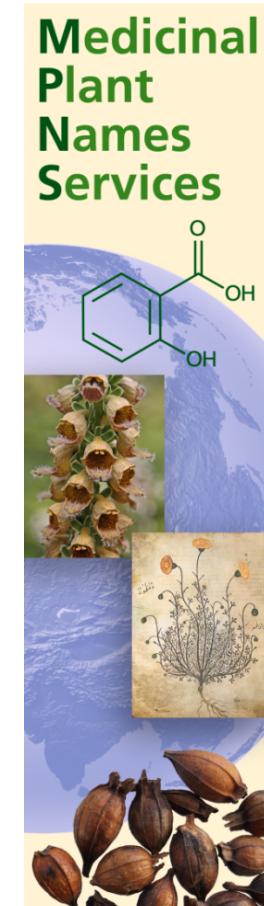


# Plant Names for Pharmacovigilance



Issues,  
Resources,  
Services  
&  
Support for IDMP

Bob Allkin, MPNS, Kew



## CONTEXT: need for terminological controls

### IDMP:

- independence from legislation
- offers precision, reliability and currency
  - avoid ambiguity: achieve consistency: up-to-date

Herbal substance = **Plant + Plant part used**

IDMP needs: unique **global persistent** identifier  
for each herbal substance

# So what's the problem?

Belgium: reliance on pinyin name “fang ji”: -  
Confusion: -



*Stephania tetrandra* (root)  
han fang ji



*Aristolochia fangchi* (root)  
guang fang ji

## Aristolochic acid nephropathy

~105 cases of renal failure

“Fang ji”: *Stephania tetrandra* + Root

US Herbs of Commerce

“*fen fang ji*”

“*han fang ji*”

British Pharmacopoeia 2012

“*Stephania Tetrandra Root*”

European Pharmacopoeia 2012

“*Stephaniae tetrandrae radix*”

## Issue 1: Common names won't do



Common names are part of language:

- use varies with place, language, discipline
- use evolves over time
- no scientific merit / “standard”

Pharmacopoeia names same limitations

- refer to detailed specific preparation
- change between editions
- imprecise determination of plant
- can refer to >1 plant or even of a “genus”
  - whose chemistry may prove to differ
- no “standard”

# Pharmaceutical name 'Cimicifugae Rhizoma'

	European Pharmacopoeia (2012)	Chinese Pharmacopoeia (2010)	Japanese Pharmacopoeia (2006)
Latin Pharmaceutical Name	<b>Cimicifugae Rhizoma</b>	<b>Cimicifugae Rhizoma</b>	<b>Cimicifugae Rhizoma</b>
Latin Scientific name(s) used in the pharmacopoeia	<i>Actaea racemosa</i> L. (Synonym: <i>Cimicifuga racemosa</i> (L.) Nutt.)	<i>Cimicifuga foetida</i> L. <u>or</u> <i>C. heracleifolia</i> Kom. <u>or</u> <i>C. dahurica</i> (Turcz.) Maxim.	<i>Cimicifuga foetida</i> L. <u>or</u> <i>C. heracleifolia</i> Kom. <u>or</u> <i>C. dahurica</i> (Turcz.) Maxim. <u>or</u> <i>C. simplex</i> (D.C.) Wormsk. ex Turcz.
Common and other name(s)	<b>Black Cohosh</b>	Largetrifoliolious Bugbane Rhizome Shengma (pin yin)	Cimicifuga Rhizome
Uses	Menopause, rheumatism	Headache, toothache, diarrhoea, measles, etc.	Headache, toothache, diarrhoea, measles, etc.

Accepted scientific name(s) for these **FIVE** species:

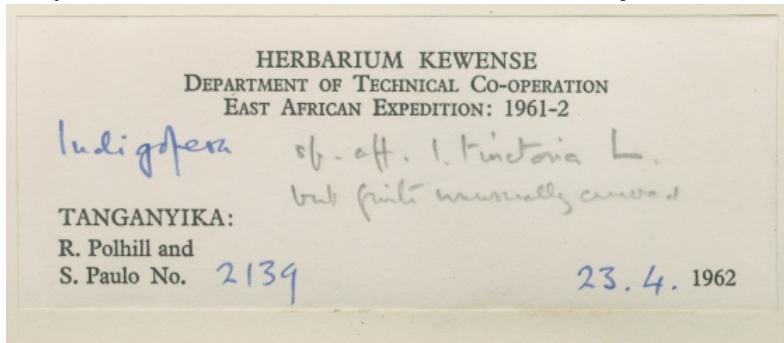
<i>Actaea racemosa</i> L.	✓		
<i>A. cimicifuga</i> L.		✓	✓
<i>A. heracleifolia</i> (Kom.) J.Compton	✓		✓
<i>A. dahurica</i> (Turcz. ex Fisch. & C.A.Mey.) Franch.	✓		✓
<i>A. simplex</i> (D.C.) Wormsk. ex Prantl			✓

