



Biodiversity and Medicines (to tackle big health challenges)

4 March 2020

Andrew Farlow

Oxford Martin School

Oxford in Berlin

University of Oxford

www.andrewfarlow.com

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HAVE I GOT NEWS FOR YOU

Have I got News For You



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MAY I GOT NEWS FOR YOU





MAY I GOT NEWS FOR YOU

hundreds of thousands of people
are being killed every day
by the actions of the government
and the military.







HAVE I GOT NEWS FOR YOU

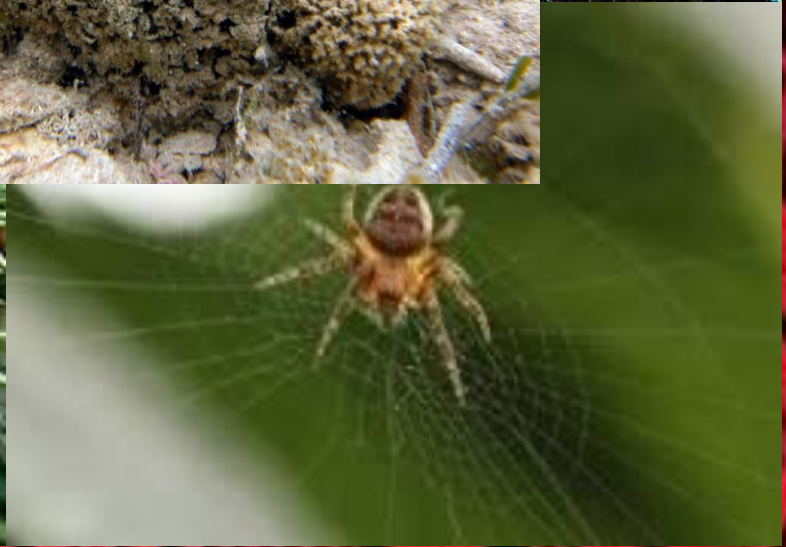


NEWS FOR YOU

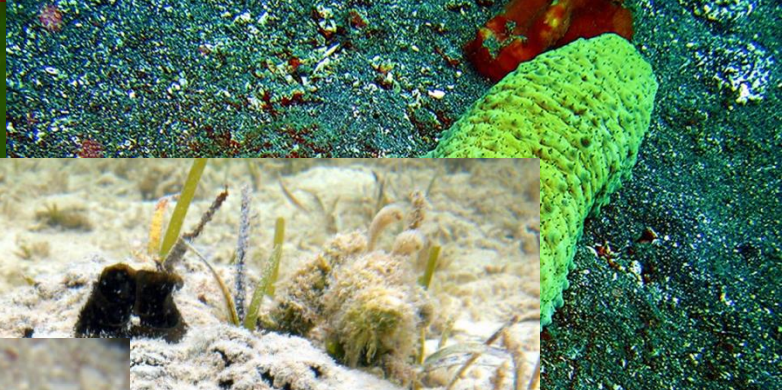
HAVE I GOT NEWS FOR YOU

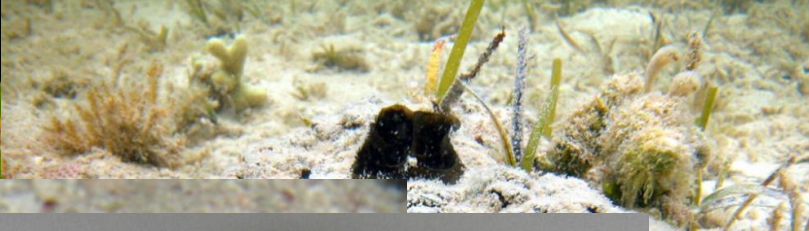












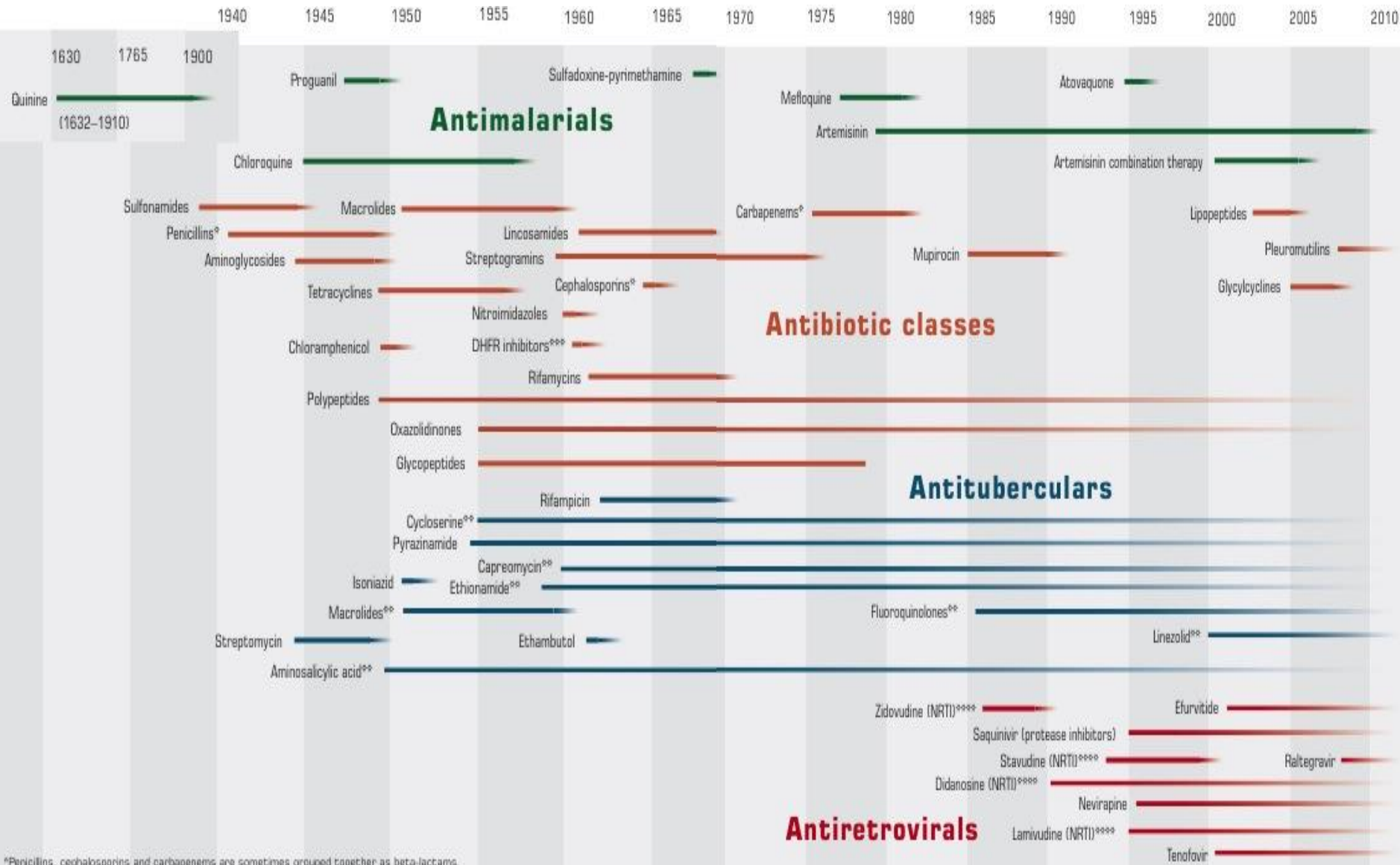
Was some of that news to you?...



Why plants?

- No immune systems
- Defend against predation by microorganisms, insects, and herbivores by manufacturing a **cocktail of chemicals**
 - > 12,000 compounds isolated
 - < 10% of the estimated total
- Millions of years of evolution
- Complex mixes of chemicals, synergistic action

Market introduction & emergence of resistance



*Penicillins, cephalosporins and carbapenems are sometimes grouped together as beta-lactams.

**Used only as second- or third-line treatment for drug-resistant TB.

***DHFR is dihydrofolate reductase.

****NRTI is nucleoside reverse transcriptase inhibitor.

Past medicines

- 593 of 1130 drugs approved between 1981 and 2010 from natural products
 - mammals, fungi, bacteria, marine organisms, plants
- 11% of WHO basic and essential drugs are exclusively from flowering plant
- **15/56 natural drugs** registered for the treatment of cancer since 1980 from **plant**
