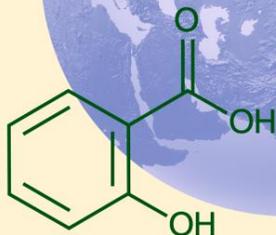


Medicinal Plant Names Services



Kew
ROYAL BOTANIC GARDENS

Medicinal Plant Names Services (MPNS)

The global trade in herbal medicines (US\$ 1.2 billion in 2003) is growing fast depending on an increasing diversity of plant and new regulatory frameworks are being put in place. It is increasingly critical therefore for professionals working in pharmacovigilance, the herbal or pharmaceutical industries or in research and development, to communicate reliably with one another about plants and their chemistry.

The problem

Medicinal plants are used globally and are known by different names in different communities, traditions, generations and languages: the same name may even be used to refer to more than one plant. Communicating unambiguously about plants requires using Latin scientific botanical names.

There are real practical obstacles facing non-botanists in using Latin scientific names appropriately. One medicinal plant may have as many as 80 different Latin names (synonyms), for example; one Latin name may refer to different plants (homonyms); Latin names are constantly changing (10,000 changes being published each year) and different botanical publications may offer different opinions as to the right name to use.

Non botanists are frequently unaware of these problems which results in significant health and economic impacts so that for example even some legislation can be meaningless (impossible to implement) or have unintended consequences. Ultimately there is no central reference to which non-botanists can turn to establish what plant a colleague refers, which scientific name to use or to find a list of all synonyms for a given plant.

MPNS: a proposed solution

The Royal Botanic Gardens Kew is developing:

- 1) a digital global reference resource for medicinal plant names.
- 2) a suite of novel information services, based upon this resource and designed specifically for professionals working in the above disciplines.
- 3) a stakeholder group drawn from these communities to help us scope, design and prioritise the above services.

The following sections provide more detail about the need for medicinal plant information services, our approach to meeting this need and why we are well placed to do so.

A new authoritative reference resource for medicinal plants

A number of global plant name resources are already housed at Kew (see separate section). These were largely designed by botanists for other botanists and none was tailored to meet the precise needs of medicinal, chemical and pharmacovigilance professionals. More significantly still none of the existing resources is complete, up to date and authoritative (peer reviewed) for medicinal plants.

Support from the Wellcome Trust is enabling MPNS to build upon the existing resources at the Royal Botanic Gardens, Kew to create an authoritative reference list of medicinal plants and their names which links to the relevant literature and legislation. We intend this resource to be more accessible and better designed for use by our target audience than the more botanical resources currently available.

Novel services from MPNS

MPNS is developing a range of information services addressing different needs.

- 1) A web portal for those with specific questions e.g. 'What is the scientific name of this plant?', 'What synonyms have been used in the past?' or 'Where is this plant found?'
- 2) Information services tailored for organizations that handle their own databases or lists of medicinal plant names. The services will include:
 - a. validation of lists of plant names; suggesting corrections when in error;
 - b. return the current "accepted" name for each plant along with all synonyms;
 - c. detecting when a user lists the same plant twice under different names.
- 3) Subscription services offering data downloads updated every 6 or 12 months.
- 4) Machine to machine web services (API interface) enabling a client's own information systems to directly access MPNS resources extracting the data it needs when it needs it.
- 5) Consultancies including
 - a. guidance and advice on the use of plant names: good practice guidelines.
 - b. design of information systems built to manage or depend upon plant names;
 - c. value added services including expert authentication services offered through Kew's Innovation Unit and Plant Authentication Services.

The web portal will be freely available across the internet. More sophisticated services, tailored to the particular requirements of an institution, will be provided under licence. Licence fees will be charged where appropriate as a means of sustaining these services over the longer term.

MPNS stakeholder group

Fundamental to establishing services which are effective is the creation of a group of stakeholders to help us scope, design and prioritise these services. We anticipate this Group meeting infrequently during the 3 – 4 year development phase and establishing itself so as to continue guiding MPNS and advising on the future sustainability of the services.

MPNS as part of a global information network

There already exists a rich diversity of information about the chemistry, use, legislation, conservation of medicinal plants including photographs. These resources range from research material or legislation to popular guides and compilations. MPNS does not aim to replace these existing resources or duplicate their efforts. It would not be sustainable to do so. Rather we seek partnerships with other information providers to the benefit of end-users.

We seek to work with key resources by validating the names they use. By linking our names index to their own information resources we can help their users locate all records for a given plant regardless of the name used. MPNS will also detect and resolve ambiguities within these partner resources and help those publishing information to use plant names unambiguously.

Rather than impose a "standard" set of names MPNS will thus allow users to map or link lists and information in one resource to information held in others.

For further information:

Please contact us if you have questions or would be interested in participating either as a potential user of the planned services or as a potential collaborating partner.

