## Taxonomy of plant pathogenic fungi

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• 1753 - Carl Linnaeus publishes Species Plantarum

• 1859 - Charles Darwin publishes On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life





- 1867 Laws of Botanical Nomenclature in Paris also covered fungi
- 1904 Pier Andrea Saccardo proposes both asexual (*Fungi* Imperfecti, Deuteromycota) and sexual (*Fungi Perfecti*) names for fungi



 1953 – James Watson and Francis Crick Charles determine the structure of DNA

*"the specific pairing ..... suggests a possible copying mechanism for the genetic material."* 



1983 – Kary Mullis
conceived PCR and the
*Thermus aquaticus* (Taq)
PCR method



• 1981– Article 59 introduced to the *International Code for Botanical Nomenclature* which formally allowed anamorphic and teleomorphic names

INTERNATIONAL CODE OF NOMENCLATURE FOR ALGAE, FUNGI, AND PLANTS (MELBOURNE CODE)

2012



- 1991 number of fungi estimated as 1.5 million species (only 70,000 known at that time) (Hawksworth 1991)
- 2011 estimate rises to 5.1 million species (Blackwell 2011)





## History of the molecular revolution

- 1990s Molecular phylogenetics and systematics gains momentum with the aim that
  - classification must reflect phylogeny



Budhanggurabania cynodonticola

#### A consequence of the molecular revolution

#### "recognises the need for ..... a single-name nomenclatural system for all fungi...."

#### The Amsterdam Declaration on Fungal Nomenclature

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Abstract: The Amsterdam Declaration on Fungal Nomenclature was agreed at an international symposium convened in Amsterdam on 19-20 April 2011 under the auspices of the International Commission on the Taxonomy of Fungi (ICTF). The purpose of the symposium was to address the issue of whether or how the current system of naming pleomorphic fungi should be maintained or changed now that molecular data are routinely available. The issue is urgent as mycologists currently follow different practices, and no consensus was achieved by a Special Committee appointed in 2005 by the International Botanical Congress to advise on the problem. The Declaration recognizes the need for an orderly transitition to a single-name nomenclatural system for all fungi, and to provide mechanisms to protect names that otherwise then become endangered. That is, meaning that priority should be given to the first described name. except where that is a younger name in general use when the first author to select a name of a pleomorphic monophyletic genus is to be followed, and suggests controversial cases are referred to a body, such as the ICTF, which will report to the Committee for Fungi. If appropriate, the ICTF could be mandated to promote the implementation of the Declaration. In addition, but not forming part of the Declaration, are reports of discussions held during the symposium on the governance of the nomenclature of fungi, and the naming of fungi known only from an environmental nucleic acid sequence in particular. Possible amendments to the Draft BioCode (2011) to allow for the needs of mycologists are suggested for further consideration, and a possible example of how a fungus only known from the environment might be described is presented.

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#### Key words:

Anamorph Article 59 BioCode Candidate species Environmental sequences International Code of Botanical Nomenclature MycoCode Pleomorphic fungi Teleomorph

#### History of the molecular revolution

- 2012 International Code of Nomenclature for algae, fungi, and plants (Melbourne Code) allows
  - electronic publication
  - English descriptions
  - new names must have an identifier,
- e.g. MycoBank number (<u>www.mycobank.org</u>)
  - one name only for each species
- 2012 ITS gene region selected as the official barcode gene

INTERNATIONAL CODE OF NOMENCLATURE FOR ALGAE, FUNGI, AND PLANTS (MELBOURNE CODE) 2012

# The molecular revolution is over and plant pathologists can now easily identify ascomycetes!

Four principles when naming plant pathogenic fungi

- Monophyly of taxa
- Clade stability
- Phenotypically conspicuous
- Host specificity secondary principle