

Agriculture and Forestry in the –omics era

World Bamboo Congress : April 10, 2012

Prof. Em. Marc Van Montagu

Chairman, IPBO



**Institute of
Plant
Biotechnology
Outreach**

Websites: www.ipbo.ugent.be

www.psb.ugent.be

www.efb-central.org

www.pubresreg.org

E-mail: marc.vanmontagu@ugent.be

World Bamboo Congress - April 10, 2012



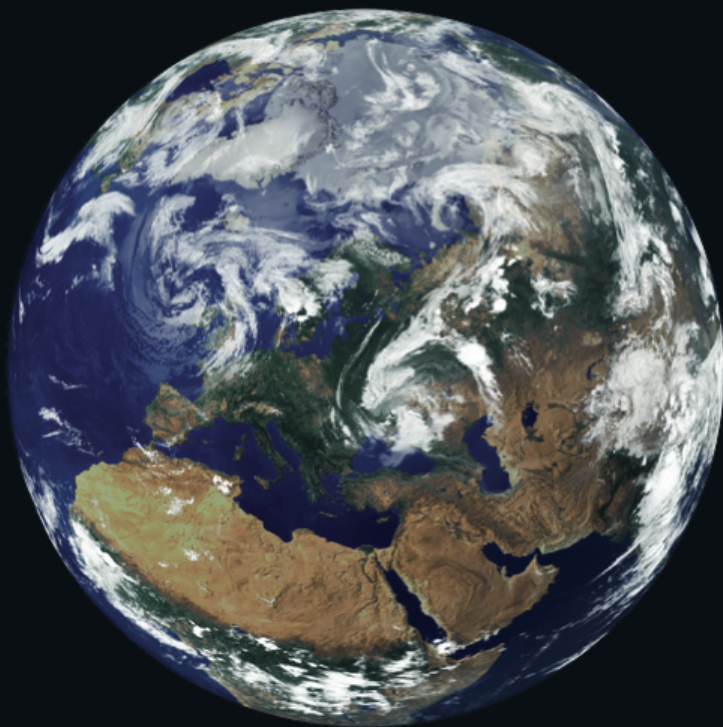
World Bamboo Congress - April 10, 2012





Government
Office for
Science

Foresight



The Future of Food and Farming: Challenges and choices for global sustainability

FINAL PROJECT REPORT



Foresight: The Future of Food and Farming (2011)

Final Project Report

World Bamboo Congress - April 10, 2012

The Government Office for Science, London.



This is a unique time in history

We urgently need to balance

future demand

with

supply sustainability

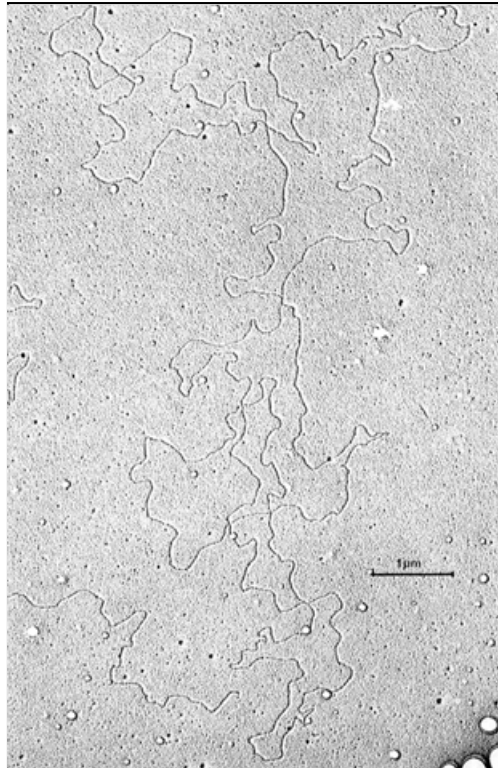
- Improving productivity sustainably using existing knowledge
- New Science & Technology to raise the limits of sustainable production to address new threats
- Reducing waste and creating value from waste
- Improving governance of the agriculture production



