----------	-------	---------	----------	---------

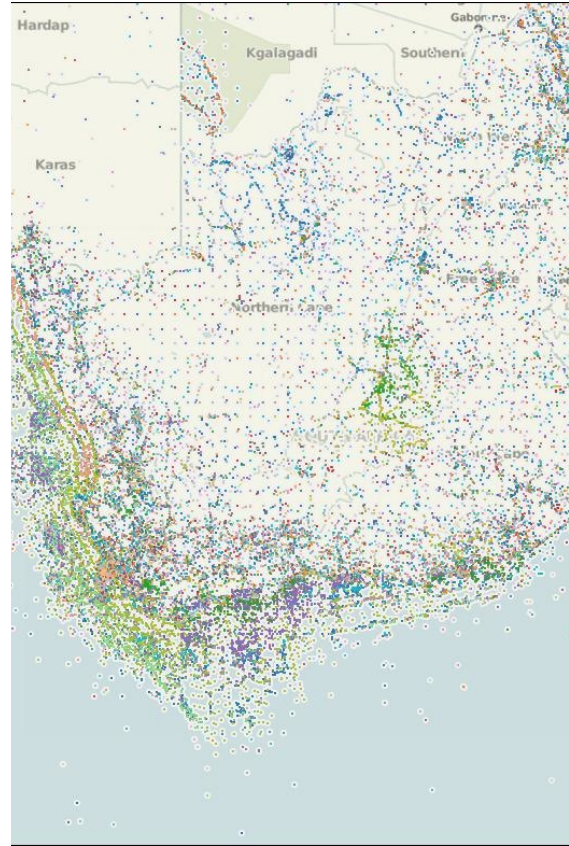
Oldham, Hall & Forero (2013) 'Biological Diversity in the Patent System'. PLOS One.