- 400,000 known species of plant
- Very few studied under laboratory conditions

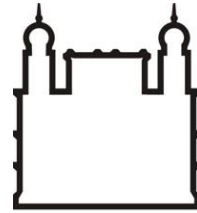
Medicines from plants

- **Cancers** (also: Camptothecin from *Camptotheca acuminata*, the happy tree; Podophyllotoxin from *Podophyllum hexandrum* and *P. peltatum*, the May apple; vincristine and vinblastine from *Catharanthus roseus*, Madagascar periwinkle);
- **heart conditions** (four patented brand-name drugs containing bark- extracted quinidine from the tree *Cinchona ledgeriana*);
- **chronic obstructive pulmonary disease** (a number of drugs based on tropane alkaloids (TAs) including scopolamine and hyoscyamine, derived from *Atropa belladonna*, deadly nightshade);
- **liver diseases** (from the seeds of *Silybum marianum*, milk thistle);
- **pain** (from *Cannabis sativa* and *Capsicum annum*, a variety of chilli);
- **diabetes** (from *Galega officinalis*, goat's rue);
- **Parkinson's** (from *Papaver somniferum*, opium poppy);
- **dementia** (from *Galanthus*, snowdrop, *Leucojum*, spring snowflake, Narcissus, daffodil, and *Physostigma venenosum*, calabar bean)

Proposition

- Building a common-good facility to accelerate the discovery and development of novel, effective, sustainable and affordable medicines based on natural products, especially plants.
- Highly interdisciplinary: biology, chemistry, botany, traditional knowledge, ethnobotany, genomics, clinical science, statistics, computer science, law, Intellectual Property (IP), 'big data', block chain, economics, business studies, management, contract design, geography, anthropology, public health, epidemiology, ecology, sociology, and medical ethics.