# Scientific plant names: why?



- ❖ Written in Latin (international) 
- ❖ Genus + species + author “*Hucus* ~~*oocus*~~ *Bob*” 
- ❖ International Code of Nomenclature
  - Formal procedures for publishing/changing a name
  - **Author must** (among other things)
    - state why plant is different
    - cite the specimen(s) seen ... = “**TYPE**” specimen
    - **Fixes the meaning of that name for all time**

# 1) Polhill & Paulo collect a specimen:



'Polhill & Paulo 2,139'  
unique identifier

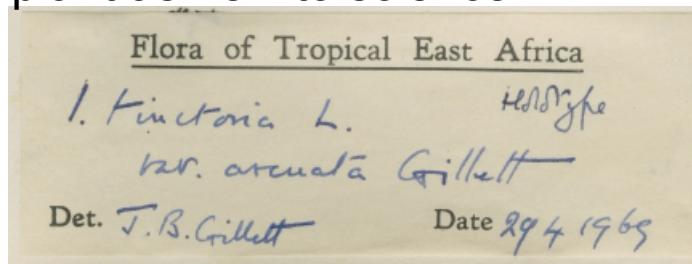


# 3) Specialist publishes new name

"*Indigofera tinctoria* var. *arcuata* Gillett"

- cites "Polhill & Paulo 2139 as 'TYPE'
- serves as physical reference

# 2) Specialist subsequently identifies plant as new to science:



## Issue 2: Synonyms: too many names

- c. 380,000 species of Higher plant
- c. 1,600,000 names for those plants
  - 10 synonyms for each medicinal species (average)
  - 500 names for some plants in British Pharmacopoeia

### Why?

- plants “discovered” > 1 in different places
- research shows two species are identical
- molecular data indicates species should move to another Genus

## Issue 2: Synonyms: too many names

### Consequences

- you fail to communicate
- fail to find published research or patient record
- prevents effective data mining
- waste investment in R&D
- waste time and effort looking for, correcting & maintaining synonyms

# Example: list from FDA



**2,046 scientific names listed:**

58% name correct and current ('Accepted')

20% name correct but older synonym

**24 plants listed under >1 name  
i.e. legislation potentially conflicting**

16% match >1 scientific name: **Ambiguous**

3% match only using fuzzy matching: **Misspelt?**

3% were not plants at all! **Errors**

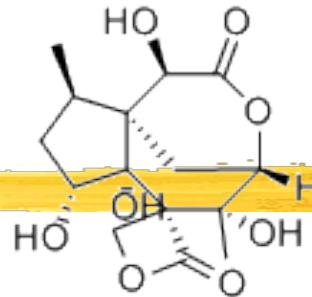
## Issue 3: Homonyms - example



EU Commission Decision: *OJEC L 2.2.2002 L 33/31*

“The botanical variety *Illicium anisatum* is scientifically recognised as highly poisonous and banned from import into the EU.....”

EU effectively banned the import of Star Anise!



'Japanese Star Anise' (Toxic)

***Illicium anisatum* L.**

common synonyms

*Illicium religiosum* S&Z.

*Bandianifera anisatum* Kuntze

Ambiguity

'Star Anise'

***Illicium verum* Hook.f.**

common synonyms

*Illicium anisatum* Lour.

*Illicium san-ki* Perr.

*Bandianifera officinarum* Kuntze

Two further homonyms

*Illicium anisatum* Bartr. ex. Michx

*Illicium anisatum* Gaertn.

## Issue 3: Homonyms: ambiguous names



- c. 1,600,000 plant names published
- 4 -5 % '*Genus + species*' published >1 author
- c. 64,000 binomials ARE ambiguous

### Consequences of ambiguity:

- risk misleading or being misunderstood
- you risk misinterpreting the literature

### Best practice:

cite author: *Genus species* Author

# Issue 4: can't rely on what you read



Use of scientific names not straightforward:

## Names misused in literature

- Misspelled
- Wrong plant (misidentified - no specimen cited)
- Synonym no longer in use
- Ambiguous name

## Taxonomic opinions differ

- regional vs global studies
- evidence base grows and improves

## Issue 4: Names keep changing

10,000 changes to names of higher plants  
published each year

- | c. 2,000 new species
- | c. 4,000 species merged/ split
- | c. 4,000 species move to new Genus

