THEME 2: INFORMATION SYSTEMS & DUE DILIGENCE

Data Science & Genetic Resources

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ONE WORLD ANALYTICS

PRESENTED TO:
WIPO / SEMINAR ON INTELLECTUAL PROPERTY AND GENETIC RESOURCES : JANUARY 21, 2021

Patent Landscape Reports

Patent landscape reports (PLRs) provide a snapshot of the patent situation of a specific technology, either within a given country or region, or globally. They can inform policy discussions, strategic research planning or technology transfer. They may also be used to analyze the validity of patents based on data about their legal status.

A PLR begins with a state-of-the-art search for the relevant technology in selected patent databases. The search results are then analyzed to answer specific questions about, for example, patterns of patenting activity or of innovation. The results are presented visually to assist understanding and conclusions or recommendations based on the empirical evidence are provided.

WIPO Technology Trends – Artificial Intelligence

WIPO's "Technology Trends" Study Probes Artificial Intelligence.

WIPO Patent Landscapes & Analytics Training

Advancing Standards and Training : Focusing on open methods, promoting open data and standard setting for patent analysis (see Resources)

OPEN ACCESS PEER-REVIEWED

RESEARCH ARTICLE

Biological Diversity in the Patent System

Paul Oldham, Stephen Hall, Oscar Forero

Published: November 12, 2013 • https://doi.org/10.1371/journal.pone.0078737

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

New Results

Biodiversity Research and Innovation in Antarctica and the Southern Ocean

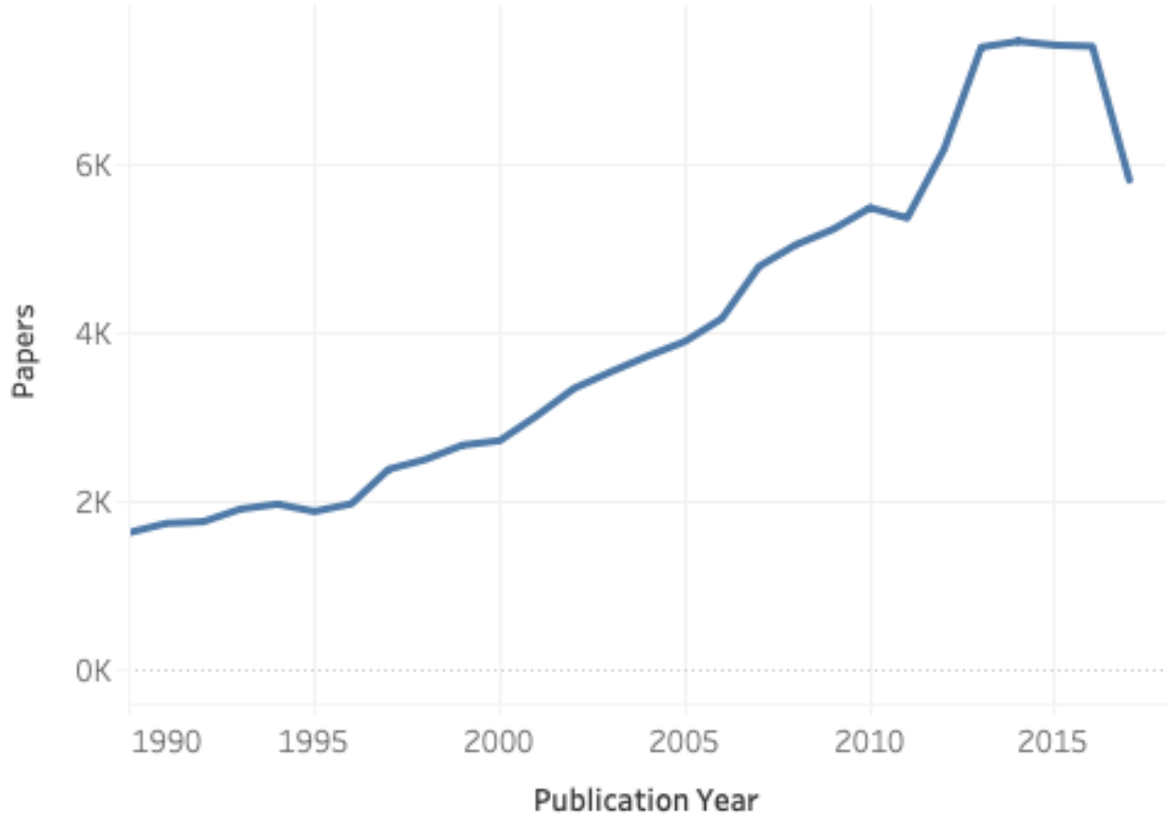
Paul Oldham, Jasmine Kindness

doi: https://doi.org/10.1101/2020.05.03.074849

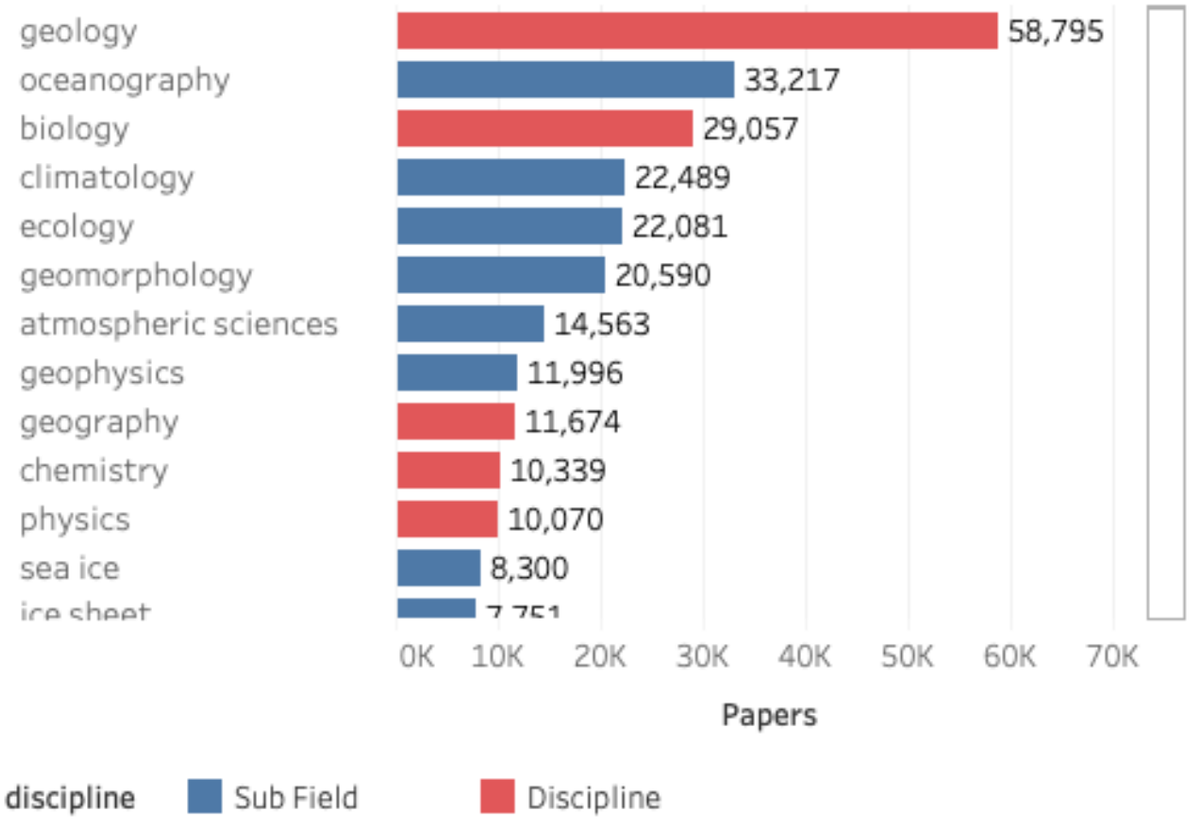
Abstract

This article examines biodiversity research and innovation in Antarctica and the Southern Ocean based on a review of 150,401 scientific articles and 29,690 patent families for Antarctic species. The paper exploits the growing availability of open access databases, such as the Lens and Microsoft Academic Graph, along with taxonomic data from the Global Biodiversity Information Facility (GBIF) to explore the