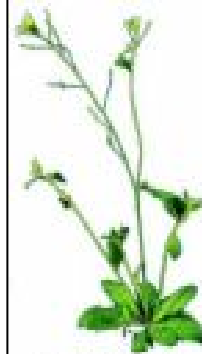
Biotech crop history



1904, *Agrobacterium tumefaciens*



**1974, Ti
Plasmid, Gent**

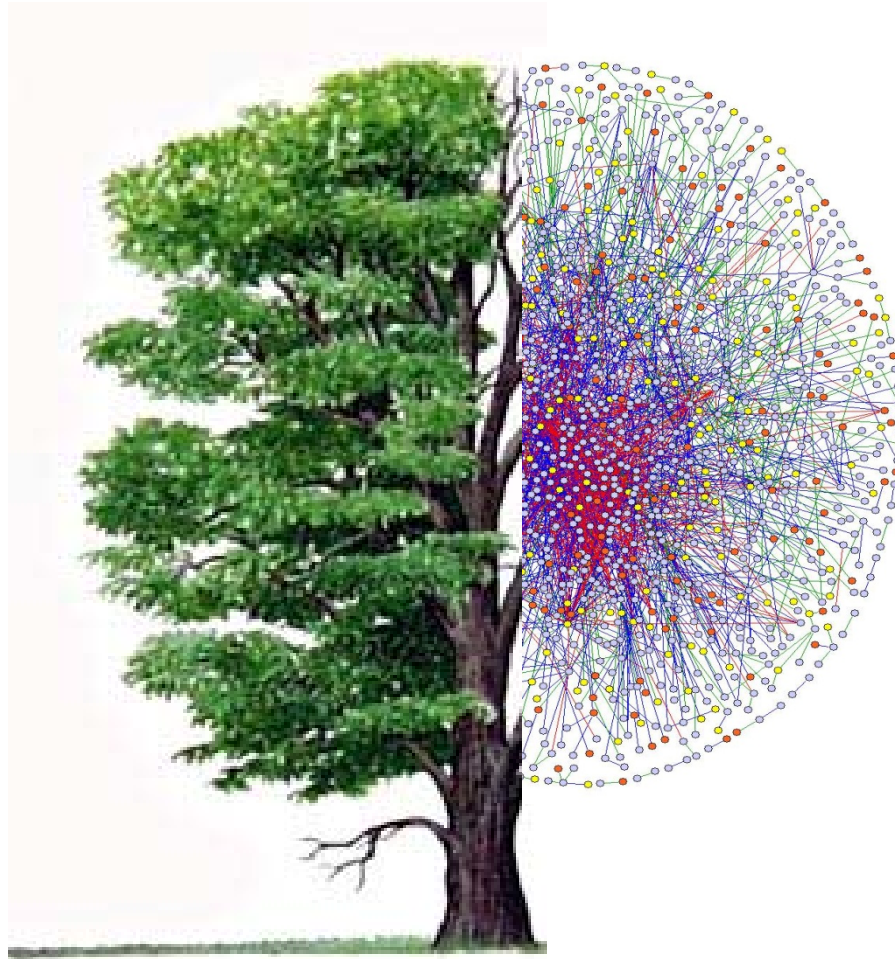


Arabidopsis thaliana
(Arabis edwardsonii)

**1990's
genomics**



**1996
Commercial
launch**



Plants for Knowledge

World Bamboo Congress - April 10, 2012





BGI (formerly known as the Beijing Genomics Institute) has purchased 128 Illumina HiSeq 2000 sequencing system, which promises to generate up to 200 gigabases of sequence data per run.

China's BGI plans to sequence the genomes of 1,000 important plant and animal reference species over the next two years as part of a new project that will solicit proposals from the scientific community.

Acquisition Puts Beijing Genomics Institute on Path to Become World's Largest Sequencing Facility

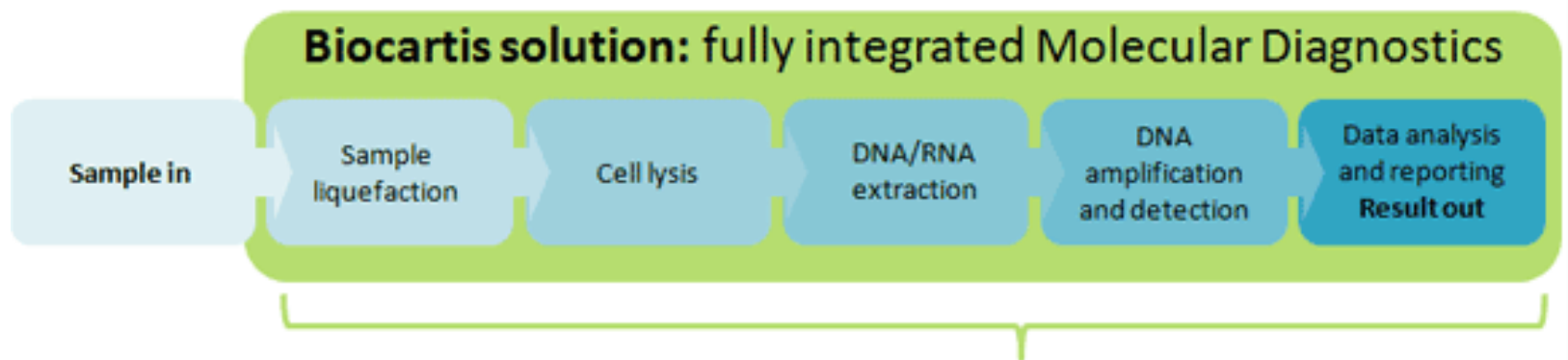
World Bamboo Congress - April 10, 2012

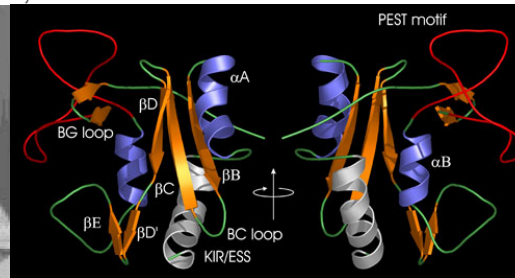


Biocartis Innovative Systems

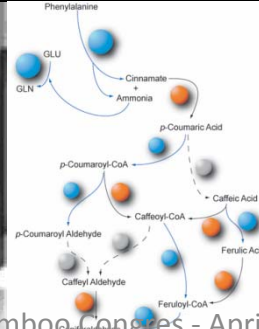
Molecular Diagnostics Platform

can detect and quantify multiple DNA- or RNA-based biomarkers in a wide variety of patient sample types with minimal user intervention