### Consequence:

Hard work keeping abreast of synonymy & changes

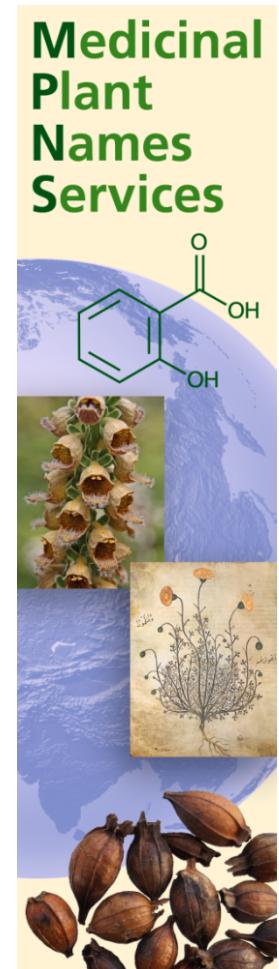
## Issue 5: Lack of reference

No single authoritative reference for plant names and plant taxonomy

- | The Plant List
- | World Checklist
- | Catalogue of Life
- | Tropicos
- | International Plant Name Index
- | EOL
- | USDA
- | GBIF etc
- | iPlants

# Why Kew?

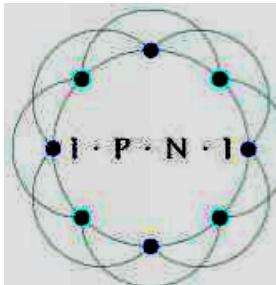
- Kew at centre of network of plant specialists and taxonomists world wide
- Kew hosts and manages the major plant names and taxonomy databases
- Provide majority of name data in systems that aggregate data (COL,EOL,GBIF)
- Kew's Plant Names Services working to make taxonomy accessible to a wider audience



# Plant Name Resources



Kew curates global authoritative references for plant & fungal names



## International Plant Names Index (IPNI)

- 1.6 million records: published names
- c. 300 K edits/ yr
- persistent unique identifiers



## Index Fungorum (IF)

- equivalent for fungi
- 600 K records

# Kew's Taxonomic Resources



Kew curates two global authoritative references to plant taxonomy



- all species all genera for 45% of families
- **Synonymy, Distribution, Habit, Links**
- Peer reviewed: >120 taxonomists worldwide
- > 200K edits annually

Fantastic quality  
40% complete



- 100% families, genera, species, names
- GSPC Target 1 for 2010
- Computer generated:
- Variable quality: relies on contributing datasets
- Last updated in 2013

100% complete  
Variable quality  
Static

# Limitations



- Multiple resources: conflicting views
- Interfaces primarily for botanists
- Lack common, trade or misspelt names
- No images
- Reliability is variable
- Machine access limited

[People and data](#)[Science departments](#)[Science staff](#)[Projects](#)[Resources and databases](#)[Databases](#)[Medicinal Plant Names Services](#)[Services](#)[Using the portal](#)[FAQs](#)[References](#)[Legumes of the World](#)[UK Germination Toolbox](#)[GIS Unit](#)[Millennium Seed Bank resources](#)[Publications and journals](#)

## Medicinal Plant Names Services

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### Medicinal Plant Names Services



**Kew**  
ROYAL BOTANIC GARDENS

Kew's Medicinal Plant Names Services (MPNS) is building a global resource for medicinal plant names that enables health professionals and researchers to access information about plants and plant products relevant to pharmacological research, health regulation, traditional medicine and functional foods.

This new resource has made it possible to develop a suite of information services tailored to the needs of these audiences. Representatives from key audiences advise on the services that are offered and the types of data included in the resource.

[Try the beta release of our portal](#)