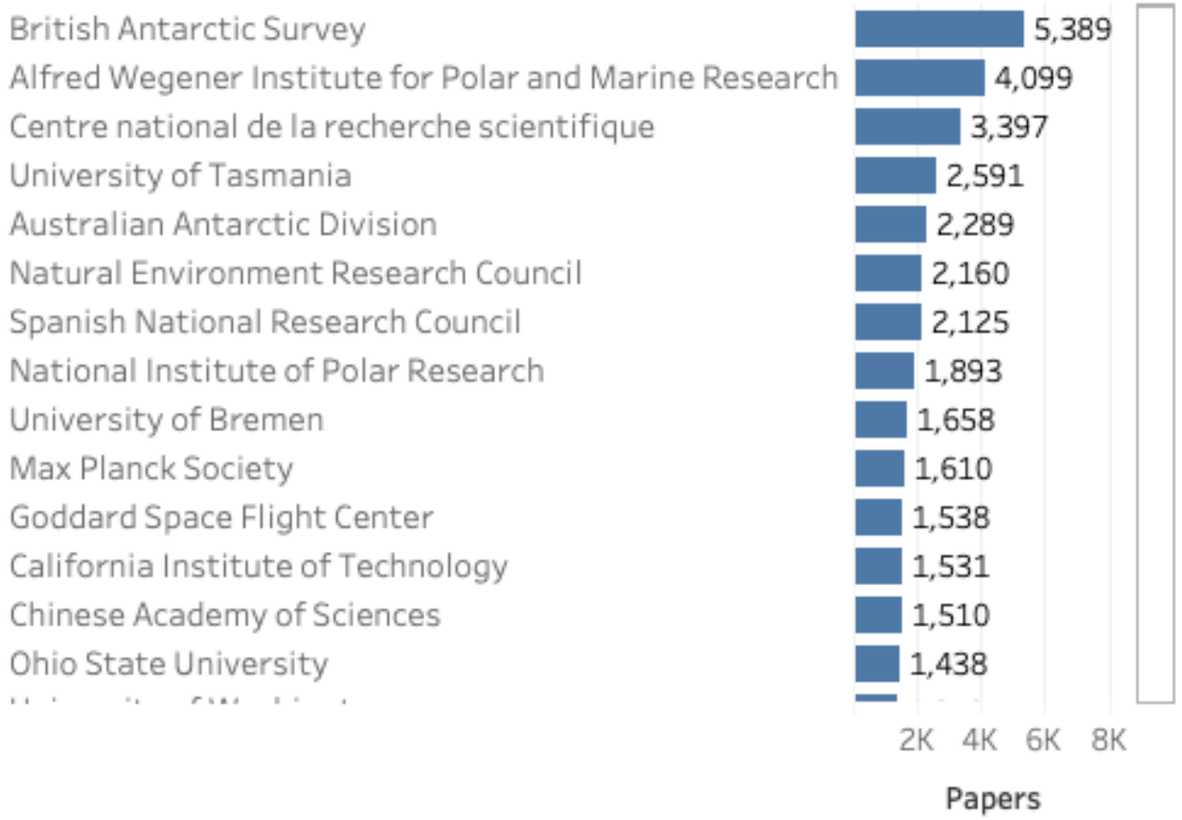
A. Trends



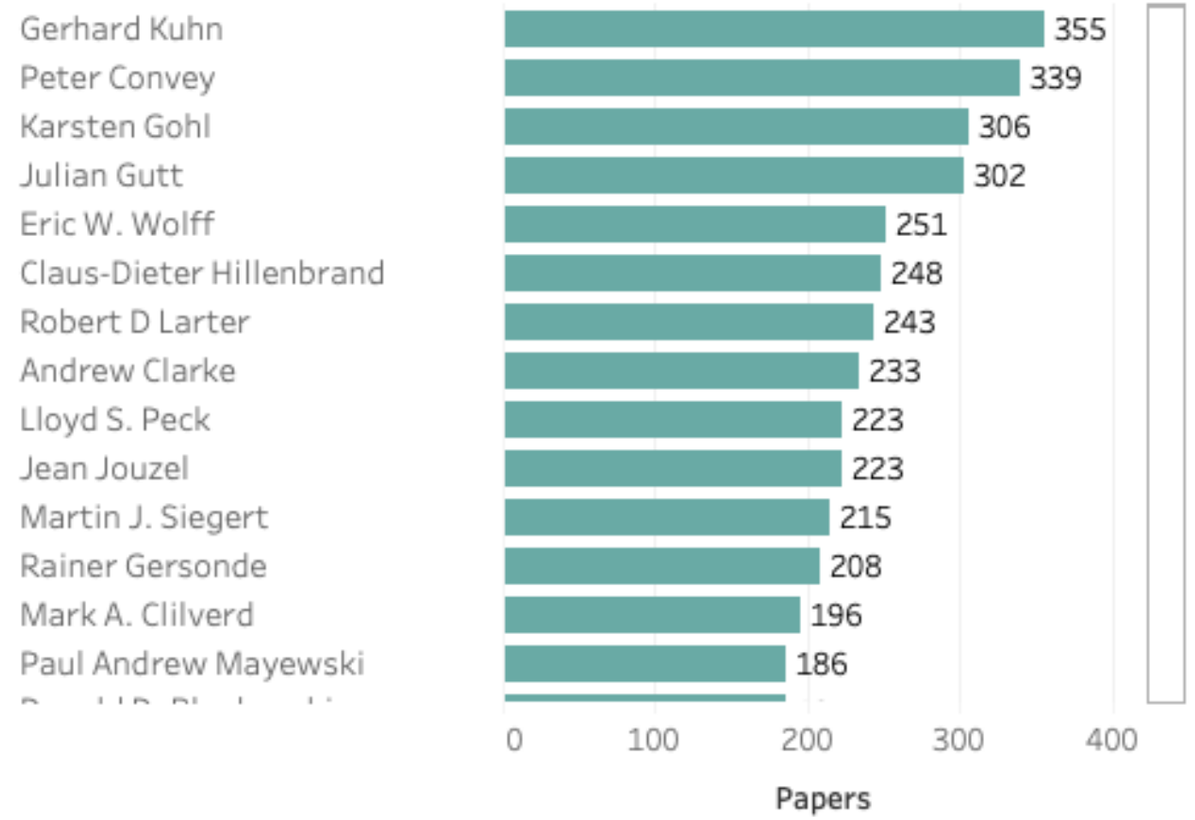
B. Fields of Study



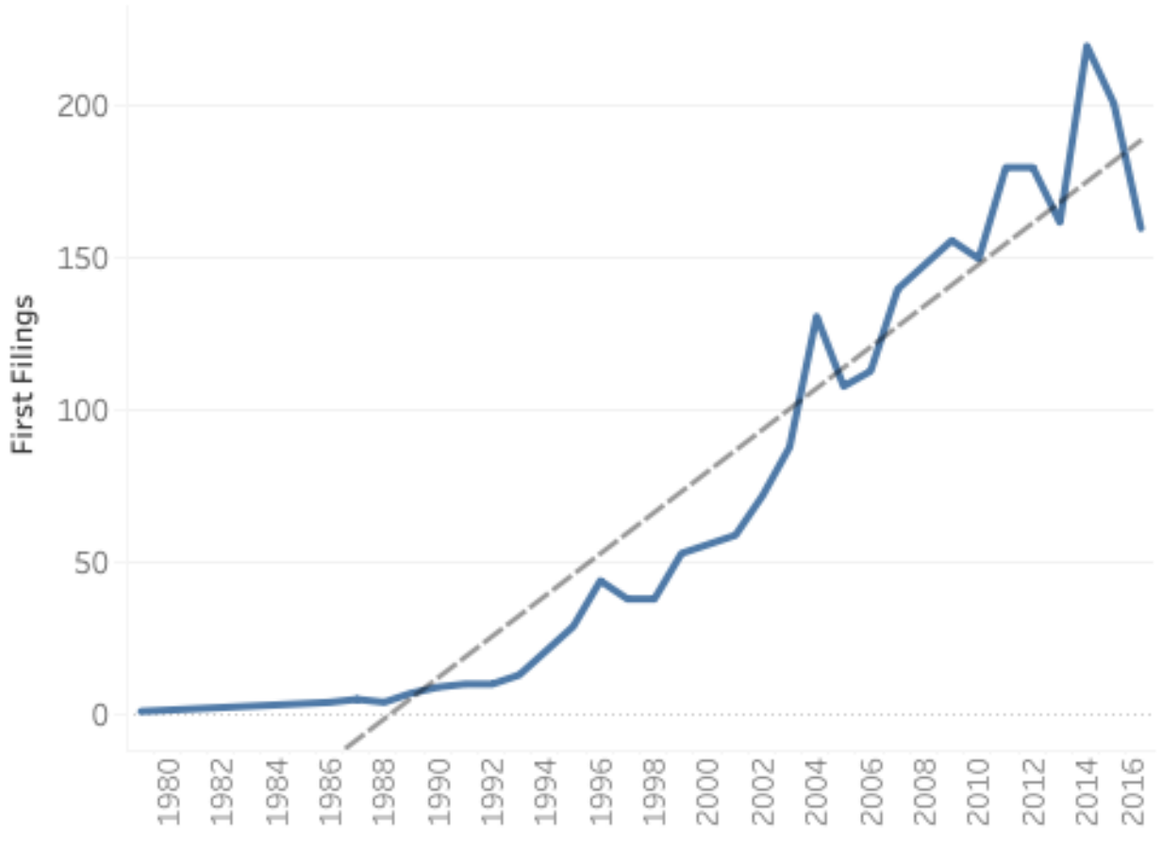
C. Organisations



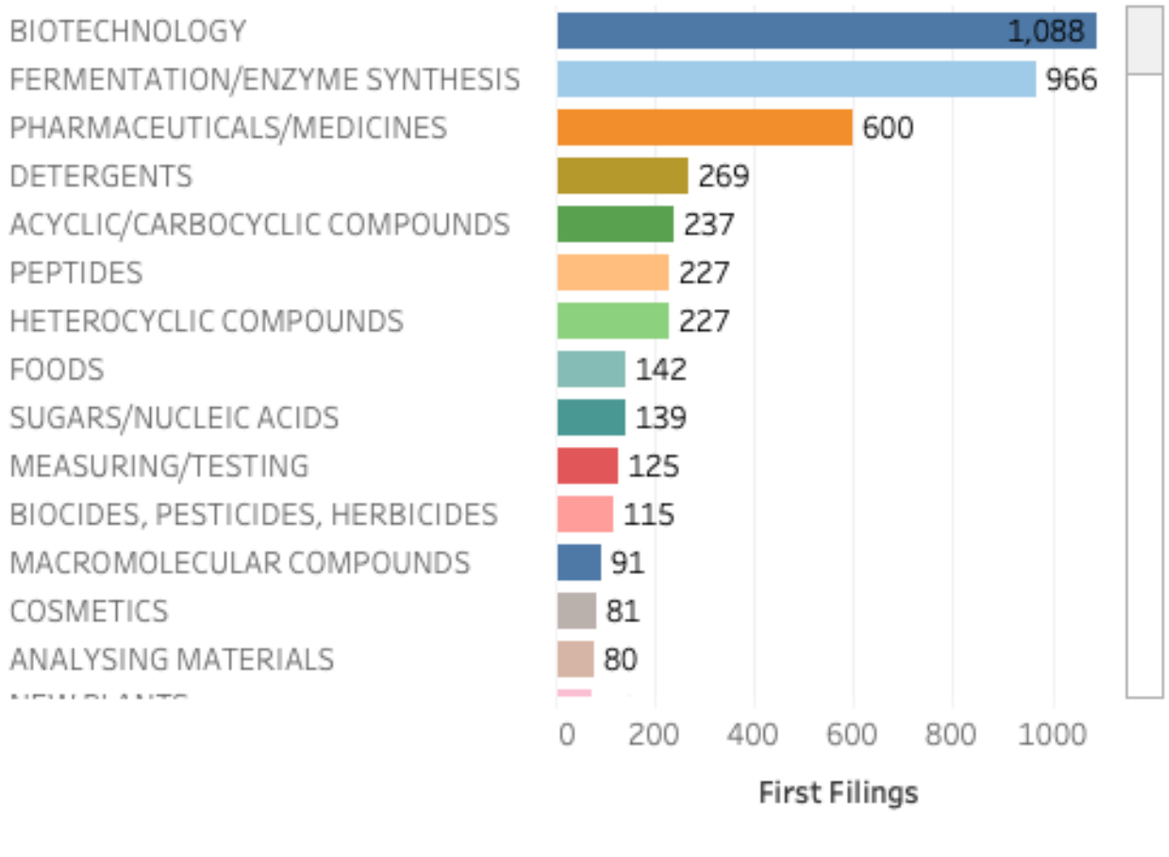
D. Authors



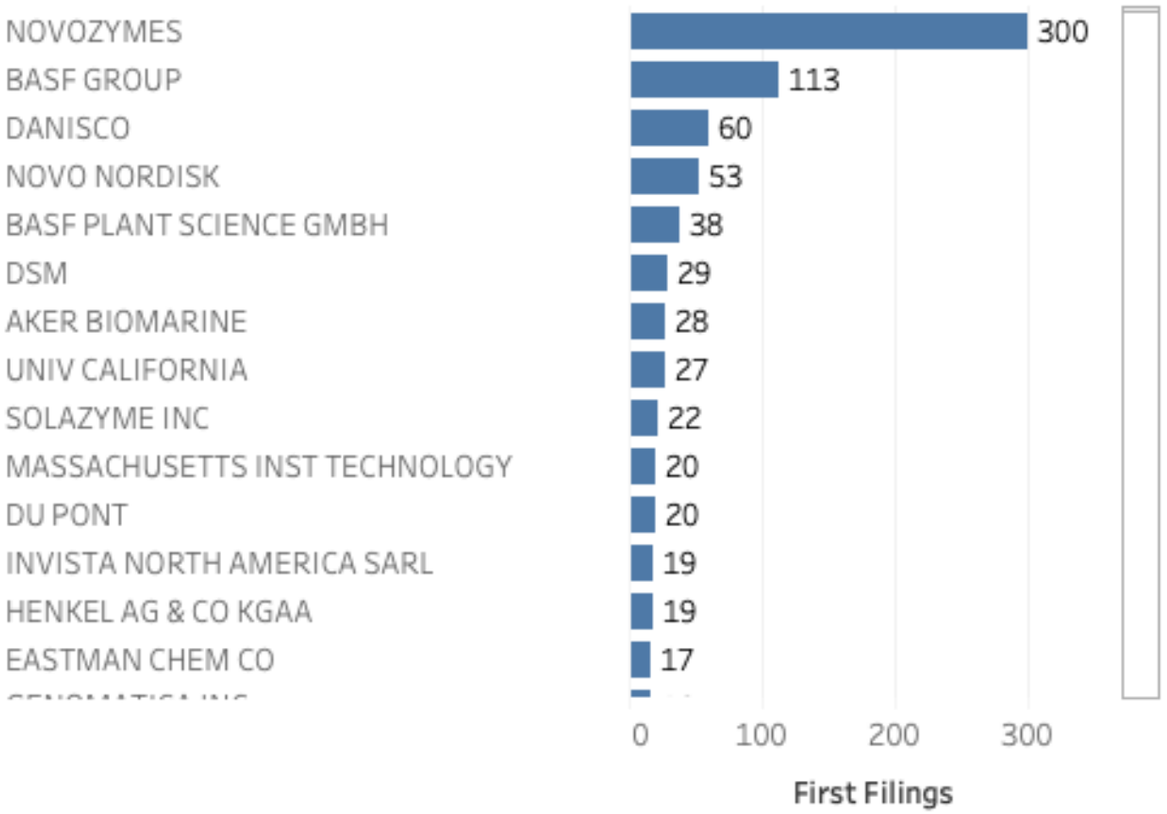
A. First Filing