FIOCRUZ/Farmanguinhos



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Fundação Oswaldo Cruz



Kew Plant and Fungal phylogenetic Tree of Life (PAFTOL)





🏠 ?
Enter a plant name or herbal drug name:

Example searches you might enter:

- 'chamaemelum nobile' (scientific binomial: accepted name or synonym)
- 'chamaemelum' (component of a scientific name e.g. genus)
- 'chamomile' (common name)
- 'ginseng' (herbal drug name)
- '삼칠삼' (herbal drug name in Arabic, Chinese or any other script)
- 'cimicifugae rhizoma' (pharmaceutical herbal drug name) ¹
- 'chamomillae' (part of a pharmaceutical herbal drug name)

Use Wild Cards to broaden your search

- 'aristol*' will find all names containing a word beginning with the string 'aristol' e.g. *Aristolochia indica* AND *Piper aristolochioides*
- '*caulis' will find all names containing a word including the string 'caulis' e.g. 'Curcuma phaeocaulis' or 'Aralia nudicaulis'

Use Quotation marks to narrow your search

- A search for the term *faba-bean* (a hyphenated common name) will find all names that contain either *faba* or *bean*
- A search for the same term enclosed in quotation marks "*faba-bean*" will find far fewer names: only those explicitly matching your search string

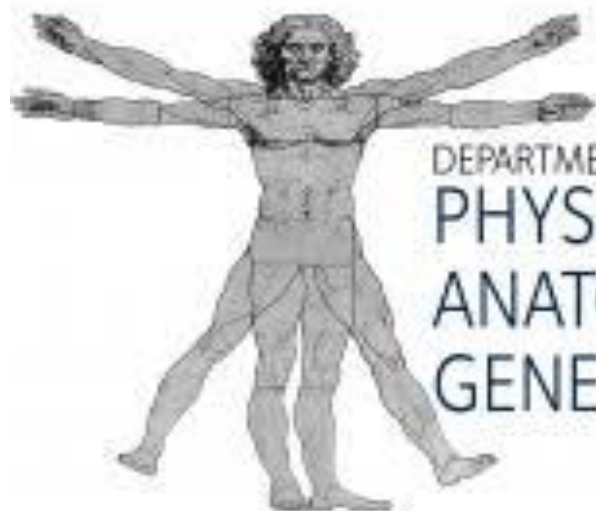
A successful search will return:

- A list of medicinal plants which have AT LEAST ONE NAME matching your search term – NB the matching name could be a common name or scientific synonym.

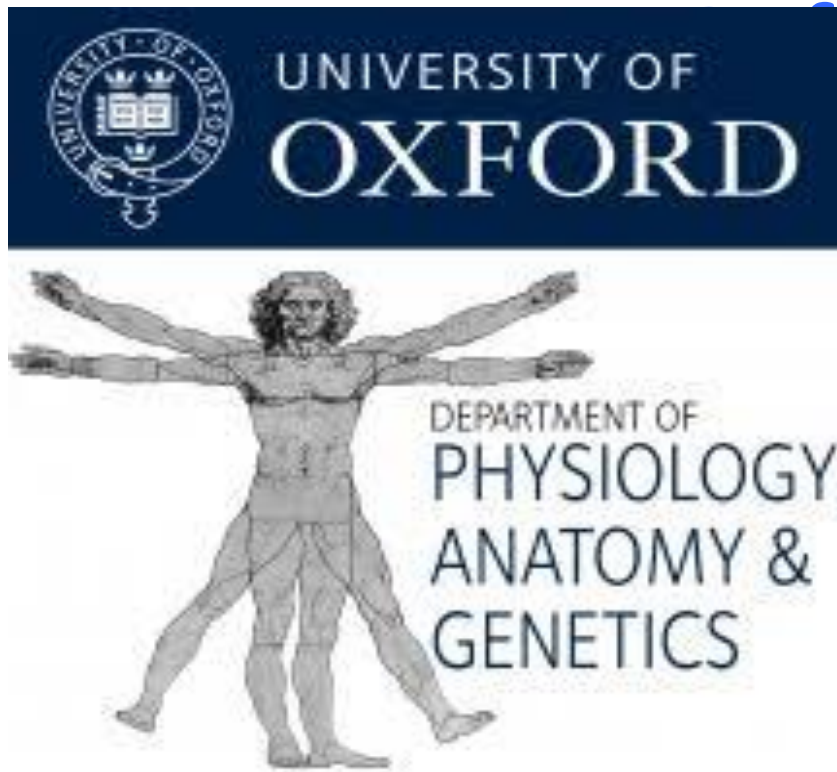
Kew Medicinal Plant Names Services (MPNS)