### Why is MPNS needed?

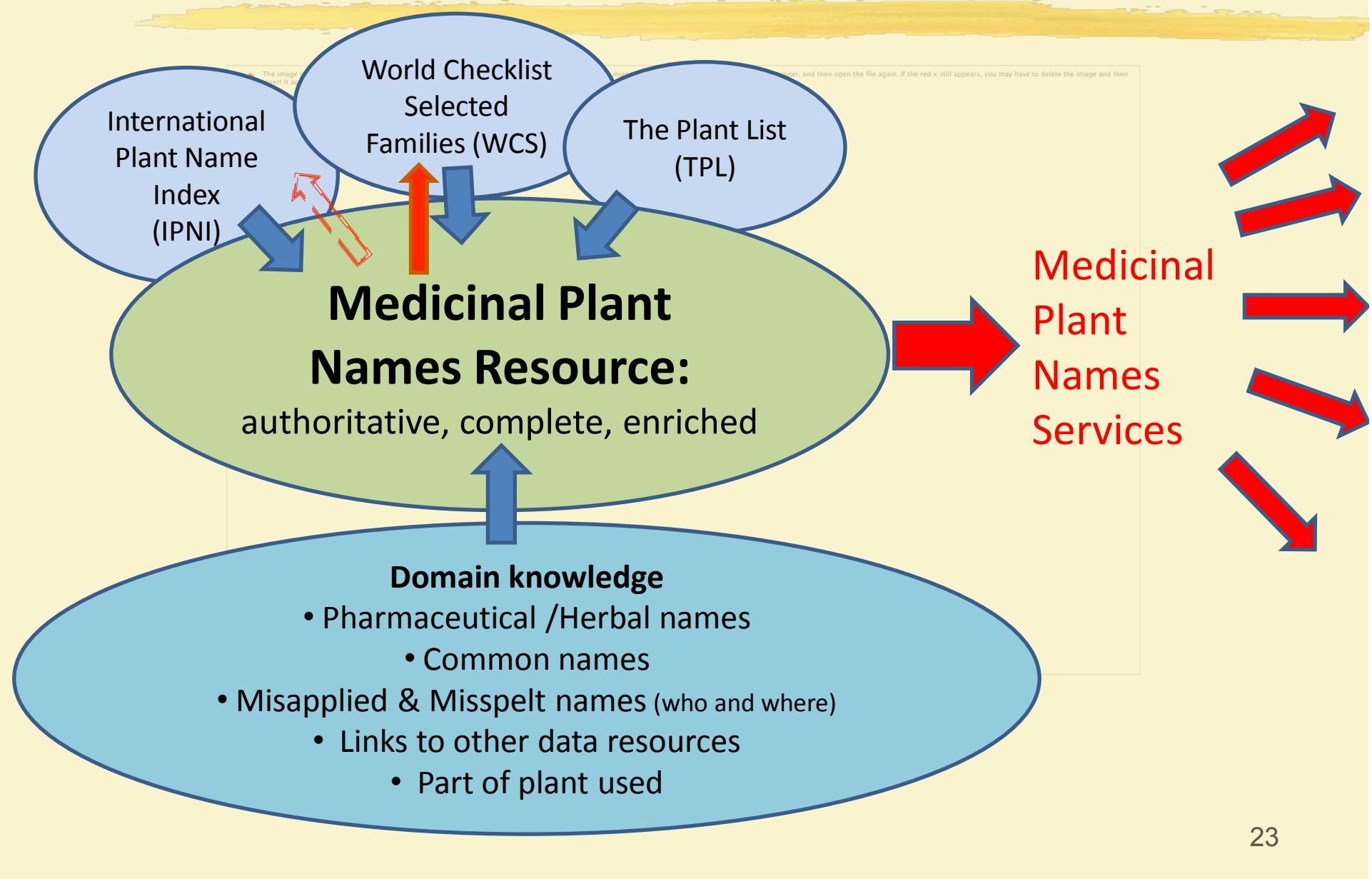
Organisations and individuals often use different names for the same plant. Professionals working in the health and research sectors, for example, as well as those in the herbal or pharmaceutical industries, all need to access information about plants and communicate accurately and effectively about them.

Medicinal plants are used globally and are known by different names in different communities, health traditions, generations and languages. The same name can also be applied to different species. Thus to find all the information