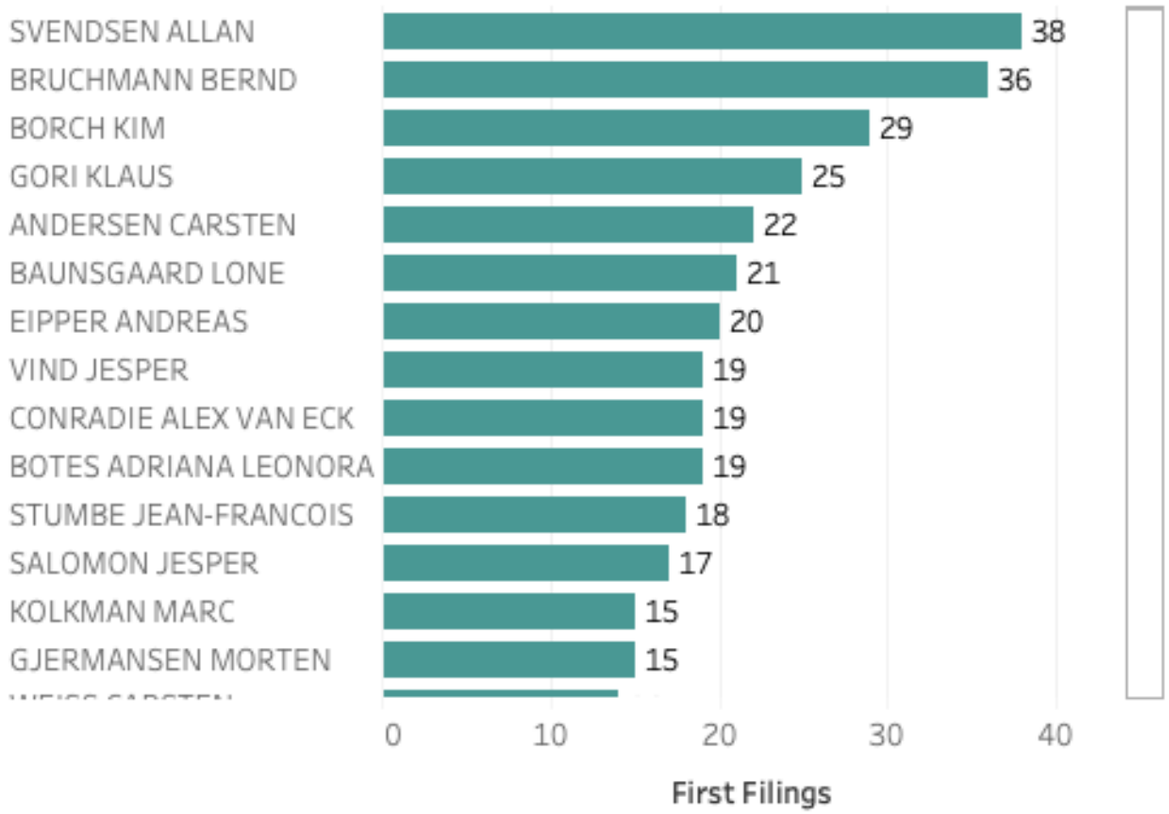
B. Technology Area



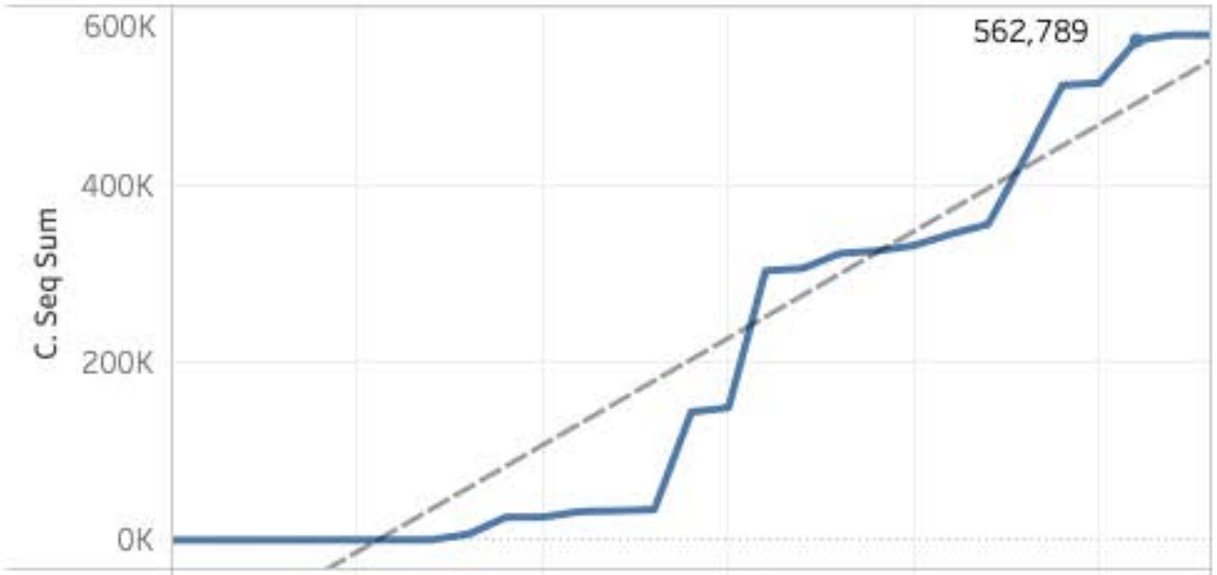
C. Applicants

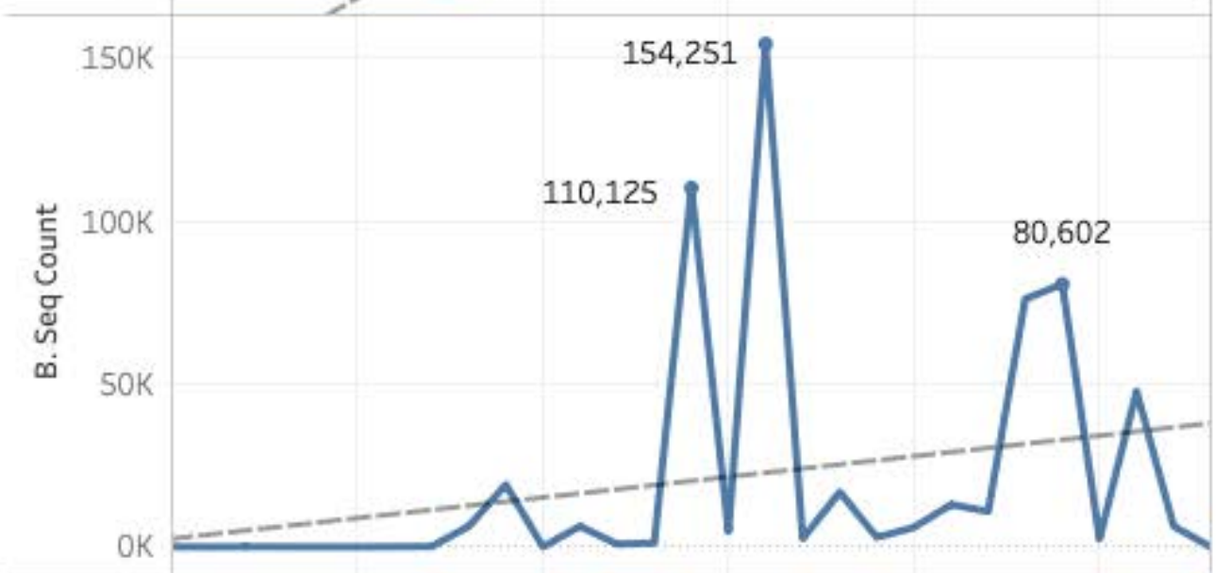


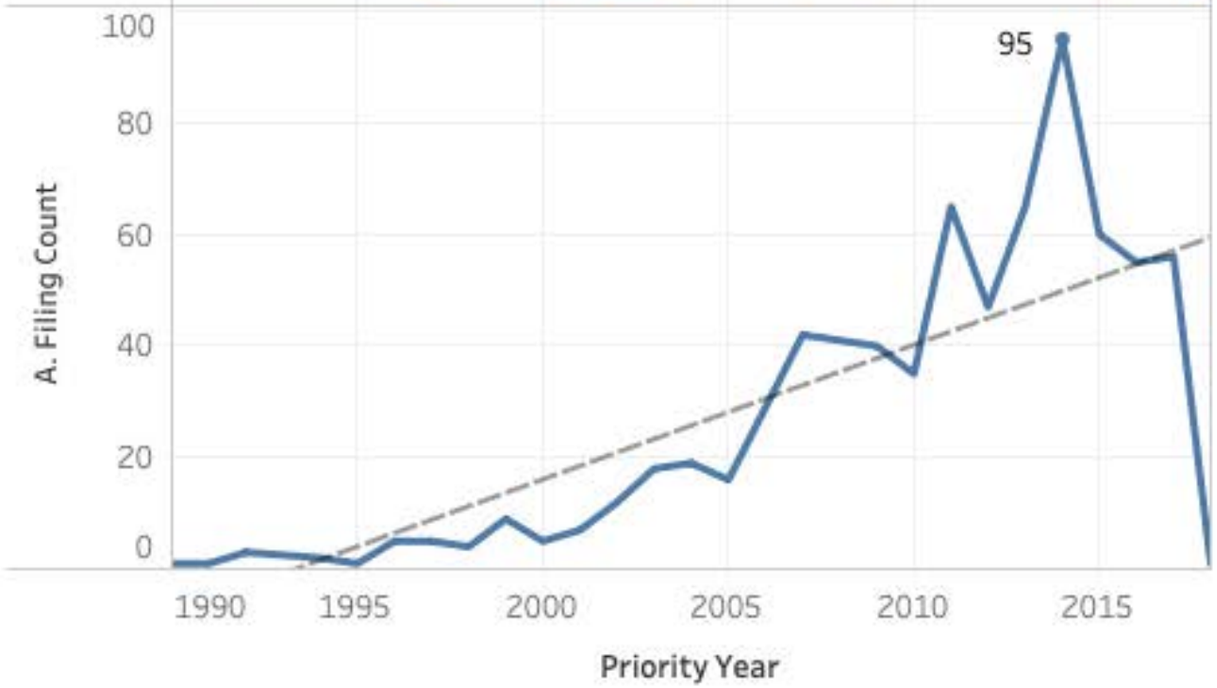
D. Inventors



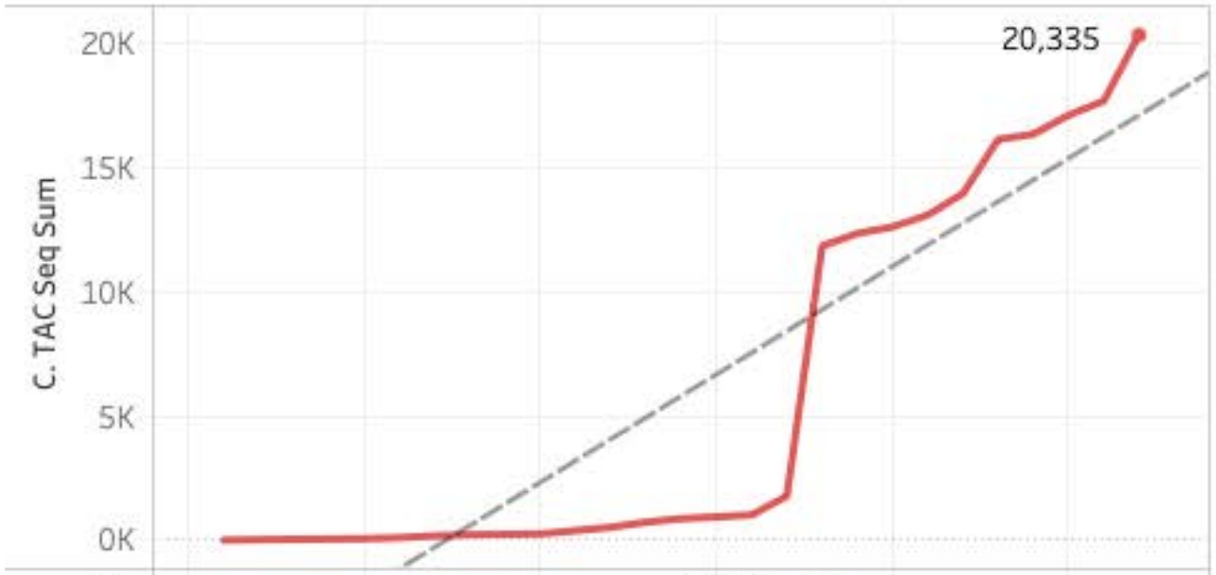
1. Sequences (Antarctic species)