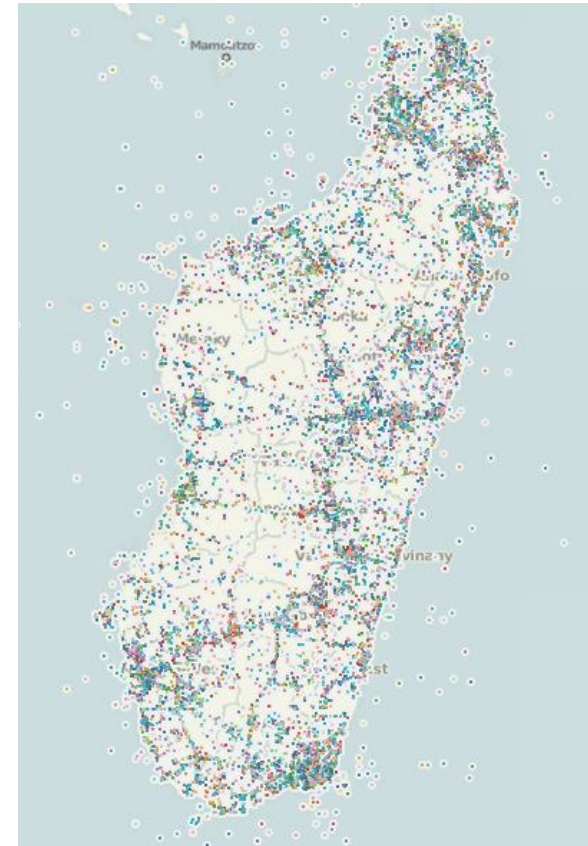
## India

398,036 Georeferenced  
records



## South Africa

10,772,138  
Georeferenced records

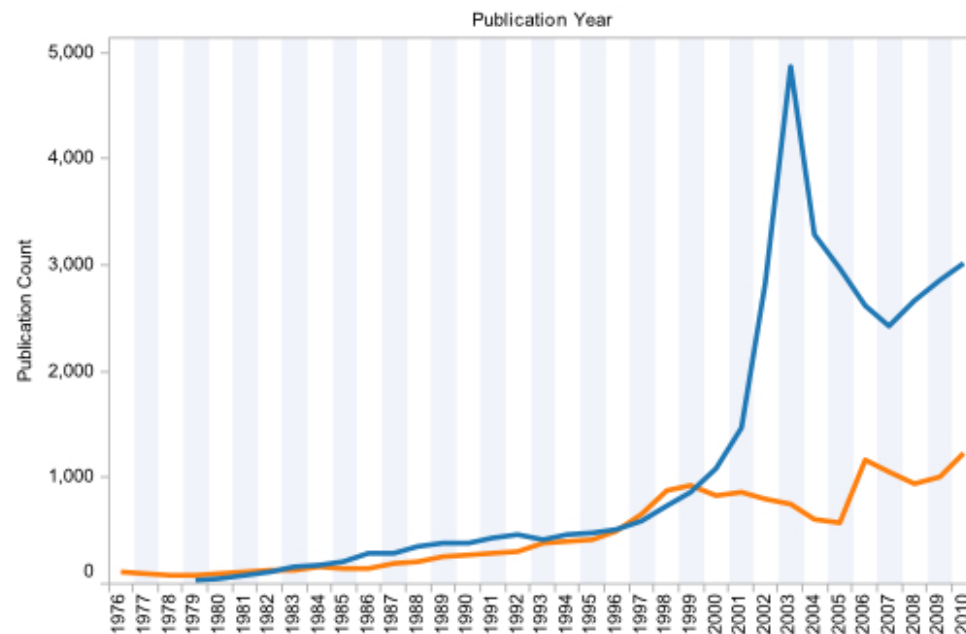


## Madagascar

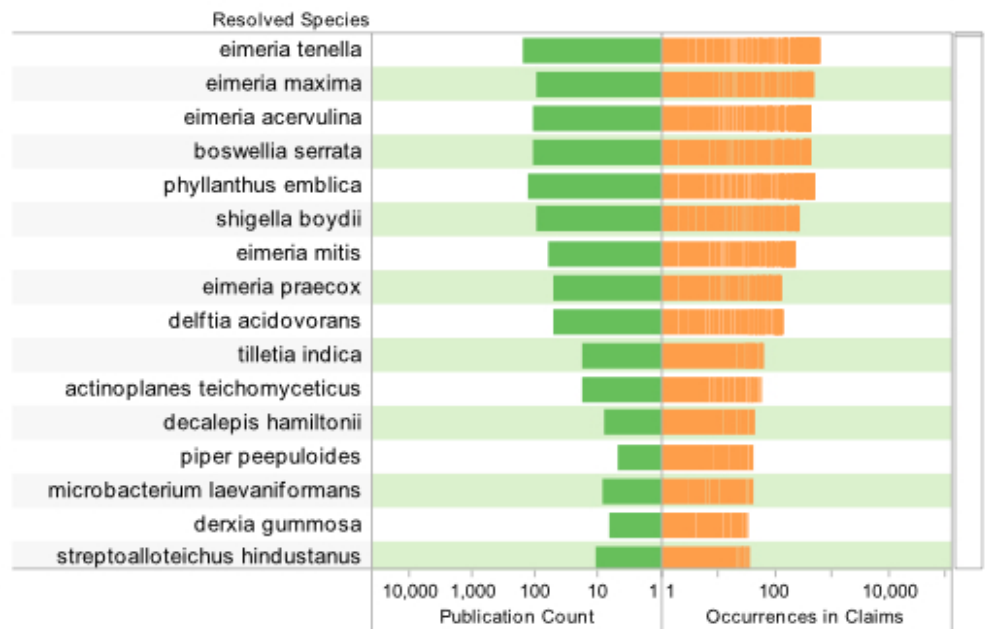
935,135 Georeferenced  
records



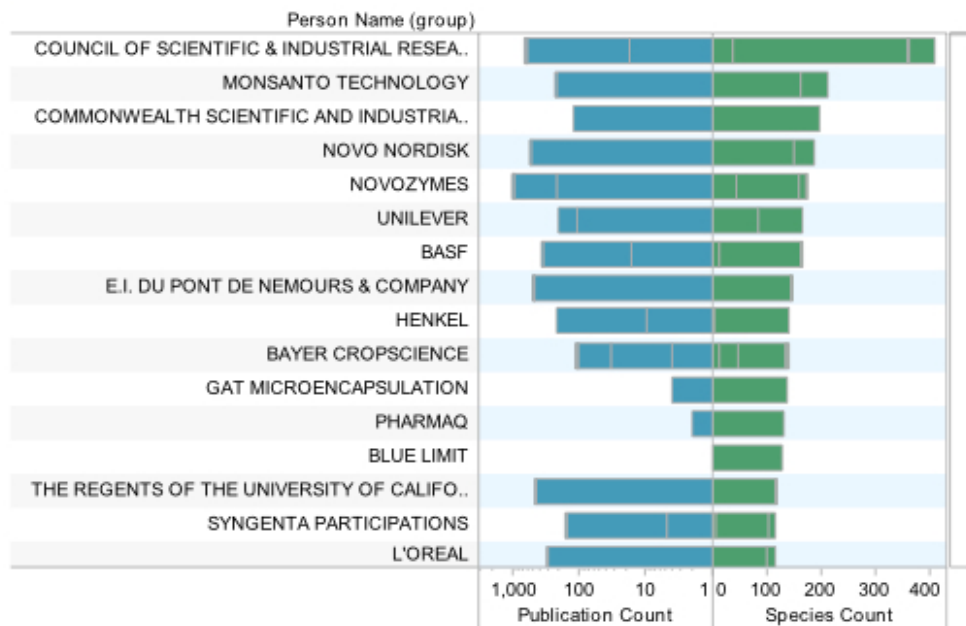
## Publication Trends



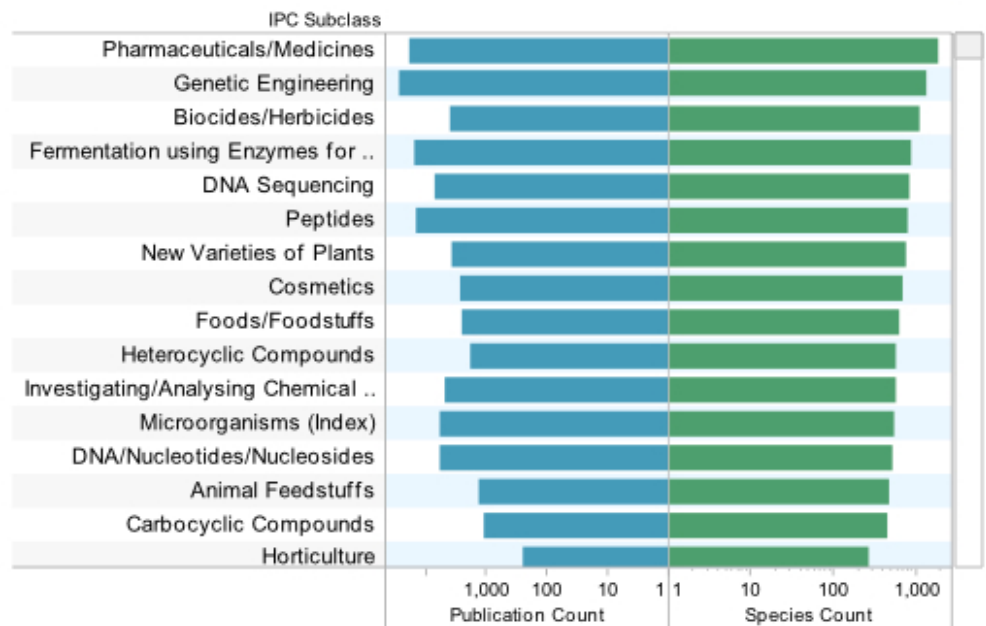
## Species



## Who?



## Classification









◀ About Espacenet Other EPO online services ▼

Search

Result list



My patents list (0)

Query history

Settings

Help

Refine search → Results → WO2010119294 (A2)

WO2010119294 (A2)

**Bibliographic data**

Description

Claims

Mosaics

Original document

Cited documents

Citing documents

INPADOC legal status

INPADOC patent family

**Quick help**

- [What does A1, A2, A3 and B stand for after a European publication number?](#)
- [What happens if I click on "In my patents list"?](#)
- [What happens if I click on the "Register" button?](#)
- [Why are some sidebar options deactivated for certain documents?](#)
- [How can I bookmark this page?](#)
- [Why does a list of documents with the heading "Also published as" sometimes appear, and what are these documents?](#)
- [Why do I sometimes find the abstract of a corresponding document?](#)
- [What happens if I click on the red "patent translate" button?](#)

## Bibliographic data: WO2010119294 (A2) — 2010-10-21

★ In my patents list   ➤ EP Register   📄 Report data error

🖨️ Print

### COMPOSITION

**Page bookmark**   [WO2010119294 \(A2\) - COMPOSITION](#)

**Inventor(s):**   FIELDS RONALD [GB] ±

**Applicant(s):**   RON FIELDS NUTRITION [GB]; FIELDS RONALD [GB] ±

**Classification:**   - international: **A61K45/06**

- cooperative: [A61K36/185](#); [A61K36/19](#); [A61K36/28](#); [A61K36/48](#); [A61K36/59](#); [A61K36/81](#); [A61K36/85](#); [A61K36/9068](#) → [more](#)