# Medicinal Plant Names Services



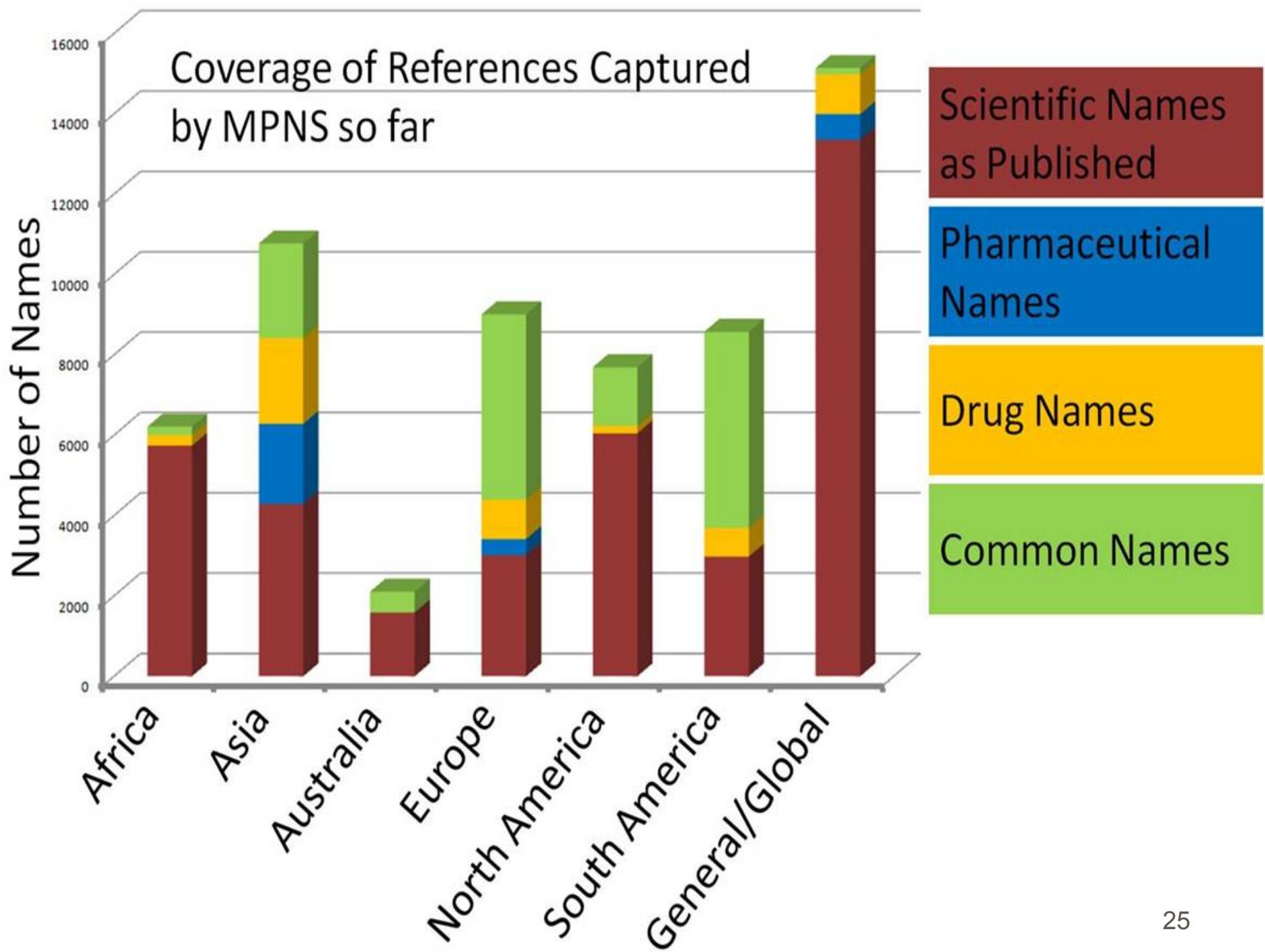
ROYAL BOTANIC GARDENS



# MPNS Resource (Version 2.0)

## 13,800 taxa

- cited in >80 medical /regulatory references
- 89 K names in use within pharmacovigilance
- 4.5 K pharmaceutical names
- 64 K common, pinyin, Chinese, Japanese, Ayurvedic & drug names
- 21 K scientific names as used in medical literature (misspelt/misused)
- 194 K names from Kew's resources (174 K not used in pharmacovigilance domain)
- Plant part + Trade form
- Taxonomic Reliability: focus on medicinal plants (>6K @ 3-star)
- Links: e.g. NCBI, etc      **suggestions welcome !**



# MPNS Services



## 1. Search Portal [www.kew.org/mpns](http://www.kew.org/mpns)

- open access

## 2. Professional services:

- consultancies for individual clients
- data/services under licence

[People and data](#)[Science departments](#)[Science staff](#)[Projects](#)[Resources and databases](#)[Databases](#)[Medicinal Plant Names Services](#)[Services](#)[Using the portal](#)[FAQs](#)[References](#)[Legumes of the World](#)[UK Germination Toolbox](#)[GIS Unit](#)[Millennium Seed Bank resources](#)[Publications and journals](#)

## Medicinal Plant Names Services

[f SHARE](#)[p SHARE](#)[t SHARE](#)[g+ SHARE](#)

Enabling effective communication in health, regulation and research.

### Medicinal Plant Names Services



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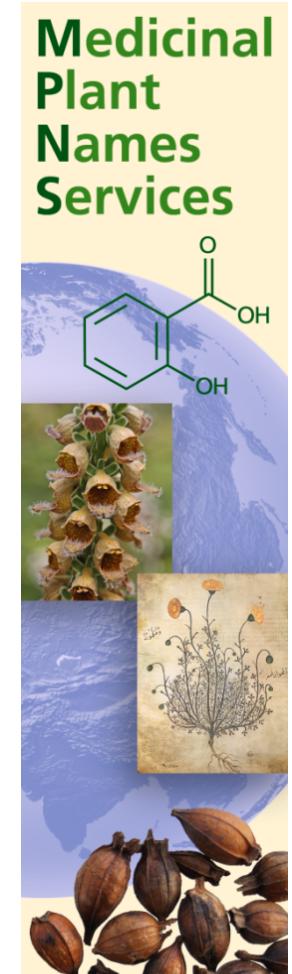
# MPNS Portal – example use



## Mu Xiang - What should I call it?



- Flora of China:  
“**Aucklandia costus** Falc.”
- Pharmacopoeia: China and Korea:  
“**Aucklandia lappa** Decne”
- US Herbs of Commerce (FDA):  
“**Saussurea costus** (Falc.) Lipschitz”
- Pharmacopoeia: Japan & Ayurvedic:  
“**Saussurea lappa** Clarke”
- Many more scientific synonyms



# Medicinal Plant Names Services



Beta Release:

Please enter a NAME to search the MPNS resource:

Need Help?