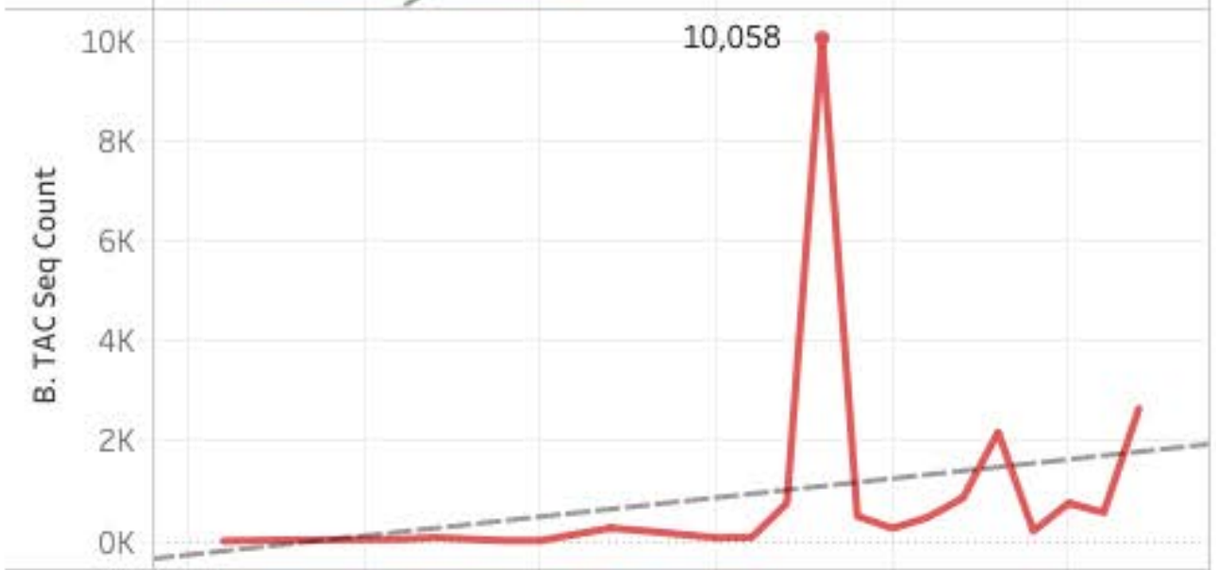


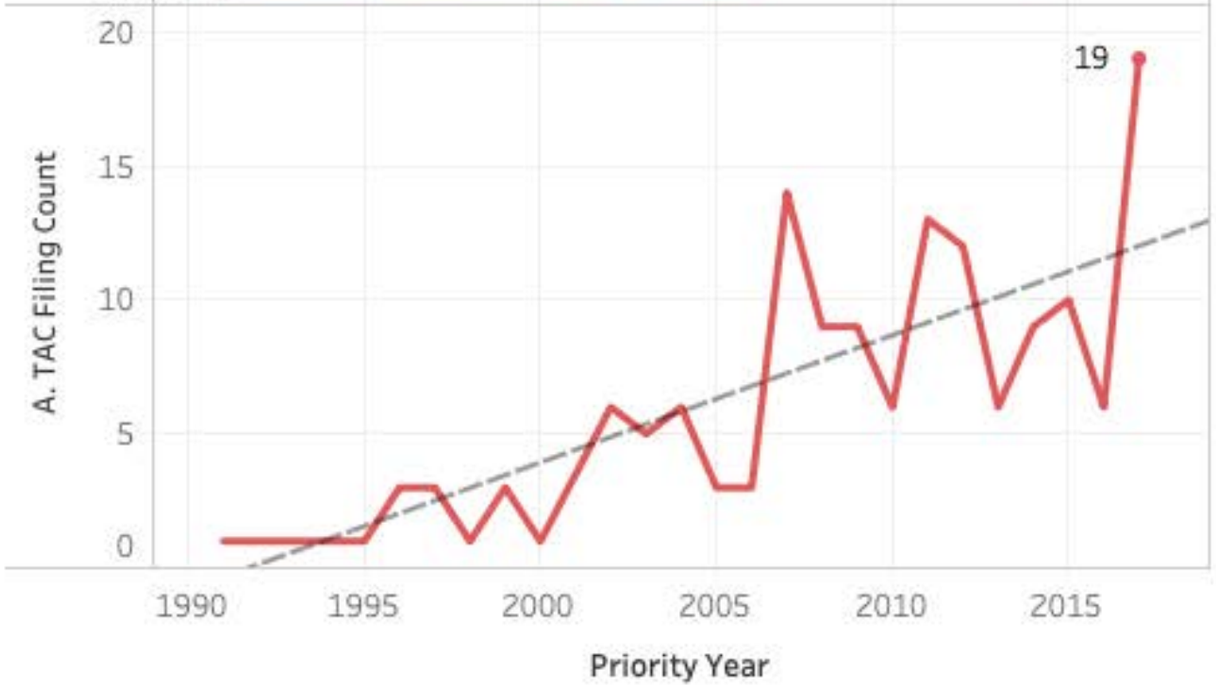




2. Antarctic Species in Titles, Abstracts or Claims





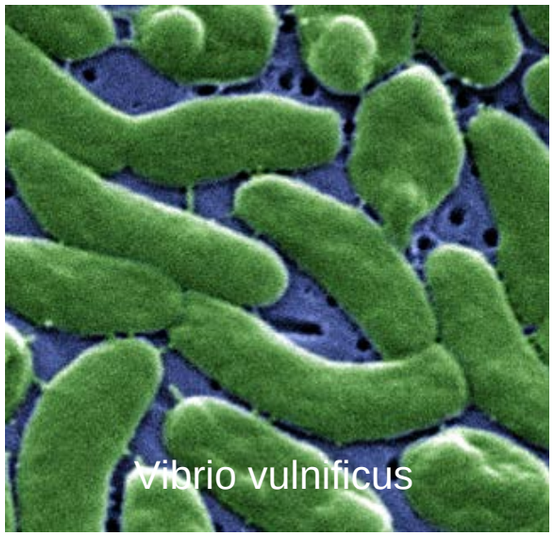


Due Diligence & Disclosure

- A sensible applicant will know where the material in their inventions came from.
- Applicants routinely refer to suppliers and other sources.
- Clarity of disclosure for GRs and TK is the key practical issue.


Bruguiera gymnorrhiza


Torpedo marmorata


Vibrio vulnificus


Thunnus albacares


Heteractis crispa


Avicennia marina

Species appearing in marine related patent activity

Where is it from?

Is the origin in the description? e.g. ”oil from Baobab trees collected in Madagascar”

Adansonia grandidieri

Is it utilised?

Was R & D conducted or or is it a passing reference. e.g “other species from Sub-Saharan Africa for treating bilharzia include…“

Balanites aegyptiaca

Is it material?

Is the genetic resource material to (part of) the claimed invention? e.g. sequence producing silk

Euprosthenopsis species

Ircc	Applicant	Species (Ircc Compiled.Csv)	Type (Ircc Compile..	
ABSCH-IRCC-ZA-206780-1	HG&H Pharmaceuticals (Pty) Ltd	Sceletium tortuosum	commercial	Abc
ABSCH-IRCC-ZA-208241-1	Totally Wild (Pty) Ltd	Aloe ferox	commercial	Abc
ABSCH-IRCC-ZA-237653-1	Quintessence Collections CC	Agothosma betulina	commercial	Abc
		Aloe ferox	commercial	Abc
ABSCH-IRCC-ZA-238274-1	Council for Scientific and Industrial Research	Siphonichilus aethiopicus	commercial	Abc
ABSCH-IRCC-ZA-238275-1	Council for Scientific and Industrial Research	Elephantorrhiza elephantina	commercial	Abc
ABSCH-IRCC-ZA-238276-1	Council for Scientific and Industrial Research	Lippia javanica	commercial	Abc
ABSCH-IRCC-ZA-238277-2	Cape Kingdom Nutraceuticals (Pty) Ltd	Agathosma betulina	commercial	Abc
		Agathosma crenulata	commercial	Abc
ABSCH-IRCC-ZA-238278-1	University of Western Cape	Galenia africana	commercial	Abc
ABSCH-IRCC-ZA-238279-1	The Esse Trust	Adansonia digitata	commercial	Abc
		Kigelia africana	commercial	Abc
ABSCH-IRCC-ZA-239334-1	University of Pretoria	Euclea natalensis	commercial	Abc
ABSCH-IRCC-ZA-239335-1	University of Pretoria	Leucosidea sericea	commercial	Abc
ABSCH-IRCC-ZA-239336-1	University of Pretoria	Helichrysum odoratissimum	commercial	Abc
ABSCH-IRCC-ZA-239337-1	Council for Scientific and Industrial Research	Elephantorrhiza elephantina	commercial	Abc
ABSCH-IRCC-ZA-239338-1	Croc Cure (Pty) Ltd	Crocodylus niloticus	commercial	Abc
ABSCH-IRCC-ZA-239339-2	Parceval (Pty) Ltd jointly with Heel Biologische Heil..	Agathosma betulina	commercial	Abc
ABSCH-IRCC-ZA-239340-1	Pastillo Seed Oil	Citrullus lanatus	commercial	Abc
		Cucumis metuliferus	commercial	Abc
ABSCH-IRCC-ZA-239341-1	University of Pretoria	Greyia flanaganii	commercial	Abc
ABSCH-IRCC-ZA-239342-1	Tartan Timbers (Pty) Ltd	Adansonia digitata	commercial	Abc
ABSCH-IRCC-ZA-239343-1	Parceval (Pty) Ltd jointly with Mast-Jagermeister SE	Agathosma betulina	commercial	Abc
ABSCH-IRCC-ZA-239437-1	University of Cape Town	NA	commercial	Abc
ABSCH-IRCC-ZA-239438-1	Nestle South Africa (Pty) Ltd	Aspalathus linearis	commercial	Abc
ABSCH-IRCC-ZA-239439-1	Rain Africa Innovations CC	Adansonia digitata	commercial	Abc
		Aloe ferox	commercial	Abc
ABSCH-IRCC-ZA-239440-1	Council for Scientific and Industrial Research	Siphonichilus eathiopicus	commercial	Abc

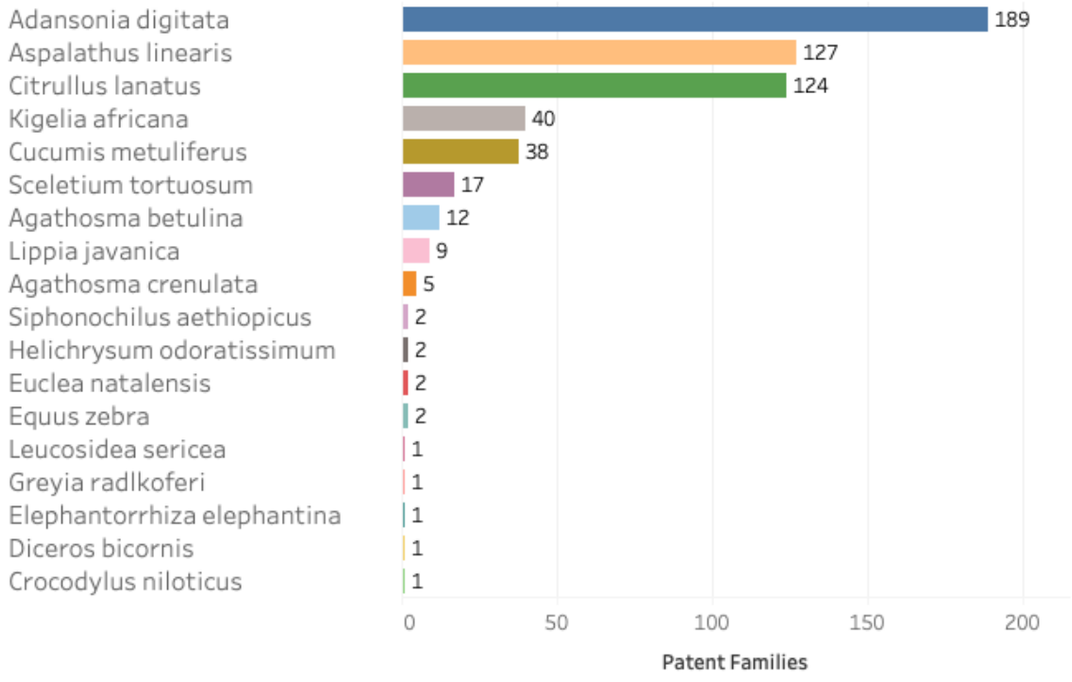
IRCC Records (South Africa)

The Nagoya Protocol includes the option to issue Internationally Recognised Certificates of Compliance (stored on the ABS Clearing House of the CBD)