**Application number:**   WO2010GB50632 20100416

**Priority number(s):**   [GB20090006548](#) 20090416

**Also published as:**   📄 [WO2010119294 \(A3\)](#)   📄 [GB2469577 \(A\)](#)

### Abstract of WO2010119294 (A2)

Translate this text into

Albanian



**patenttranslate**

powered by EPO and Google

The invention provides a composition for oral administration comprising as active ingredient a combination of material derived from the plants *Andrographis paniculata*, *Tinospora Cordifolia*, *Eclipta alba*, *Tephrosia purpurea*, *Vitex negundo*, *Zinzibar officinale*, *Terminaliai chebula* and *Withania somnifera*. Methods for preparing such a composition and the use of such a composition in therapy of animals are also provided.



## ULC30EX PLUS - Maintains Optimum Health in Horses

Real case: I definitely saw an improvement in my horse after I gave him your herbal product Ulc30EX this morning. He was eating well within 10 mins. Over the next half hour his face changed, he was engaging with me and had a keen appetite. He was almost back to normal!



Holistic, Herbal remedies assisting all kinds of animals

Ron Fields Nutrition is committed to providing the market place with credible information and reliable products that will help to maintain peak performance for competitive, domestic and farm animals. All nutritional products have been extensively researched and are scientifically designed and formulated to be effective safe nutritional supplements.





WE MAKE THINGS  
CLEARER



Go

DONATE



Home

About us

Cancer information

How we can help

Online community

Get involved

Fundraising

Home > Cancer information > Cancer treatment > Treatment types > Chemotherapy > Individual drugs > Topotecan (Hycamtin®)

Cancer treatment



Treatment types



Biological therapies

Chemotherapy

General information

Being treated

Side effects

Individual drugs

• By brand name

• Abraxane

• Amsacrine

• Azacitidine

• Bendamustine

• Bleomycin

• Busulfan

• Cabazitaxel

• Capecitabine

• Carboplatin

• Carmustine

• Chlorambucil

• Cisplatin

• Cladribine

• Clofarabine

• Crisantaspase

• Cyclophosphamide

## Topotecan (Hycamtin®)

Topotecan is a **chemotherapy drug** usually given to treat **ovarian cancer**, **small-cell lung cancer (SCLC)** and advanced **cervical cancer**. This information should ideally be read with our general information about **chemotherapy** and your **type of cancer**.

### On this page

- What topotecan looks like
- How it is given
- Possible side effects
- Less common side effects
- Additional information
- Things to remember about topotecan capsules
- References

### What topotecan looks like

[Back to top](#) ^

Topotecan is a powder that dissolves to form a colourless fluid.

Topotecan is also available as 0.25mg yellow and white capsules, and 1mg pink capsules. The capsules are only used to treat people with SCLC that has come back (relapsed) after initial treatment.

### How it is given

[Back to top](#) ^

Topotecan may be given as a drip (infusion) in one of the following ways:

- by injection into a vein (intravenously), through a fine tube inserted into a vein, usually in the back of your hand (cannula)
- through a fine, plastic tube inserted under the skin and into a vein near your

Share this page



Share



Tweet



Social Media Groups

### Questions about cancer?



For answers, support or just a chat, call the Macmillan Support Line free (Monday to Friday, 9am-8pm)

### Related Information



- Central lines (skin-tunnelled venous catheters)
- Cervical cancer
- Chemotherapy
- Lung cancer
- PICC lines (peripherally inserted

*Daucus carota* (Carrot)



*Lilium polyphyllum*

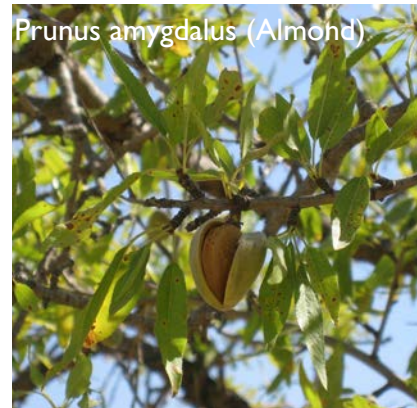


## Biodiversity based products can be ubiquitous

Himalaya is one of the best known brands of personal care products in India (and one of the most popular brands in my house). It combines herbal ingredients from India and has built its brand using Ayurvedic medicine.