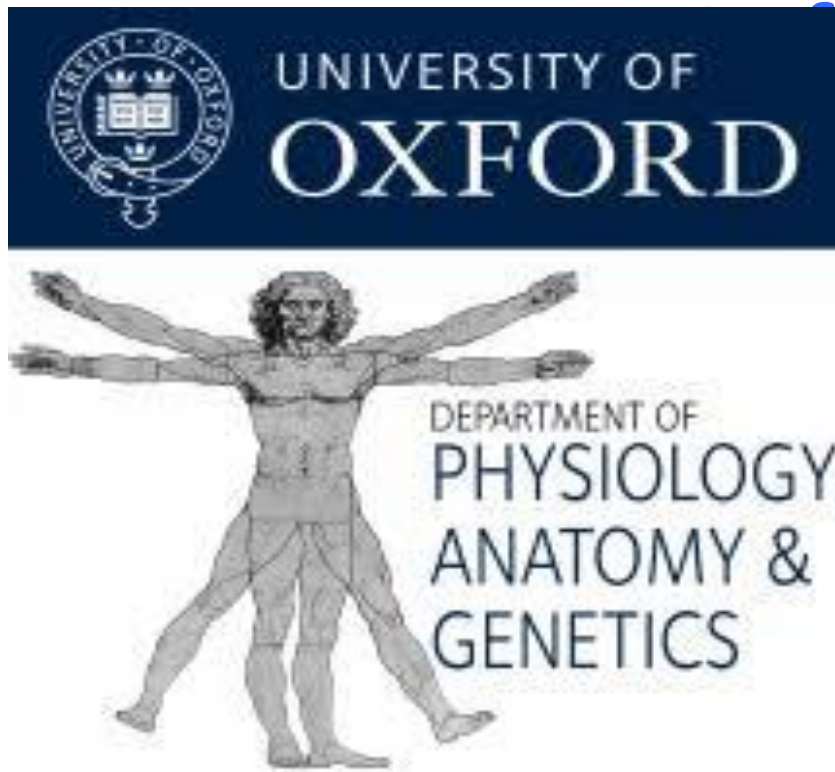


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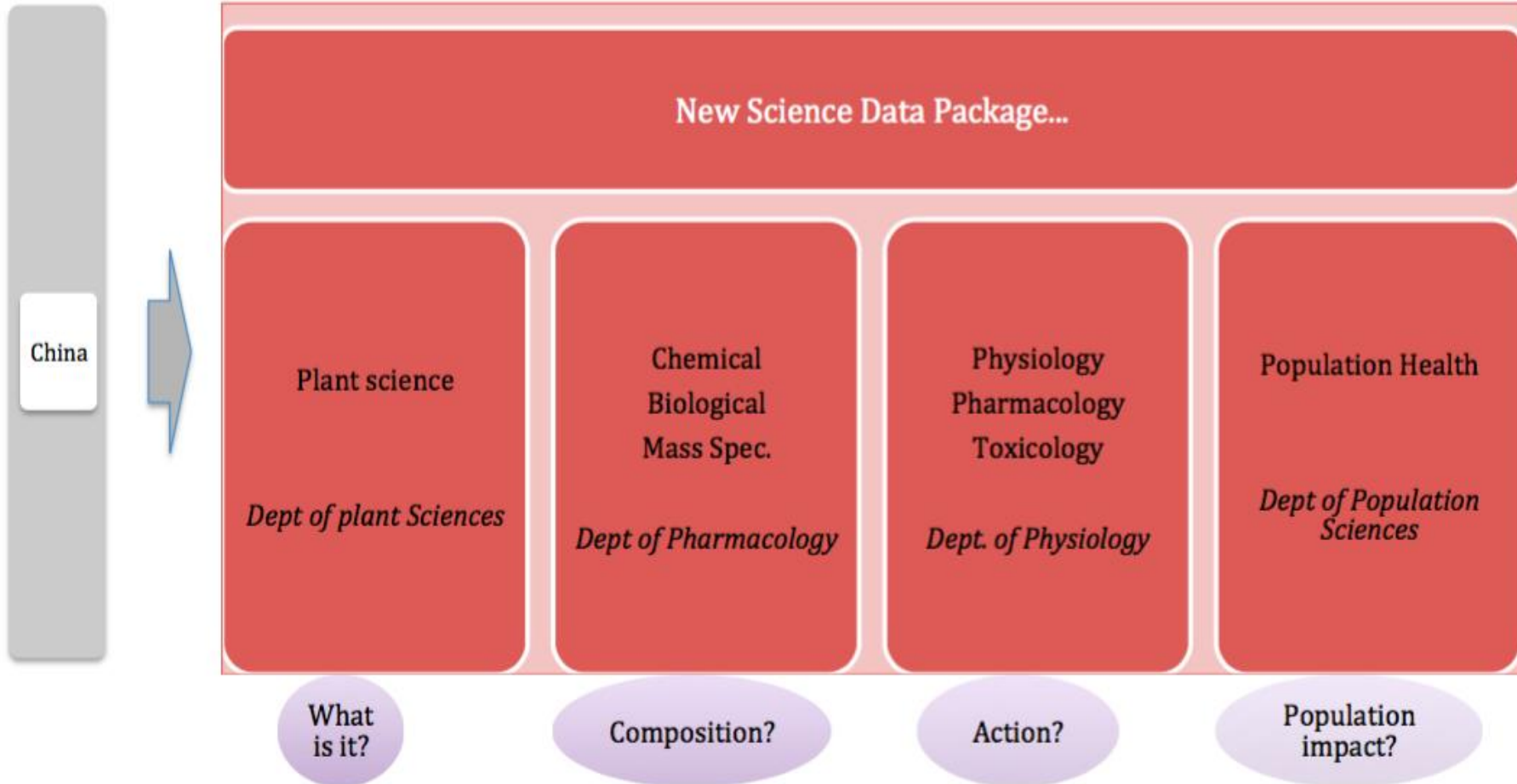
DEPARTMENT OF
**PHYSIOLOGY,
ANATOMY &
GENETICS**