Mu Xiang

Limit search to:

All names



GO

16 records matched your search. These records relate to:



Accepted scientific names	Records referring to name
Aucklandia costus Falc.	5
Inula helenium L.	3
Dolomiaeae souliei (Franch.) C.Shih	2
Syzygium aromaticum (L.) Merr. & L.M.Perry	2
Vladimiria souliei var. cinerea Y.Ling	2
Aquilaria sinensis (Lour.) Spreng.	1
Aristolochia debilis Siebold & Zucc.	1

Mu Xiang

All names

GO

Accepted scientific name:

***Aucklandia costus* Falc., Ann. Mag. Nat. Hist. 6: 475 (1841).**

Taxonomic source: [World Checklist - unpublished](#)

Family: Asteraceae

Non-scientific names and plant parts

Scientific synonyms

Published in medicinal plant references as

Further information

Non-scientific names for this plant and parts used:

Non-scientific name:	Class of name:	Trade forms:	Plant parts:	Medicinal plant reference:
Amaya	Other	dried root	root	Siddha Pharmacopoeia India, vol. 1 (2008)
aucklandia	Other		root	Herbs of Commerce (McGuffin et al., 2000)
Aucklandiae Radix	Pharmaceutical		root	Korean Herbal Pharmacopoeia (2002)
Aucklandiae Radix	Pharmaceutical	dried root	root	Pharmacopoeia of China 2010
Changal Kustha	Other	dried root	root	Siddha Pharmacopoeia India, vol. 1 (2008)
Changal Kustha	Other	dried root	root	Ayurvedic Pharm. of India (1999-2011)
Changalva Koshtu	Other	dried root	root	Siddha Pharmacopoeia India, vol. 1 (2008)
Changalva Koshtu	Other	dried root	root	Ayurvedic Pharm. of India (1999-2011)
Common Aucklandia Root	Other	dried root	root	Pharmacopoeia of China 2005
Common Aucklandia Root	Other	dried root	root	Pharmacopoeia of China 2010
costus	Other		root	Herbs of Commerce (McGuffin et al., 2000)
costus root	Other		root, oil	Med. Pl. of the World (Wyk & Wink, 2004)
Costus Root Oil	Other	oil	root	Food Chemicals Codex (USP, 2008)
Goshtam	Other	dried root	root	Ayurvedic Pharm. of India (1999-2011)
Kath	Other	dried root	root	Siddha Pharmacopoeia India, vol. 1 (2008)
Kath	Other	dried root	root	Ayurvedic Pharm. of India (1999-2011)
Koshtham	Other	dried root	root	Ayurvedic Pharm. of India (1999-2011)
Kottam	Other	dried root	root	Siddha Pharmacopoeia India, vol. 1 (2008)
Kottam	Other	dried root	root	Ayurvedic Pharm. of India (1999-2011)
Kud	Other	dried root	root	Siddha Pharmacopoeia India, vol. 1 (2008)
Kud	Other	dried root	root	Ayurvedic Pharm. of India (1999-2011)

Mu Xiang

All names

GO



Accepted scientific name:

***Aucklandia costus* Falc.**, Ann. Mag. Nat. Hist. 6: 475 (1841).

Taxonomic source: [World Checklist - unpublished](#)

Family: Asteraceae

Non-scientific names and plant parts

Scientific synonyms

Published in medicinal plant references as

Further information

#### Further information:

The following online resources may contain further information about this plant. Please click on any link to search that resource. You can choose to search by the accepted name only or the accepted name plus all of its synonyms.

Search using just the accepted name:



National Center for Biotechnology Information

53 records



GenBank — Nucleotide Alphabet of Life



Google Images



Wikispecies



Encyclopedia of Life

Search using all scientific names used for this plant:



National Center for Biotechnology Information



1,454 records



GenBank — Nucleotide Alphabet of Life



Google Images

# Professional Services



**Name Validation:** check & enrich your plant name lists



**Vocabularies & Data Controls:** authoritative lists



**Harmonisation:** Mapping your plant lists onto others



**Consultancies:** authentication, system design, advice re workflows



**Web Services (API):** Connect IT systems to MPNS



**Training:** courses on best practice and resources

## Medicinal Plant Names Services



# MPNS support of IDMP

1. Definition
2. CV for plant names and plant parts
3. API for maintaining this CV

## 1) IDMP: Definition

Herbal Annex: co authored by Herman Deiderik & Liz Dauncey (MPNS)