*Prunus amygdalus* (Almond)



Aloe Vera



(Do not leave India without this)



Our herbs are sourced  
from a network of over  
**4,000 farmers**  
across India

[read more...](#)



## OUR PRODUCTS

Head-to-heel herbal products  
for the entire family >>

## INNOVATION

Innovation that makes a  
difference >>

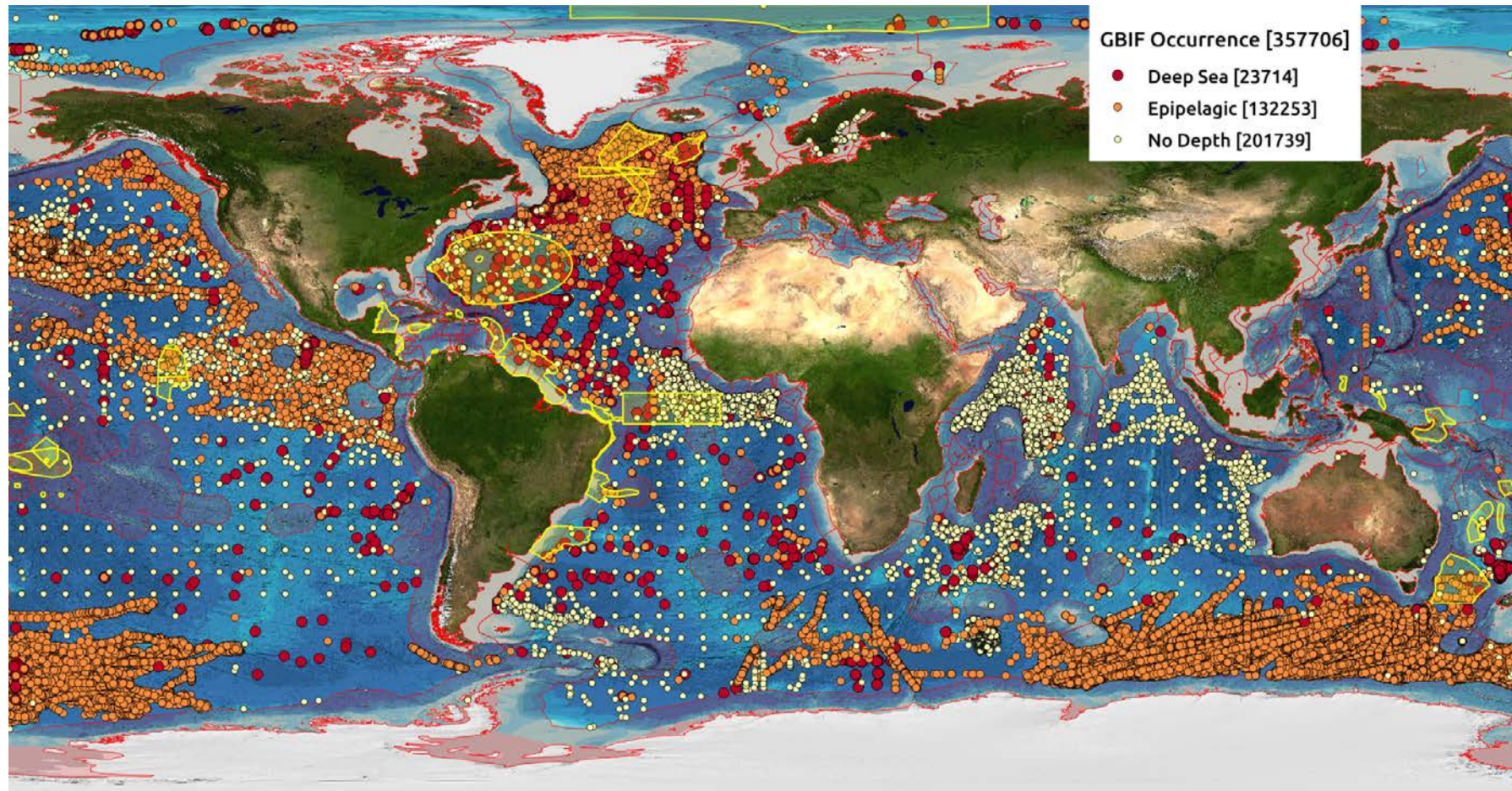
## RESPONSIBILITY

Caring for the Earth &  
the community >>

## ASK THE EXPERT

Have a health query?  
Ask our in-house experts >>





## Innovation & the Deep-Sea

The UN General Assembly is debating a potential new agreement on deep-sea marine genetic resources. We set out to find what organisms appear in patents to inform the debate.