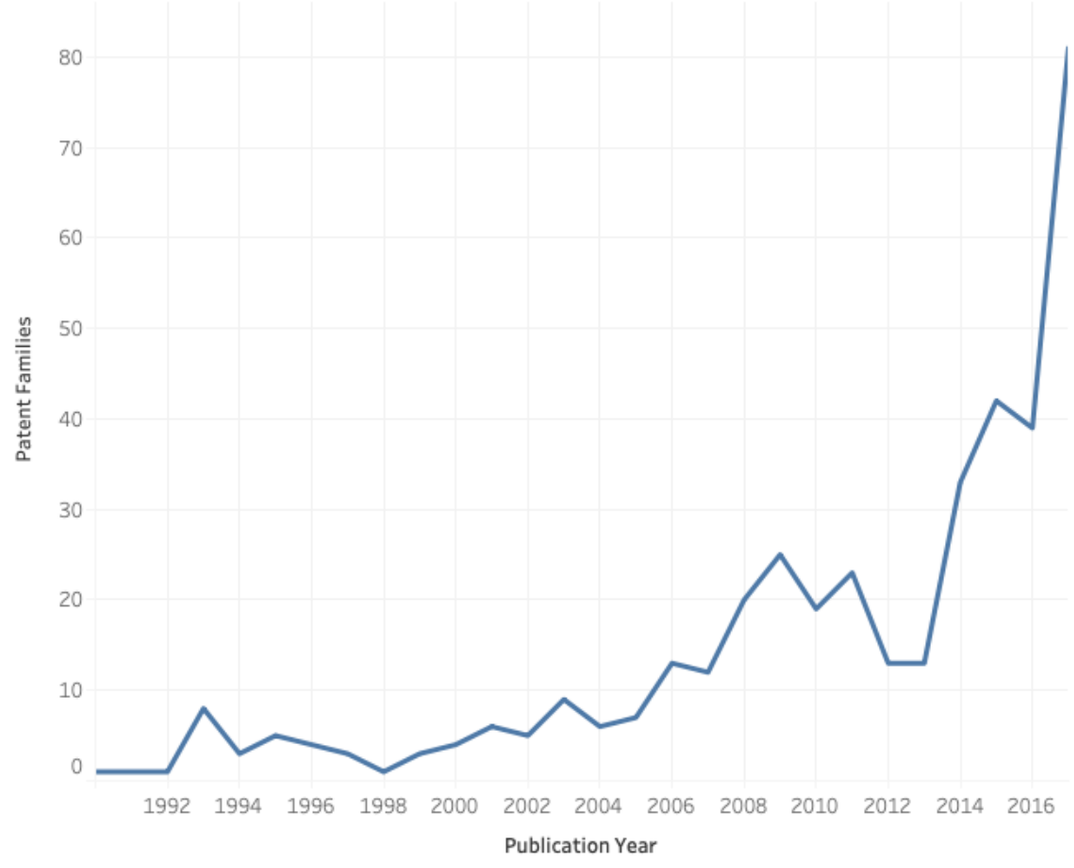
Disclosure Statement

- A disclosure statement - modelled on the US Bayh-Dole Act requirement for disclosure of federally sponsored research - could greatly improve transparency without affecting patentability requirements.
- ‘Genetic resources in this application were collected under ABSCH-IRCC-ZA-206780-1. The Government of [South Africa] has certain rights in this invention etc…’

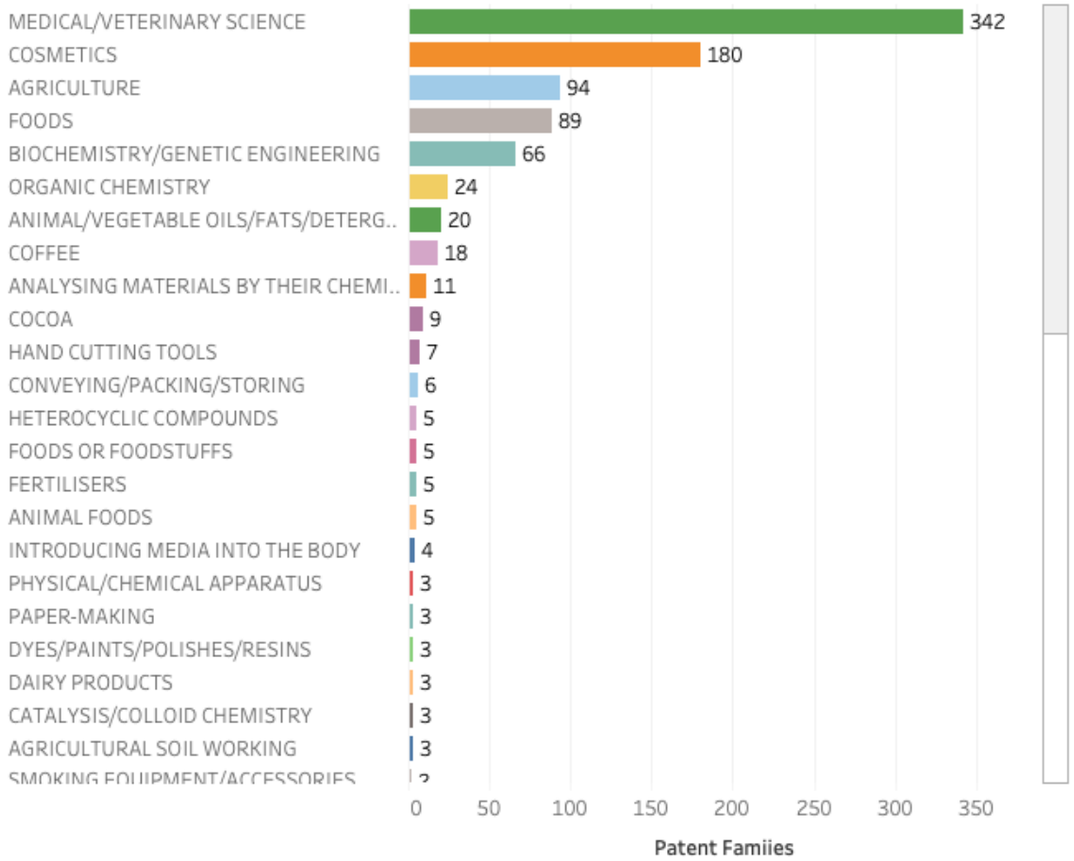
IRCC Species



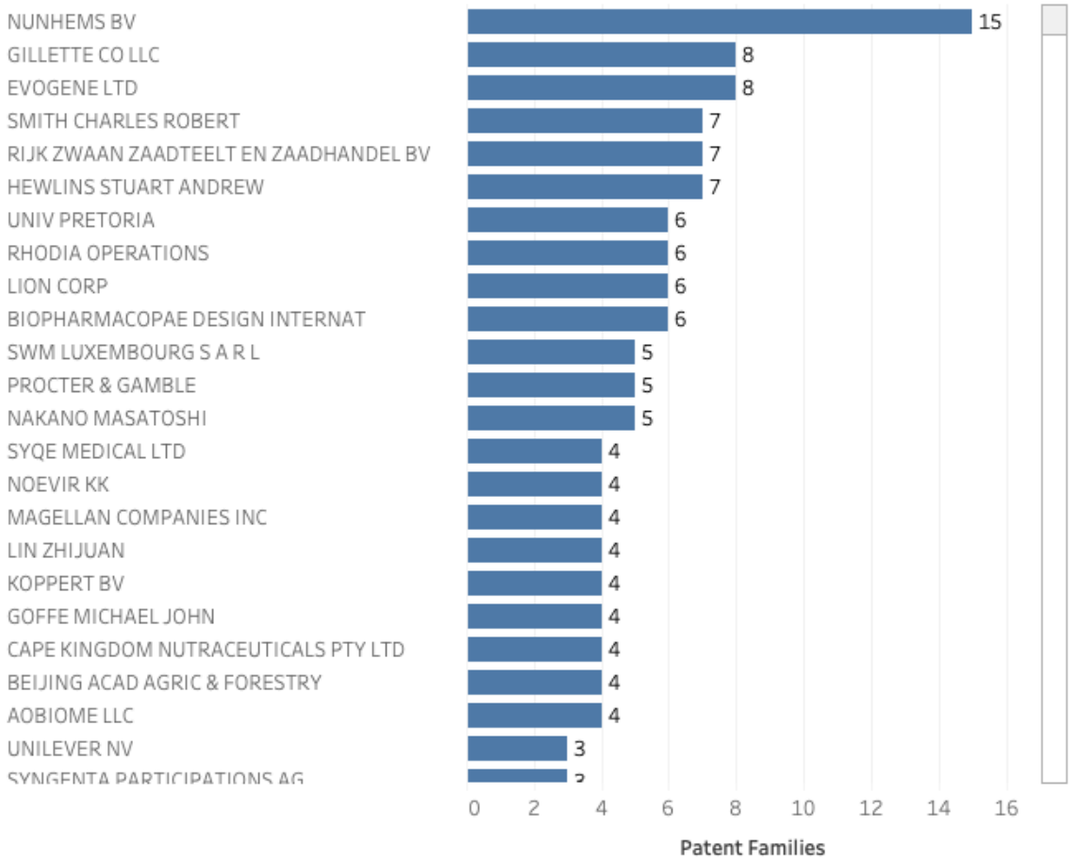
IRCC Species Trends (publication year)



Technology Area



IRCC Species Patent Applicants



Colombia (signatory to NP)

Applicant: ECOFLORA S.A.S

Title: Colorant Compounds Derived From Genipin Or Genipin Containing Materials (US9376569B2)

Statement of Access and Benefit Sharing (ABS)

[0002] This invention is based on the extraction and use of a blue dye with edible properties from the fruit of the Genipa americana tree. This tree grows in a variety of rainforests of Colombia. In compliance with the principles of ABS of the Convention of Biological Diversity and its implementing Nagoya Protocol, access to the genetic resources was obtained through agreements with ethnic communities and the authorities charged by Colombian legislation with administering their collective territories. The assignee has also entered into agreements with several community entrepreneurial initiatives that coordinate local production and supply dynamics with commercial partners. Through a shareholding agreement, these community-owned suppliers share in the financial benefits of commercialization of the genetic resources. Additional benefit sharing is provided through Fundación Espavé, a nonprofit organization that is a member of the Union for Ethical BioTrade and that trains local producers on sustainable sourcing in the Pacific rainforest.

prodigy ✓

PROJECT INFO

DATASET	ecoflora
LANGUAGE	en
RECIPE	ner.correct
VIEW ID	ner_manual

PROGRESS

THIS SESSION	0
TOTAL	0

∞

ACCEPT	0
REJECT	0
IGNORE	0

HISTORY

TAXA 1 | GPE 2 | UNI 3 | COMMON 4 | LOC 5 | TK 6 | IPLC 7
VIRUS 8 | HAB 9 | ABBR 10 | DATE 11 | ORG 12

This invention is based on the extraction and use of a blue dye with edible properties from the fruit of the Genipa americana TAXA tree. This tree grows in a variety of rainforests HAB of Colombia GPE . In compliance with the principles of ABS of the Convention of Biological Diversity ORG and its implementing Nagoya Protocol ORG , access to the genetic resources was obtained through agreements with ethnic communities IPLC and the authorities charged by Colombian legislation with administering their collective territories IPLC . The assignee has also entered into agreements with several community entrepreneurial initiatives that coordinate local production and supply dynamics with commercial partners. Through a shareholding agreement, these community-owned suppliers share in the financial benefits of commercialization of the genetic resources. Additional benefit sharing is provided through Fundación Espavé ORG , a nonprofit organization that is a member of the Union for Ethical BioTrade ORG and that trains local producers on sustainable sourcing in the Pacific LOC rainforest HAB

✓ ✗ ⊘ ↵

TAXA 1 | UNI 2 | COMMON 3 | HAB 4 | GPE 5 | LOC 6 | GEO 7

VIRUS 8 | ABBR 9 | TK 10 | IPLC 11

Local plants COMMON as repellents against Anopheles arabiensis TAXA , in Mpumalanga Province LOC , South Africa GPE .. OBJECTIVE: To assess the repellency effect of three local plants COMMON ; fever tea COMMON (Lippia javanica TAXA), rose geranium COMMON (Pelargonium reniforme TAXA) and lemon grass COMMON (Cymbopogon excavatus TAXA) against laboratory reared Anopheles arabiensis TAXA mosquitoes COMMON . DESIGN: A laboratory experimental study. SETTING: Mpumalanga Province LOC , South Africa GPE . SUBJECTS: Three adult male volunteers. MAIN LOC OUTCOME MEASURES: Affordable alternatives to synthetic repellents against biting of Anopheles arabiensis TAXA mosquitoes COMMON . RESULTS: All three alcohol plant COMMON extracts provided significantly m alcohol control. The a ovided 76.7

DSI & Emerging Technologies

- Issues under debate:

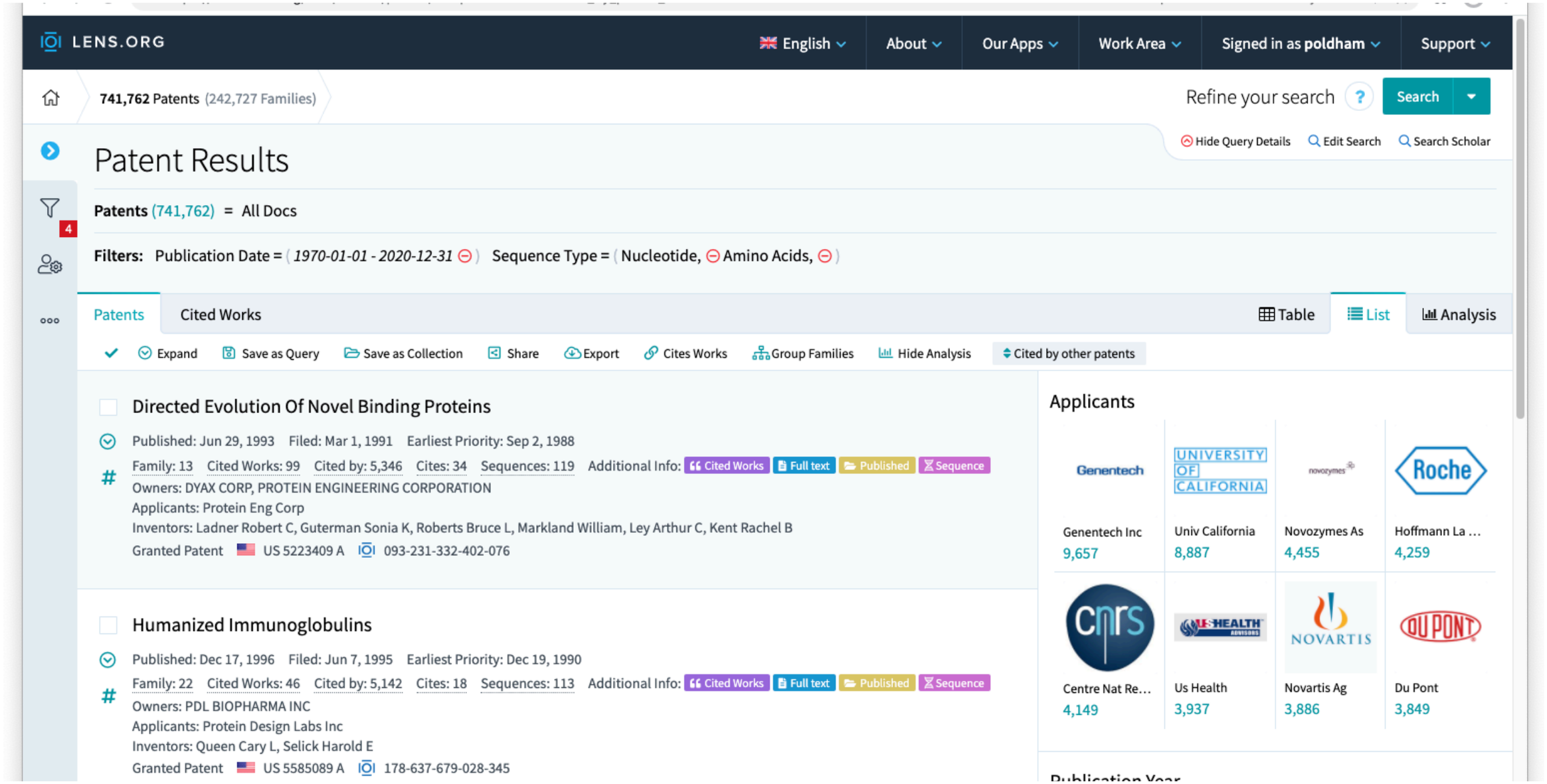
  Synthetic Biology

  Gene editing

  Gene drives

  Genetic sequences (CBD, NP, ITPGRFA, UNCLOS, WHO)

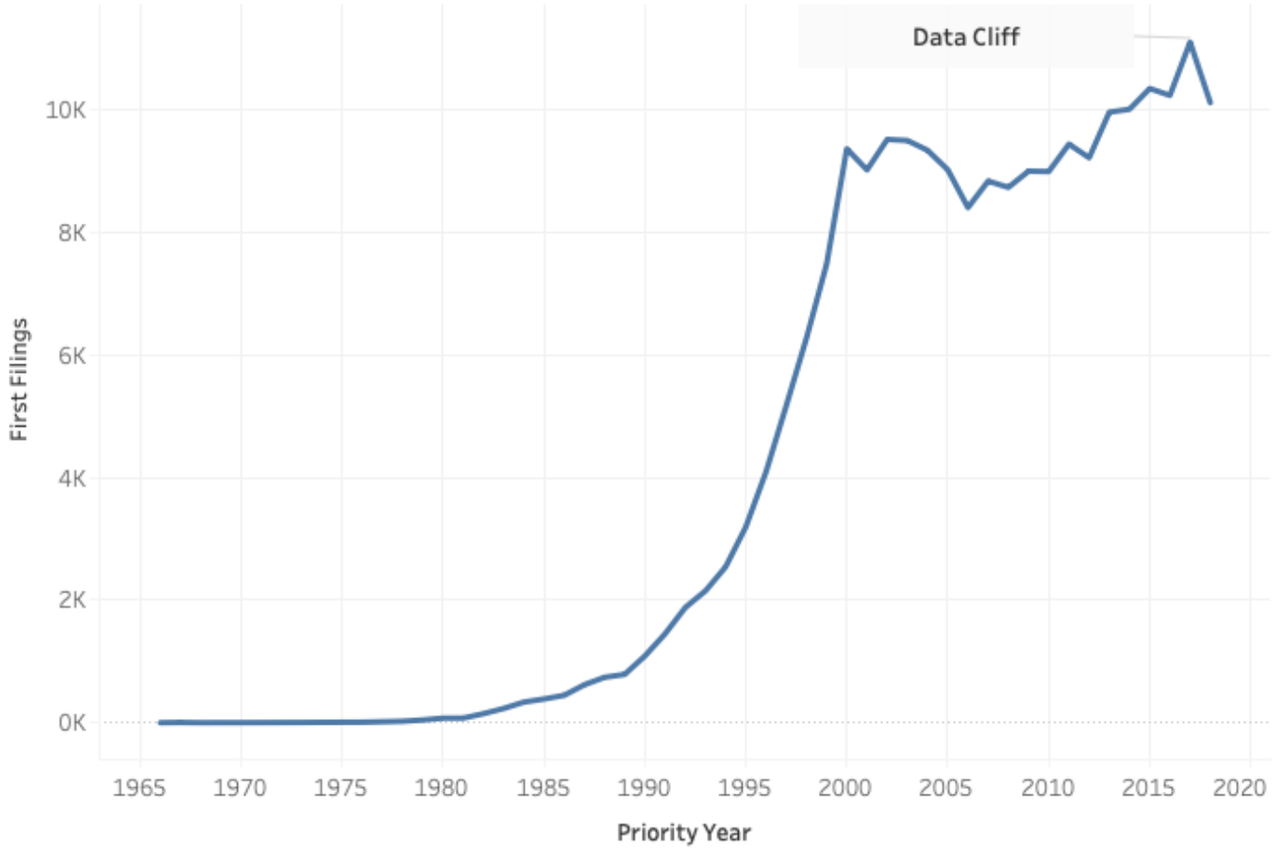
- How do we make this visible?



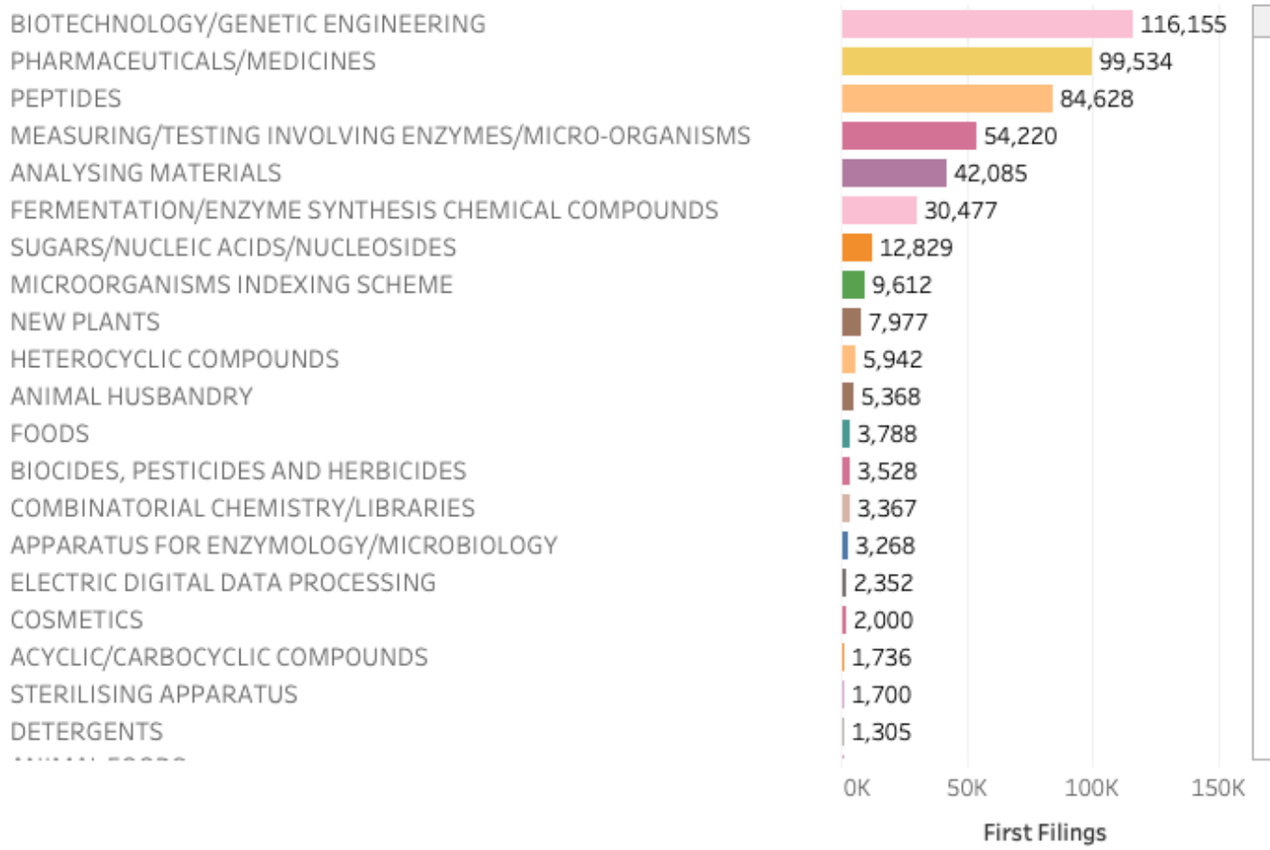
Sequence Data in Patent Documents

The Lens (Cambia, Australia) has indexed patents documents containing sequences. As of yesterday there were 741,000 publications and 242,000 patent families