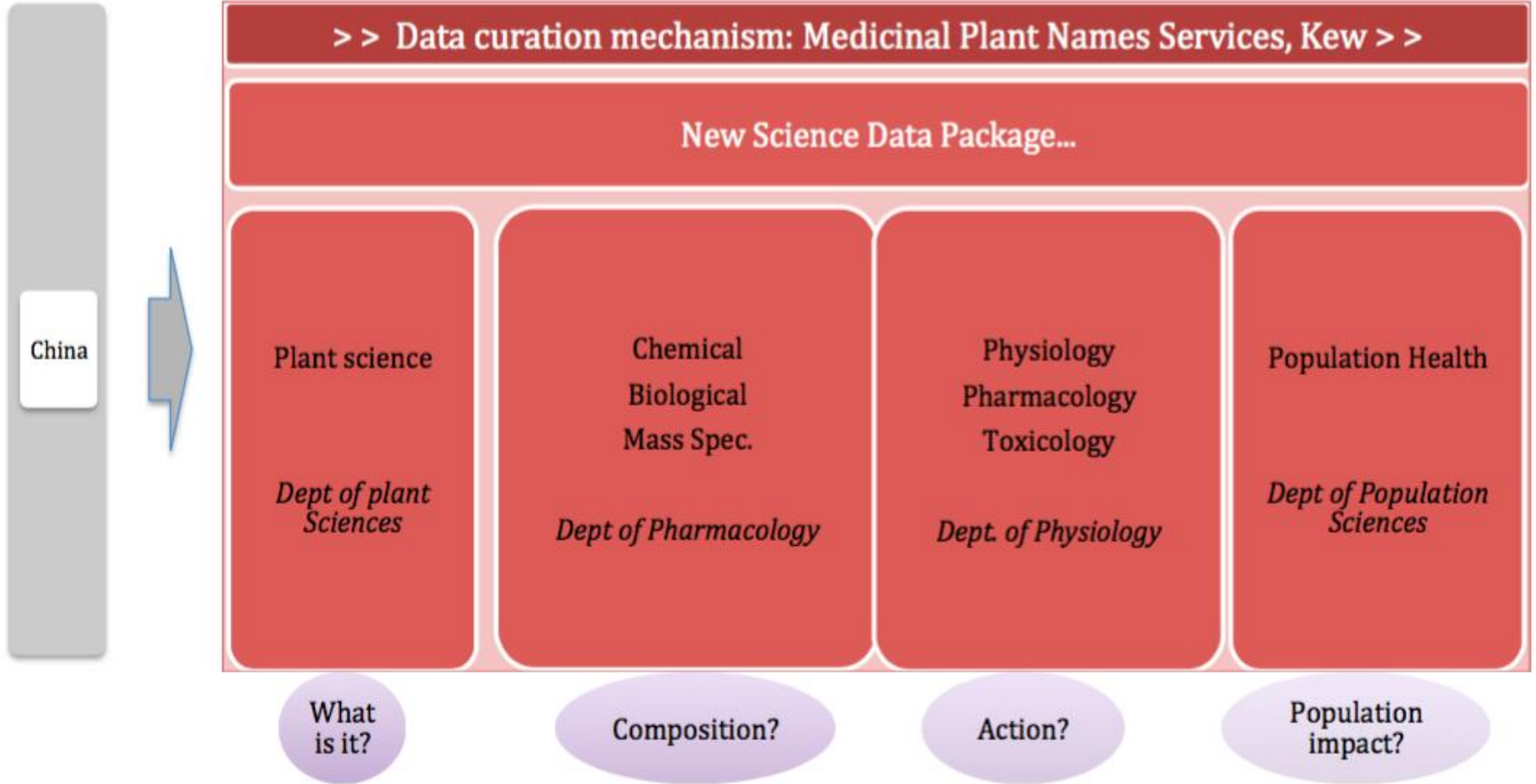