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Medicinal Plant Names Services



Medicinal Plant Names Services (MPNS): Background & Context

Impact: examples of misuse

Inappropriate use of plant names has practical and sometimes alarming consequences. A few examples follow:

- European, US and UK Regulators (working in both Health and Trade) have frequently published legislation which is either ambiguous (it is unclear which plant is being controlled) or simply wrong (e.g. banning the import of a useful plant rather than its poisonous relative).
- Poisons clinics (e.g. within National or WHO networks) fail to share adverse reactions records with one another since they use different names for the same plant.
- A researcher fails to locate all chemical & molecular records for a particular plant within a major digital resource (e.g. GenBank or PubMed; US Ministry of Health) because those records use different names.
- Herbal practitioners prescribe the wrong plant by confusing similar names; at best that plant could render the prescription ineffective and at worst make it toxic.
- US and Japanese health regulators are known to have assigned inconsistent control procedures for a single medicinal plant by listing it more than once under different synonyms.
- Industry R&D teams undertake laboratory trials of inappropriate plants or miss commercial opportunities through failing to find key research published using older synonyms for that plant.
- Customs officers fail to implement trade regulations when unscrupulous importers employ obscure synonyms or even make up meaningless names when importing plant materials.

The scale of the problem

The impact of the lack of a central reference point for medicinal plant names is significant.

- The global trade in herbal medicines is significant. In 2003 it consisted of 467,000 tonnes annually worth US\$1.2 billion involving more than 3,000 different plant species. The volume and diversity are known to have increased significantly since then.
- The US National Institutes of Health's National Library of Medicine (PubMed) contains 22 million literature citations relating to plants which grew by 40,000 citations last year. Many names included are old synonyms, spelt incorrectly (and thus never found) or are ambiguous and thus misleading.
- There are between c 350,000 and 400,000 species of plant. More than 1 million different Latin Scientific names have been published for these plants and these names change over time: new plants are discovered (2,000 per annum), known plants are reclassified into different genera (4,000 per annum) and names are placed into synonymy for the first time (4,000 per annum).
- It is not possible to be precise about the number of plants that are used for medicinal purposes though the consensus is more than 70,000 different species.
- The Uppsala Monitoring Centre (WHO) hold records relating to more than 3,000 herbal plant species (with incomplete nomenclature) and act as a clearing house for a worldwide network of poisons and health clinics reporting adverse reactions (30,000 cases involving plant materials last year).

Why Latin scientific plant names are necessary

Latin scientific plant names are the only means for communicating unambiguously about plants. Common names vary between countries and depend upon language; their meanings varying from place to place or between communities. Trade names or pharmaceutical names may also be used variably. 'Scientific plant names', in contrast, are formally published (following the International Code for Botanical Nomenclature) including a link to the physical plant specimens seen by the author publishing the new name. These 'type

specimens', deposited in herbaria around the world, fix the meaning of that name for all time. Latin scientific plant names are international in scope and used in legislation (trade, health & conservation).

Obstacles to using Latin scientific plant names

Despite the advantages of Latin scientific names there are nevertheless known issues in communicating safely and effectively – especially for those that were not trained as botanists.

Many more names than plants: 1.6 million Latin scientific names have been registered for c. 370,000 known plant species. Thus a medicinal plant may have as many as 80 alternative names & information recorded under any one of these synonyms. To find all published data for a particular plant therefore requires that pharmacovigilance staff know all possible names for a plant. Where do they find out?

One name can mean different plants: The same Latin scientific name (published by different botanists at different times: "homonyms") may refer to different species i.e. plants may share the same name.

Previous misuse of names: Many names cited in pharmacopoeia, in the medicinal literature or even in current legislation are

- a. synonyms of the currently accepted names
- b. names that were never formally published and are thus meaningless
- c. names used in error (mistaken identity)

Names change: New plants are constantly discovered and as our knowledge about biodiversity improves so we understand the relationships among plant species more perfectly and name changes become necessary to better reflect these taxonomic proximities and indicate which are more likely to share a similar chemistry. 10, 000 name changes are published annually.

Opinions differ: Views of plant relationships published 50 years ago may no longer be valid and studies of the plants in one country will look at different sets of plants from those in other countries. Thus publications can contain conflicting opinions about which names are synonyms of which.

MPNS & existing plant name reference resources

A number of global plant name references already exist & are managed by the Royal Botanic Gardens Kew. Each has a different purpose, scope and history. Each is useful but none is complete for all medicinal plants or designed specifically for use by those working with medicinal plants. MPNS will build on these resources to deliver information services specifically to such audiences

The International Plant Name Index (www.ipni.org): is a comprehensive catalogue of published Latin scientific plant names. It is used globally as the standard reference for these names. It contains 1.6 million records, and is continuously updated as new plant names are registered. It is a collaborative project with Harvard University and the Australian Government, hosted and curated at Kew and is accessible free of charge via the internet. Its main use is for nomenclatural and taxonomic research. It does not attempt to provide information on synonymy among those names.

The World Checklist of Selected Plant Families (www.kew.org/wcsp/) has been developed over the last 15 years at Kew with guidance and advice from >150 botanical specialists worldwide. This lists all plants of the world for an increasing number of plant families. For all species in any of the included families, you can discover geographical distribution, full Latin scientific synonymy and cross references to all of the scientific plant names ever used for each plant. Peer reviewed accounts are available online for c 45% of plant families.

The Plant List (www.theplantlist.org) is a working list of all known plant species and aims to be comprehensive for all species of vascular plant and of *Bryophytes* (mosses and liverworts). Built in collaboration with the Missouri Botanical Garden, The Plant List provides the accepted Latin scientific name for most species linked to all Latin scientific synonyms by which that species has been known. The list also includes names of Unresolved status (when the various contributing data sources did not contain sufficient evidence to establish whether the name is accepted or not). *The Plant List* includes 1 million Latin scientific plant names of species rank of which c 300K are accepted species, c 480K are synonyms and c 263K are unresolved names.