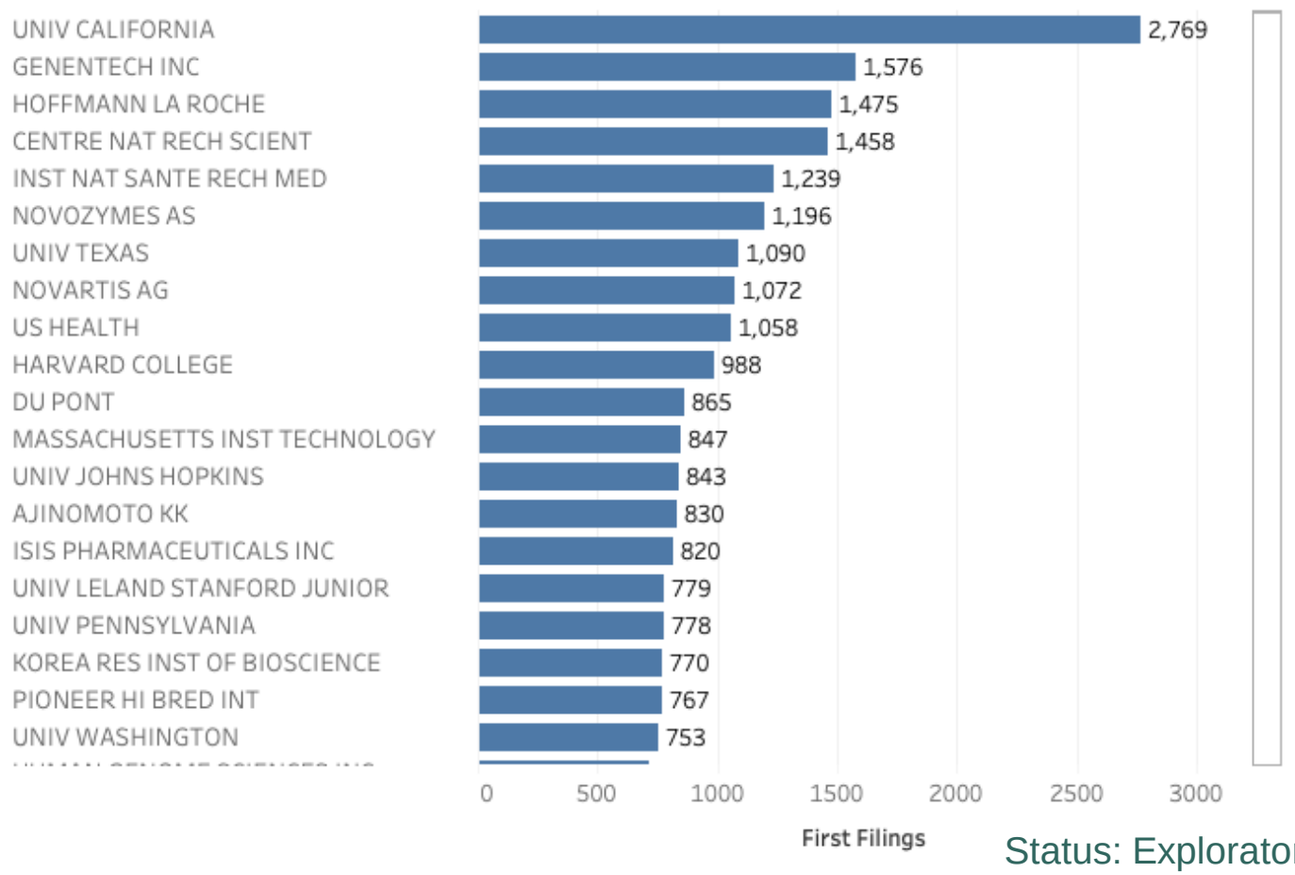
Priority Year



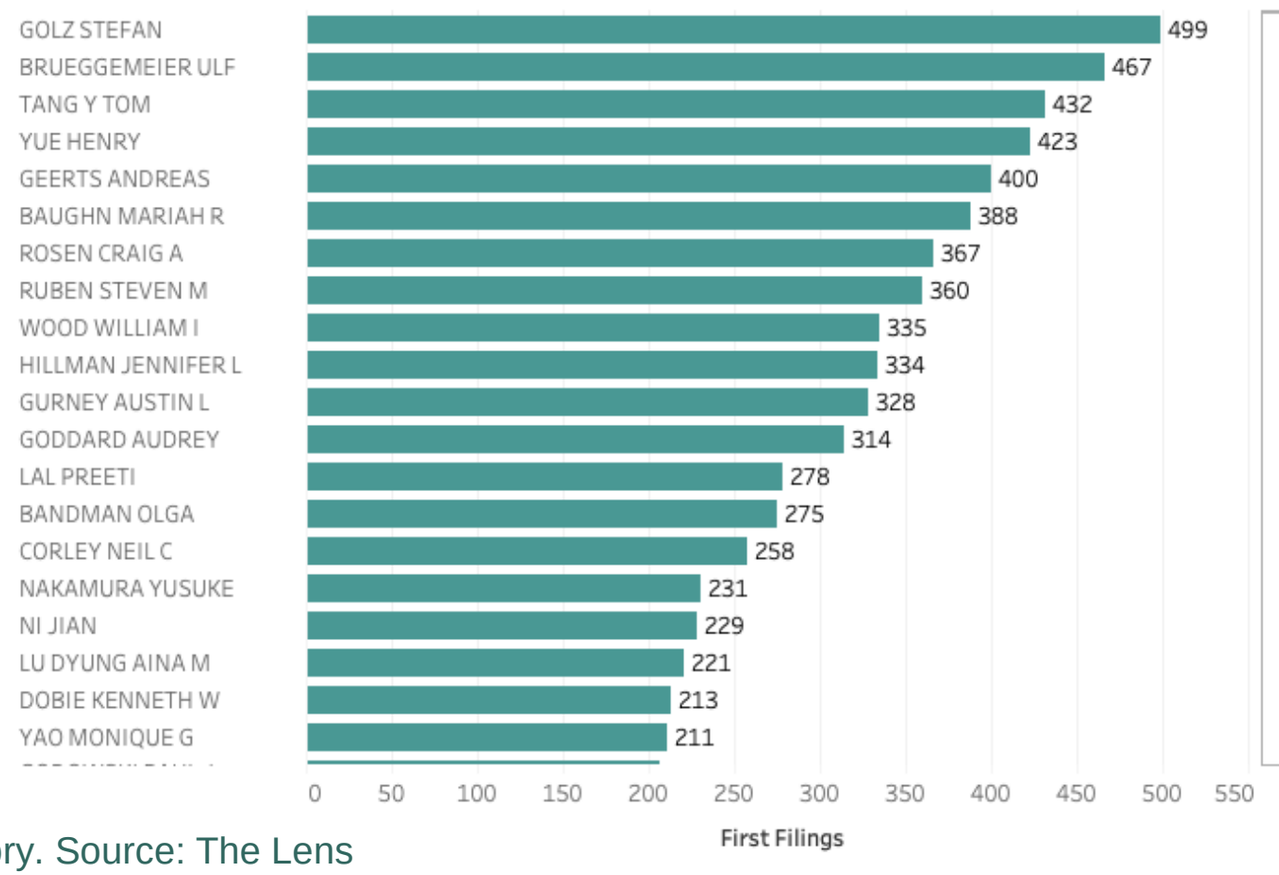
Technology Areas



Applicants

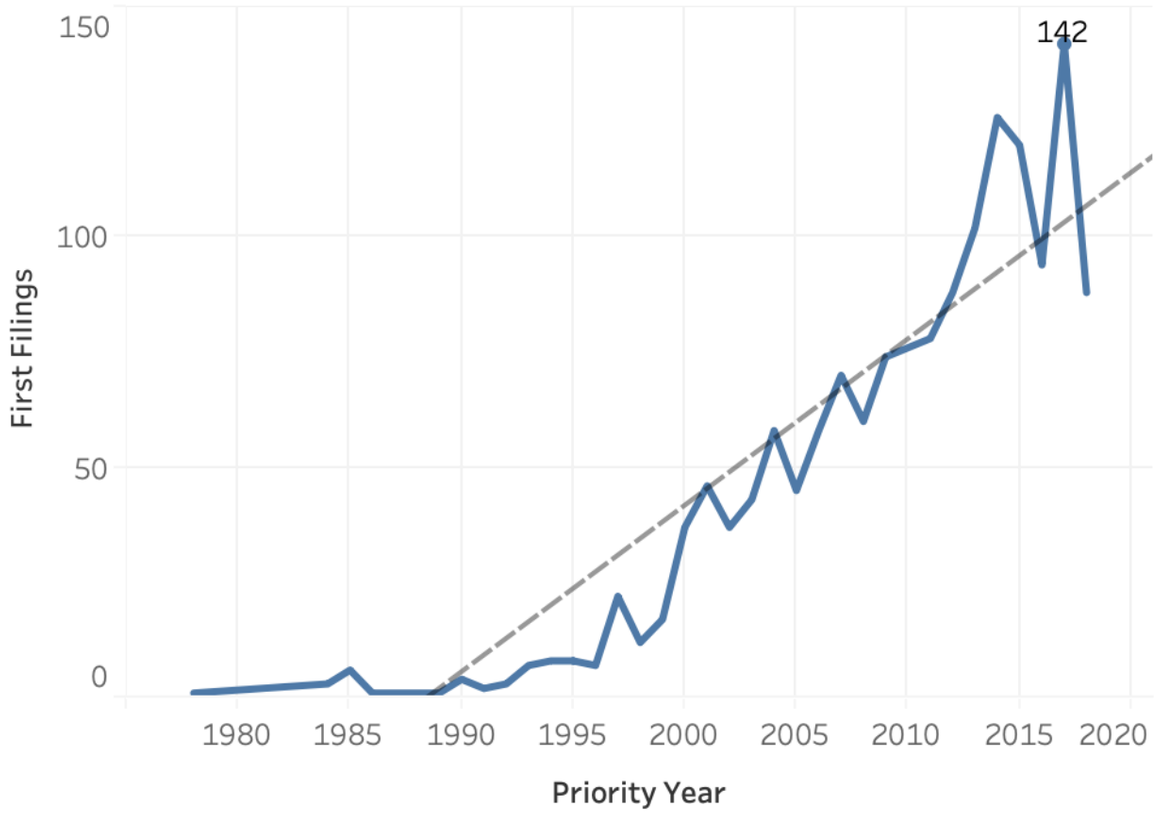


Inventors

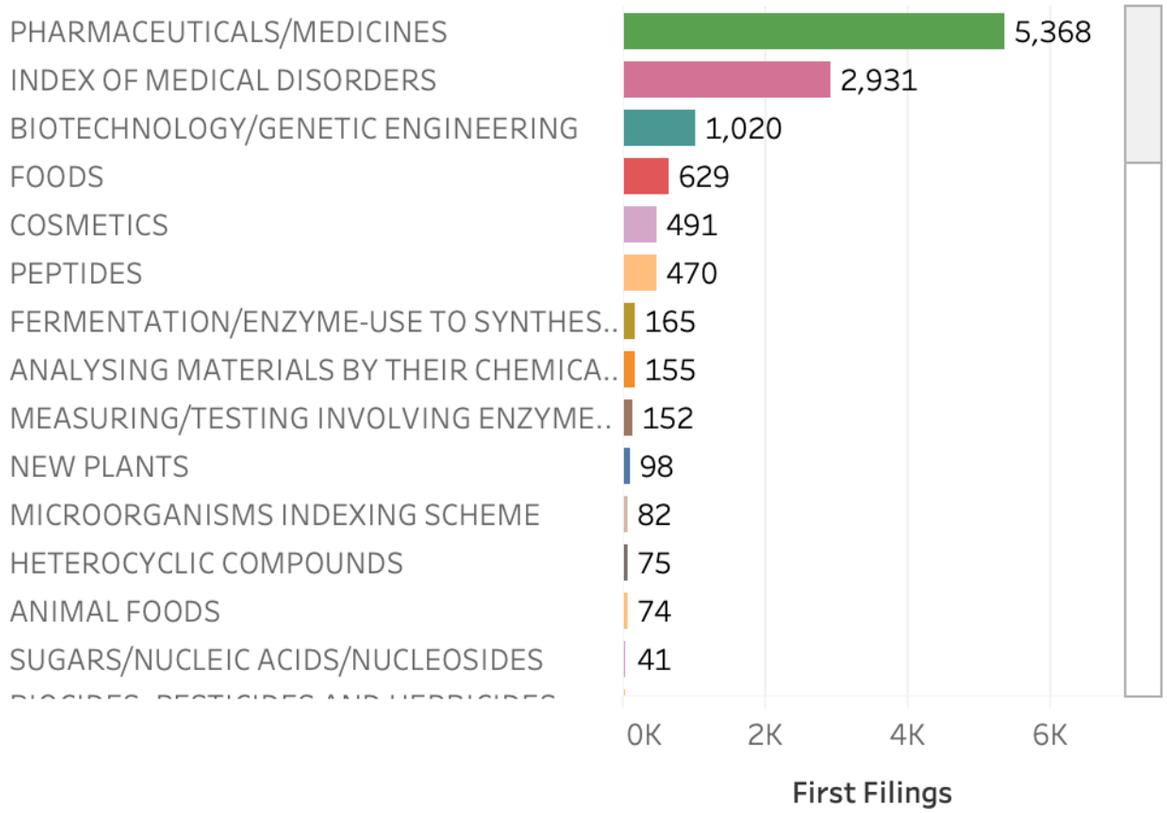


Status: Exploratory. Source: The Lens

A61K36 Sequence Filings



A61K36 Sequence Technology Areas



A61K36 Sequence applicants

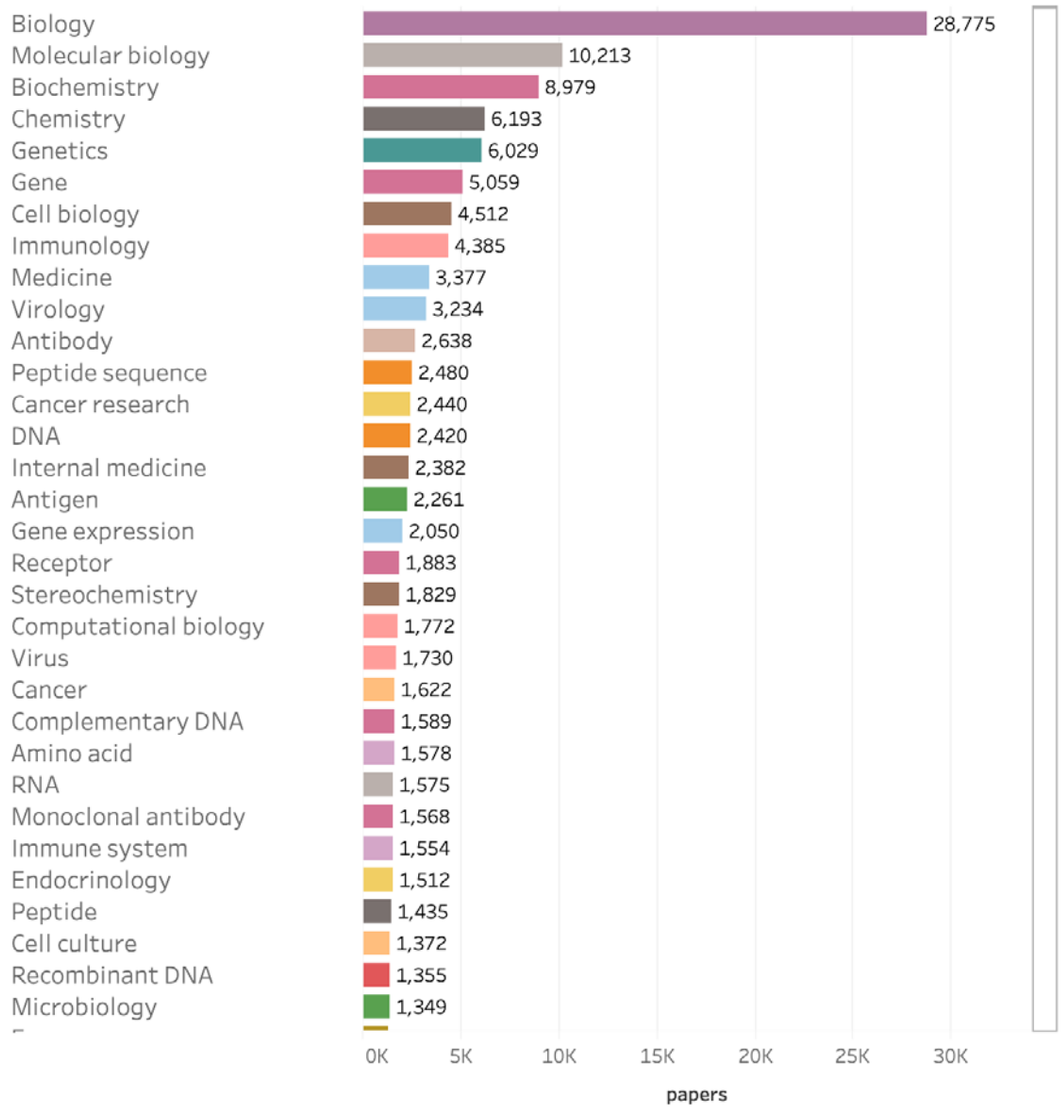
A61K36 Sequence Inventors

Status: Exploratory. Source: The Lens

SEQ Literature Top Cited in Patents

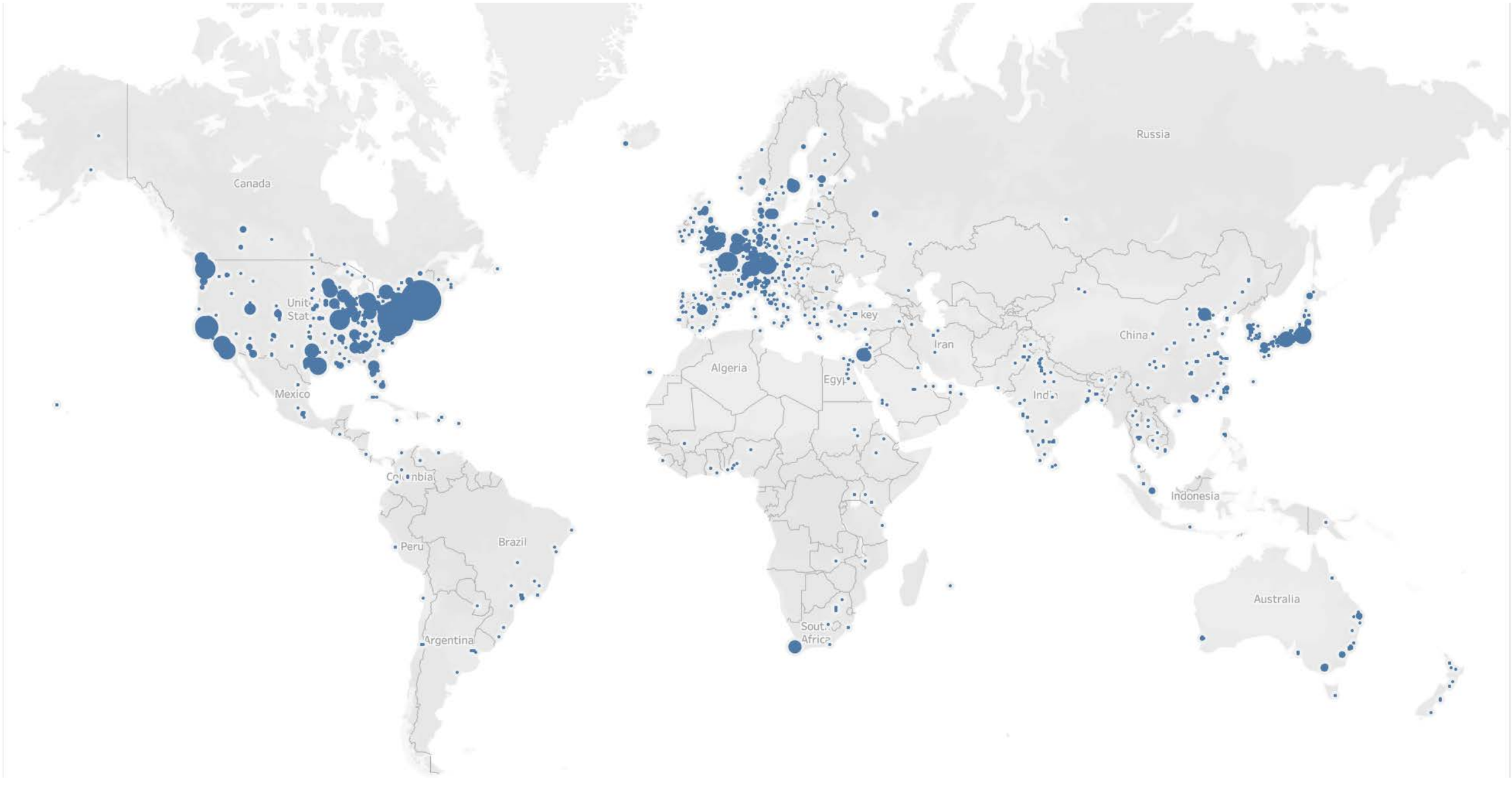
Title	
Basic Local Alignment Search Tool	11,520
Review ArticlePharmaceutical Salts	9,716
Continuous cultures of fused cells secreting antibody of predefined specificity	9,594
A general method applicable to the search for similarities in the amino acid sequ..	8,713
Gapped BLAST and PSI-BLAST: a new generation of protein database search pro..	7,989
Protective Groups in Organic Synthesis	6,651
Possible dissociation of the heparin-binding and mitogenic activities of heparin-..	6,610
Single amino acid substitution altering antigen-binding specificity	6,130
Comparative characterization of the PvuRts1I family of restriction enzymes and ..	6,118
Reshaping human antibodies for therapy.	5,929
Single-chain antigen-binding proteins	5,828
Improved tools for biological sequence comparison.	5,765
Deciphering the message in protein sequences: tolerance to amino acid substitu..	5,615
Replacing the complementarity-determining regions in a human antibody with t..	5,428
Canonical structures for the hypervariable regions of immunoglobulins	5,071
Protein engineering of antibody binding sites: recovery of specific activity in an ..	4,800
Binding activities of a repertoire of single immunoglobulin variable domains sec..	4,686
Chimeric human antibody molecules: mouse antigen-binding domains with huma..	4,333
By-passing immunization: Human antibodies from V-gene libraries displayed on ..	4,263
Making antibody fragments using phage display libraries	3,913
Antibody-antigen Interactions: Contact Analysis and Binding Site Topography	3,825
Applications and statistics for multiple high-scoring segments in molecular sequ..	3,519
Systems for Identifying New Drugs Are Often Faulty	3,469
Reshaping human antibodies: grafting an antilysozyme activity	3,416
Transforming growth factor alpha: mutation of aspartic acid 47 and leucine 48 r..	3,380
From genes to protein structure and function: novel applications of computation..	3,305
Generation of a large combinatorial library of the immunoglobulin repertoire in ..	3,134