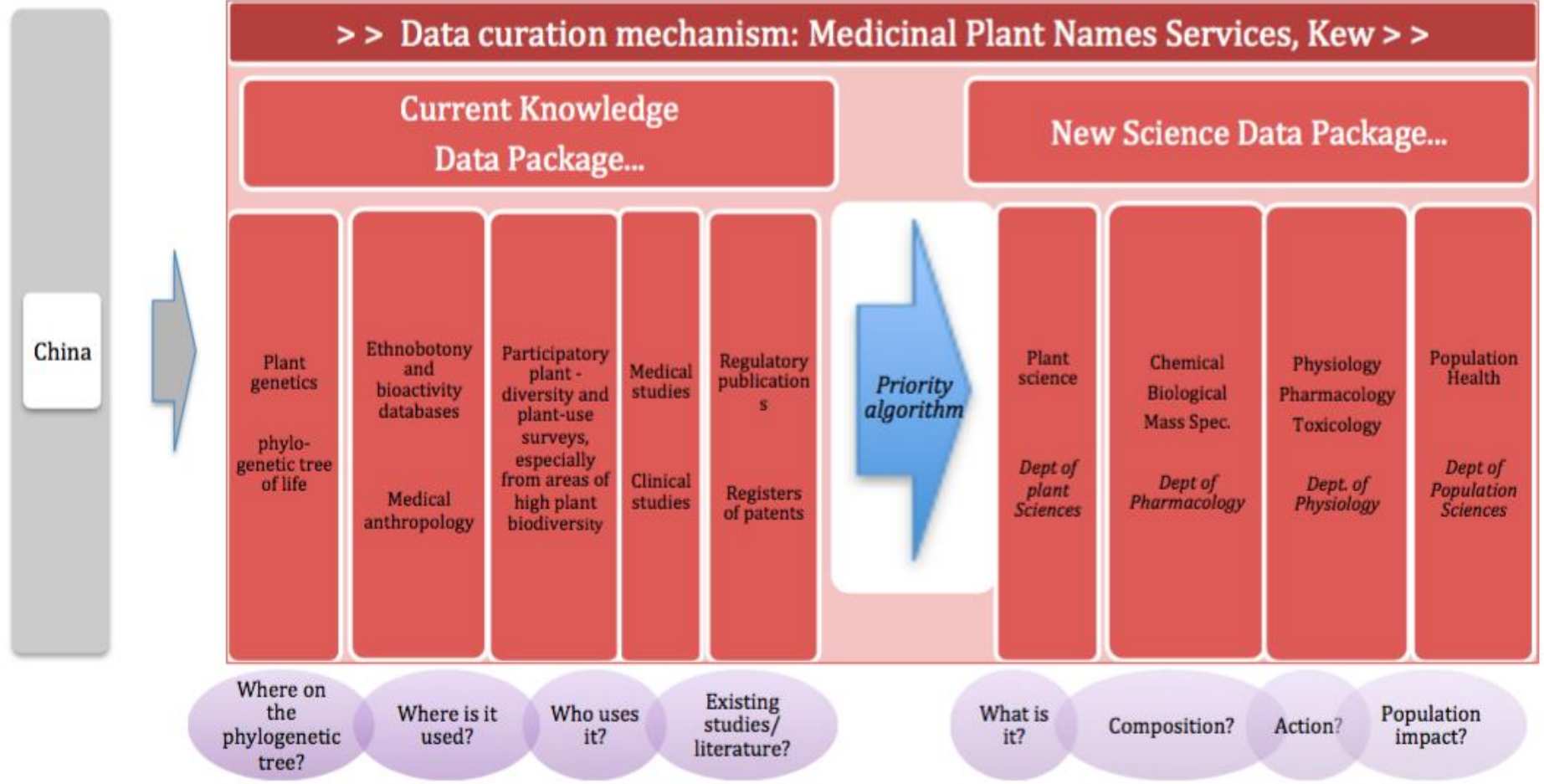


Other Partners...