*Euphausia superba*



*Aequorea victoria*



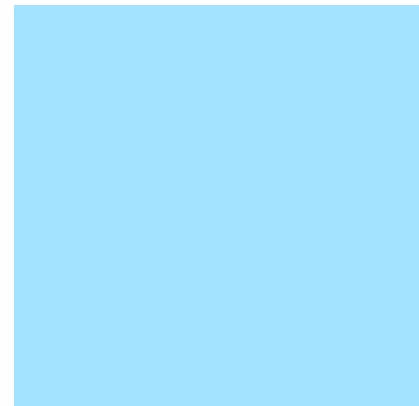
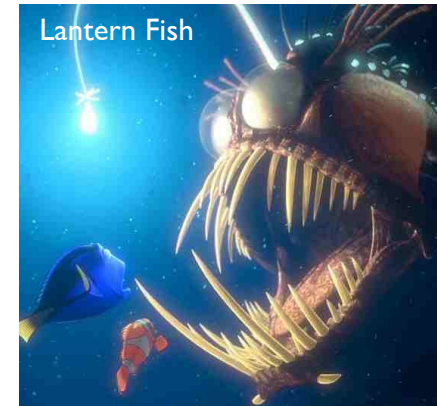
*Alvinella pompejana*



*Ecteinascidia turbinata*



Lantern Fish



GET A FREE MYSTERY SAMPLE PACK WITH ANY WOMEN'S SUBSCRIPTION **SUBSCRIBE NOW >****! EDITOR'S TIP**

Pair this marine-derived face moisturizer with the matching **eye cream** to maximize the anti-aging benefits.

## Kiehl's Abyssine Cream +

★★★★☆ 237 Reviews / [Write a Review](#)**\$48.00**

Size: 1.69 fl oz

Quantity: [♡ ADD TO FAVORITES](#)

*Uh oh — this item is unavailable. Please join the waitlist, and we'll contact you when it is available! In the meantime, check out some of our **best sellers**.*

**JOIN WAITLIST**[f Like](#) 0[Tweet](#) 0[Pin it](#) 15[Give suggestions for this page](#)**BIRCHBOX BREAKDOWN**

It's time to take a deep dive into skincare science. A group of Kiehl's researchers were in the Galapagos when they discovered abyssine, a molecule that thrives in the darkest depths of the ocean. Upon inspection in their lab, they found that this molecule's ability to protect itself translated into a host of skin benefits—from fading wrinkles to neutralizing free radicals. They turned these findings into this all-time bestselling cream. The lush, quick-absorbing formula





# Nemo finds trouble

- Bioluminescence is a key property of interest for biotechnological research on the deep sea. However, this is also interesting for other reasons. For example the CSIR in India applied for a patent that identifies genetic markers for lantern fish that live in the oxygen minimum zones in the deep sea.
- Other organisms have developed defence mechanisms against Lantern-like fish such as *Malacosteus niger* by expelling a bioluminescent cloud that deters the predator... Nemo did not have this available to him.



*Malacosteus niger*



*Acantheephyra purpurea*

# The Limits of Innovation

- While humans make use of biodiversity in numerous different ways our research on the patent system reveals a more sobering reality;
- Innovation, in the patent system touches on approximately 4% of described species (assuming 1.9 million described species) and just 1% of predicted global species (8.7 million +/- 1.3 Mora et al. 2011);
- This raises the question of how this situation could be improved to open up biodiversity to innovation while pursuing its conservation and sustainable use?



*Adansonia grandidieri* (Madagascar)



# The Limits of Innovation

- Improving taxonomic knowledge and the availability of basic taxonomic information as an enabling condition for wider research - including socio-economic research;
- Promoting fairness, equity and benefit-sharing in R&D. Biodiversity information can improve transparency about the utilisation of genetic resources and traditional knowledge and address uncertainties.
- Rethinking Intellectual Property and Incentives. We need to think about mixed and flexible models that can be adapted to different situations and needs.