Role for plant names in related annexes

Development of CV for “plant parts”  
Liz Dauncey

## 2) Plant Name CV:

**SCOPE:** scientific names / synonyms used within medicinal literature/legislation

- derived from MPNS
- names used for medicinal plants from >80 major references (incl. all major pharmacopoeia)
- covers all higher plants
- includes species, subspecies and varieties
- does NOT currently include
  - algae, lichens or fungi
  - cultivars

## 2) Plant Name CV: Draft

### In numbers:

- 24,000 scientific names
- 15,900 species
- 920 subspecies /varieties

### Provides:

- Correct spelling of each scientific name
- Taxonomic status (Synonym/Accepted/...)
- Currently Accepted scientific name
- Parent species for varieties/subspecies
- Family (cf APG III system)
- Reliability of taxonomic opinion (H/M/L)
- Source of taxonomic opinion
- Identifier from Kew's systems

### 3) API: maintenance of CV



#### Purpose

- to provide continued access to current taxonomy
- to benefit from improvements to Kew's taxonomy
- to track changes to names over time

#### Approach

- CV supplied for use locally within GInAS
- Independence from Kew's servers/software
- Agreed refresh frequency (initially 3 monthly)

#### Technologies

- Restful service
- Relational databases: Posgres and MySQL

### 3) API: tracking changes



#### Name changes:

- to spelling of Family, Genus, Species or Author
- to status of name

#### Taxonomic changes:

- to accepted (current) name for that plant
- to family
- to taxonomic reliability/source

#### Scope changes with significance for GInAS:

- new plant considered to have medicinal use
- plant removed: no longer considered to have medicinal properties (previously linked through synonymy)
- molecular data indicates that 1 “plant” should now be treated as TWO plants!

### 3) GInAS API: time lines



#### Completed:

Design of API & content of CV discussed/agreed

Draft CV built and being trialled

#### Phase 2: (2015?)

Measure and define changes in CV

API envelope to ensure secure use and monitor access

Trial API with GInAS

#### Phase 3: (Spring 2016?)

Trial by other partners?