- “Traffic”, Wildlife trade specialists;
- WHO? Traditional Medicine Strategy 2002–2005, Traditional Medicine Strategy 2014–2023;
- We are in discussions with agencies in India, Sri Lanka, China, and Germany;
- Exploring African countries (so far Botswana, Cameroon, Ethiopia, Ghana, Kenya, Mauritius, and Sudan).

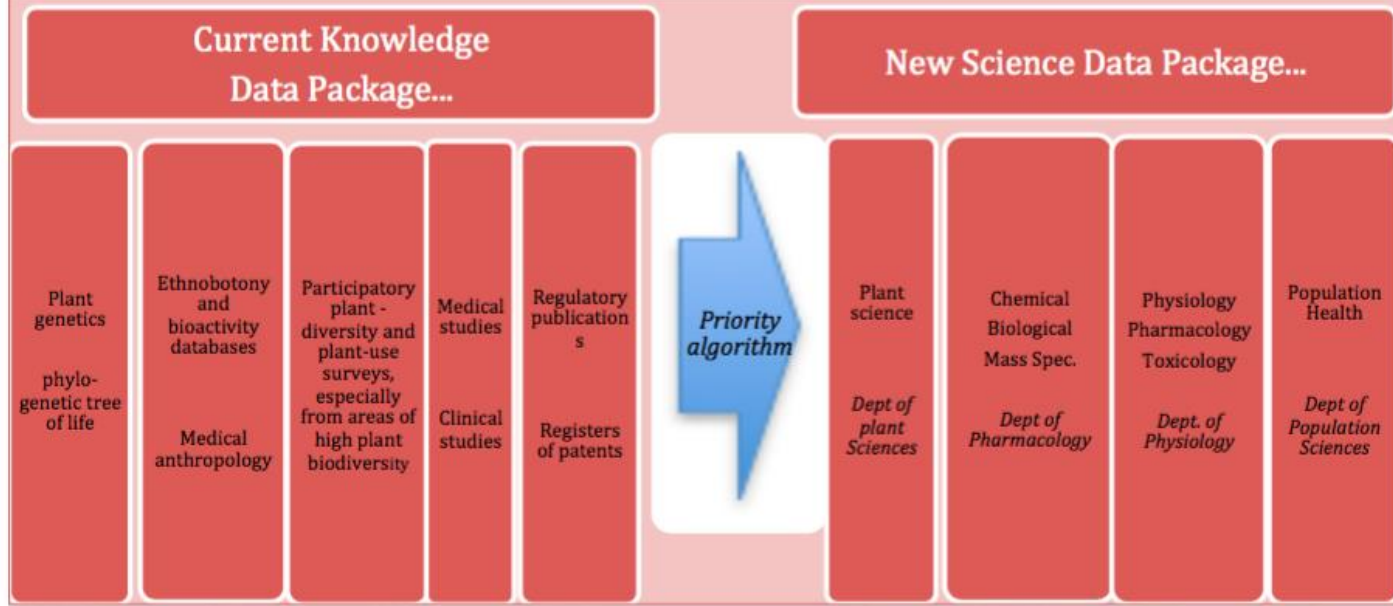






Blockchain: open-science plant-knowledge ledger

>> Data curation mechanism: Medicinal Plant Names Services, Kew >>



Blockchain: ledger of biodiversity/plant-knowledge ownership

FairWild Standard

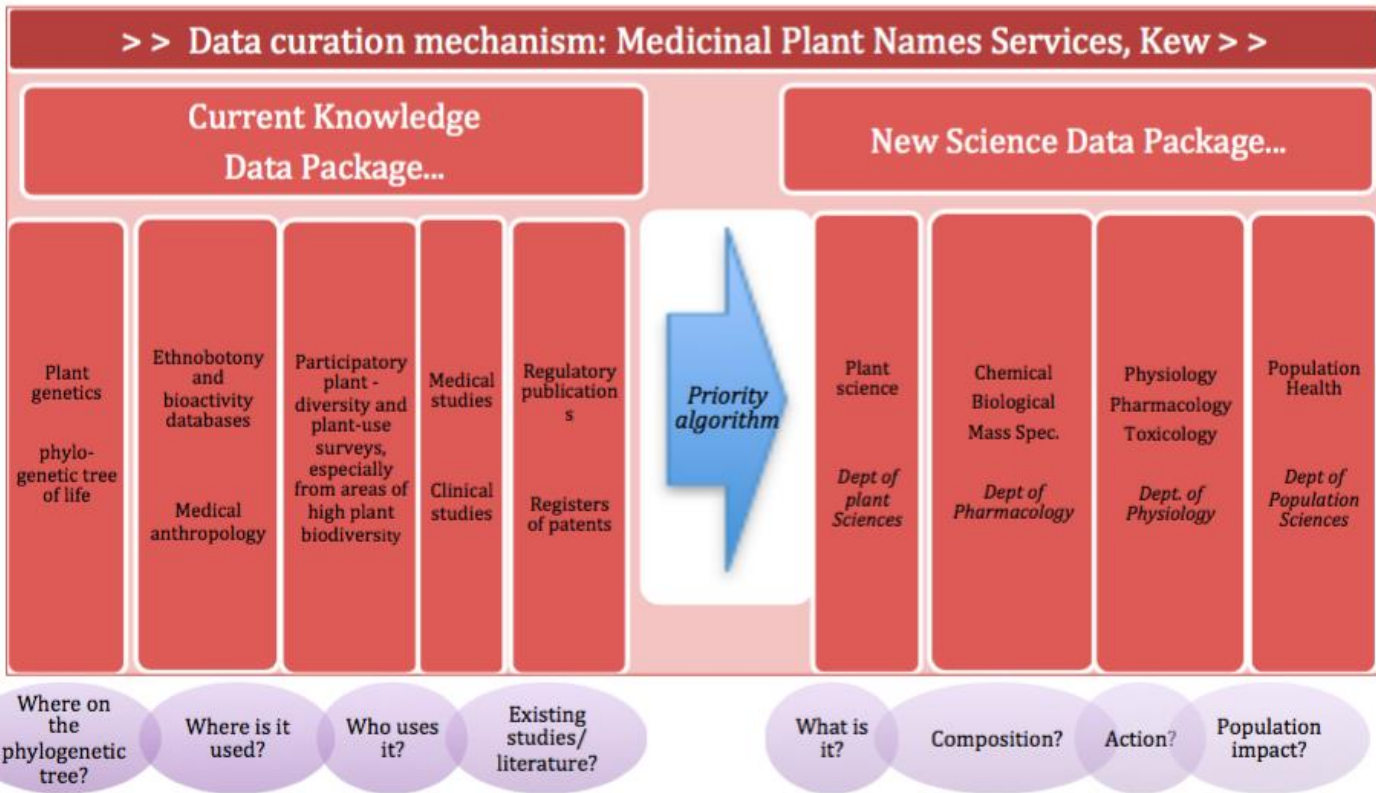
Access and Benefit-Sharing Agreements

Prior Informed Consent (PIC) Agreements

Community Biodiversity Registers/ Protocols

Compliance with Nagoya Protocol and UN Convention on Biological Diversity

Blockchain: open-science plant-knowledge ledger



- Brazil
- India