Amino acid substitution matrices from protein blocks	3,121
"Diabodies": small bivalent and bispecific antibody fragments	3,106
Phage antibodies: filamentous phage displaying antibody variable domains	3,092
Effects of amino acid sequence changes on antibody-antigen interactions.	3,061
Rapid and efficient site-specific mutagenesis without phenotypic selection.	3,024
New methods of drug delivery.	2,906
A comprehensive set of sequence analysis programs for the VAX	2,896

SEQ Cited Literature Fields of Study



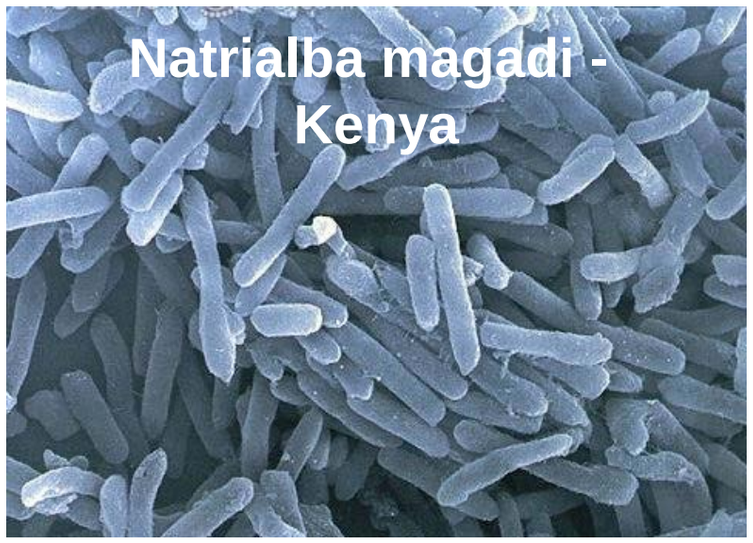
Literature Citations (NPL)

Literature cited in sequence related patent data indicates research shaping patent activity. Also helps reveals new technologies such as synthetic biology and CRISPR.
Sources: Lens and MAG. Status exploratory (50,000 top cited records)



Patent citations help reveal the global research landscape shaping sequence activity

Available affiliation information for 50,000 publications cited in patent data containing sequences. Status: Exploratory. Sources: the Lens, GRID.



Open Data

Open data that is Findable, Accessible, Interoperable and Reusable (FAIR) is central to advancing analytics for GR.

More could be done to promote open patent data to inform policy and public debates.

Disclosure

A clear disclosure statement would create transparency and promote trust.

Making the role of biodiversity in innovation visible is central to promoting recognition of its importance for human welfare.

Emergence

The patent system is well placed to inform debates on digital sequence information. But, attention to quality of analysis is needed.

Machine learning methods will increasingly improve the visibility of

Resources

- Patent Analytics:
  - WIPO Manual on Open Source Patent Analytics
  - WIPO Handbook on Patent Analytics (work in progress)
  - Online training resources (workshop materials)
- Genetic Resources:
  - WIPO Patent Landscape on Marine Genetic Resources (ASEAN)
  - WIPO Patent Landscape on Animal Genetic Resources
  - Africa Studies
  - Valuing the Deep: Marine Genetic Resources in Areas Beyond National Jurisdiction
- Emerging Technologies
  - Synthetic Biology: Mapping the Scientific Landscape
  - Synthetic Biology: Mapping the Patent Landscape
  - CRISPR: Pre-existing technological core and roots for the CRISPR breakthrough.
  - Tracking the Emergence of Synthetic Biology
  - Emergence scoring to identify frontier R&D topics and key players
  - Forecasting technologies using data augmentation and deep learning.

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