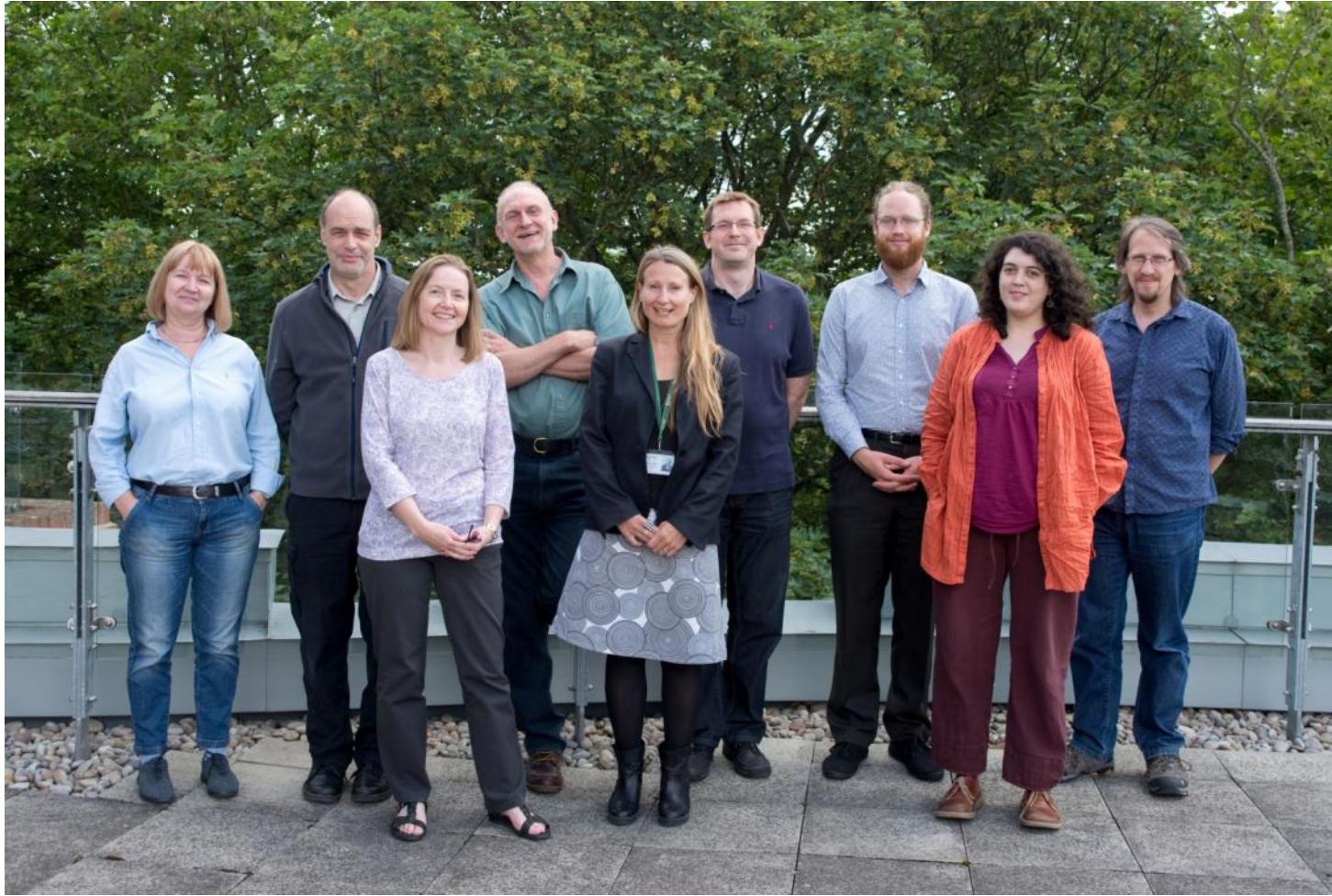
CV refresh in place

#### Medium term

Add Fungi, Allergens, Food supplements, Poisonous plants....?

MPNS services uptake within community and NEW services

# MPNS Team



## Medicinal Plant Names Services



# Medicinal Plant Name Services



Thanks for your attention

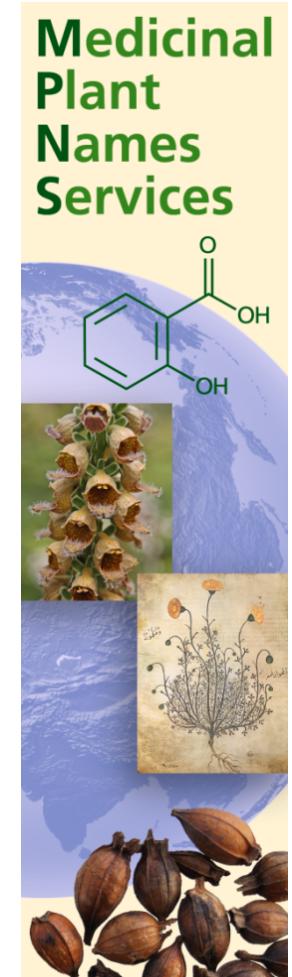
Questions?

[www.kew.org/mpns](http://www.kew.org/mpns)

[www.ipni.org](http://www.ipni.org)

[www.kew.org/wcsp](http://www.kew.org/wcsp)

[www.theplantlist.org](http://www.theplantlist.org)



Where am I? > Home > Scientific Research & Data > Databases & Publications > MPNS > Search

## Medicinal Plant Names Services



Please enter a NAME to search the MPNS resource:

[Need Help?](#)

Limit search to:

Aquilaria malaccensis

All names

GO

88 records matched 'Aquilaria malaccensis' from medicinal and taxonomic sources.

2  
 Accepted scientific names from taxonomic sources

7  
 Scientific names as used in medicinal plant references

28  
 Non-scientific names found in medicinal plant references

13  
 Medicinal plant references

88  
 All records

Accepted scientific name of plant	Records from medicinal sources using accepted scientific name	Records from medicinal sources using a synonym	Records from taxonomic sources	Total Records
Aquilaria malaccensis Lam.	23	47	13	83
Aquilaria sinensis (Lour.) Spreng.	0	4	1	5

indicates plant used medicinally.

Where am I? > Home > Scientific Research & Data > Databases & Publications > MPNS > Search

# Medicinal Plant Names Services



[Back to search results](#)

[Need Help?](#)

Limit search to:

Aquilaria malaccensis

All names

▼ GO

***Aquilaria sinensis* (Lour.) Spreng., Syst. Veg. 2: 356 (1825).**

Taxonomic source: [World Checklist - unpublished](#)

Family: Thymelaeaceae

Non-scientific names and plant parts

Scientific synonyms

Published in medicinal plant references as

Further information

## 6 Scientific names that are considered to be synonyms:

*Agallochum grandiflorum* (Benth.) Kuntze, Revis. Gen. Pl. 1: 283 (1891).

*Agallochum sinense* (Lour.) Kuntze, Revis. Gen. Pl. 1: 283 (1891).

*Aquilaria chinensis* Spreng., Syst. Veg. 2: 356 (1825), orth. var.

*Aquilaria grandiflora* Benth., Fl. Hongk.: 297 (1861).

*Aquilaria malaccensis* Benth., Hooker's J. Bot. Kew Gard. Misc. 5: 195 (1853), nom illeg.

*Aquilaria ophispermum* Poir. in G.-F.Cuvier, Dict. Sci. Nat., ed. 2, 18: 101 (1821).