- China
- Peru
- Africa (various)

- PIPELINE (case of Brazil)
- antibiotic
 - antifungal
 - leishmaniasis
 - cancer

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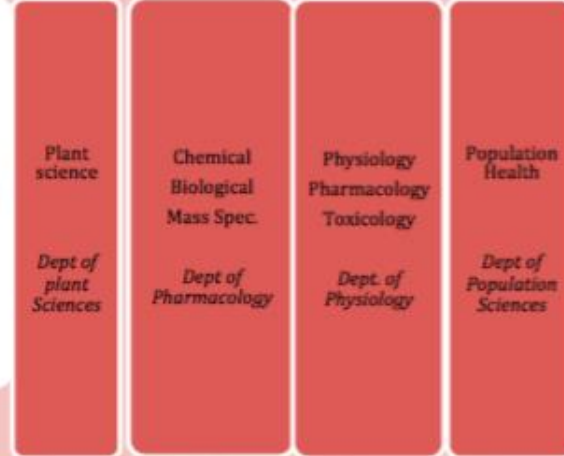
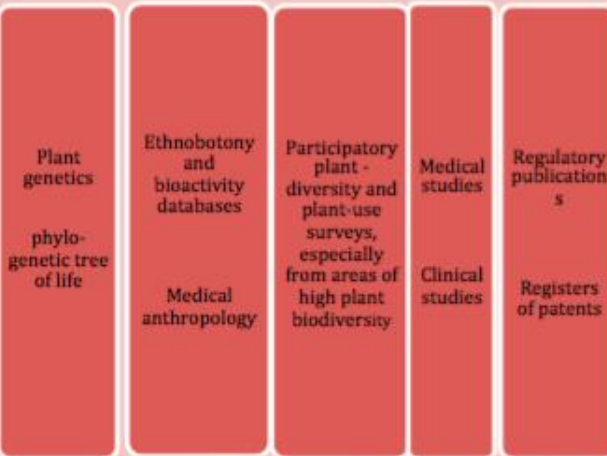
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Current Knowledge
Data Package...

New Science Data Package...



Priority algorithm

- Brazil
- India
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- Peru
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- PIPELINE (case of Brazil)
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Blockchain: ledger of biodiversity/plant-knowledge ownership

FairWild Standard

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Low biodiversity protection

Valuation and protection of biodiversity for medicine and health

High biodiversity protection



THANK YOU