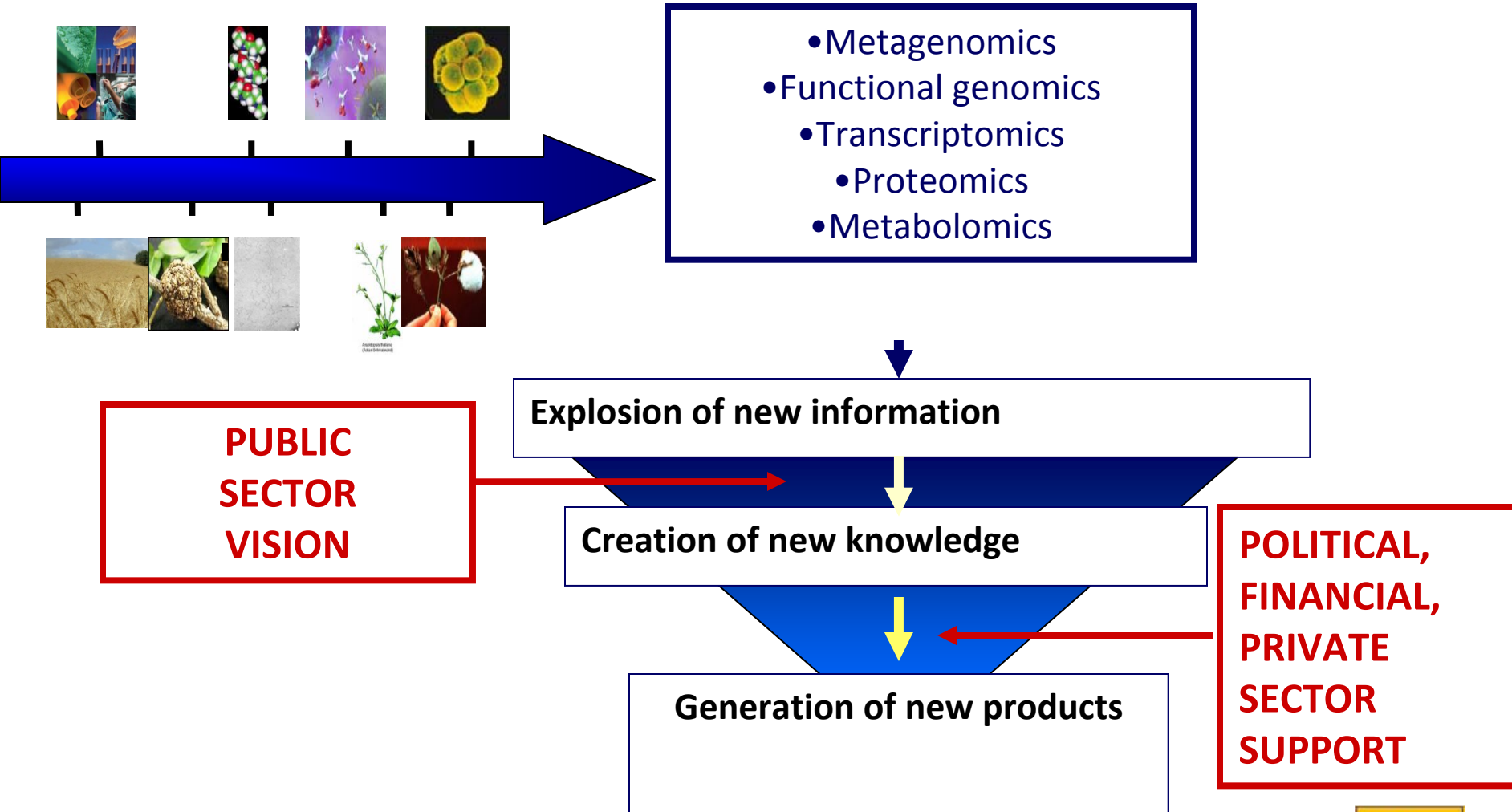


- in micro sequencing
- in detecting protein modifications
- protein turnover
- biosynthetic pathway analyses





Systems Biology: Outstanding Developments





Technologies for creating the appropriate crops

- Plant breeding
- Affordable biomarkers
- BUT one should dare to say that **without GM plants** we cannot achieve the goals of food security and green industry



Science provides new opportunities to explore niche markets

Biotech uses scientific and technological innovation to:

- capture the latent value in biological processes and renewable bioresources
- utilise these resources, processes and eco-industrial clusters to produce sustainable bioproducts, jobs and income



Major public concerns

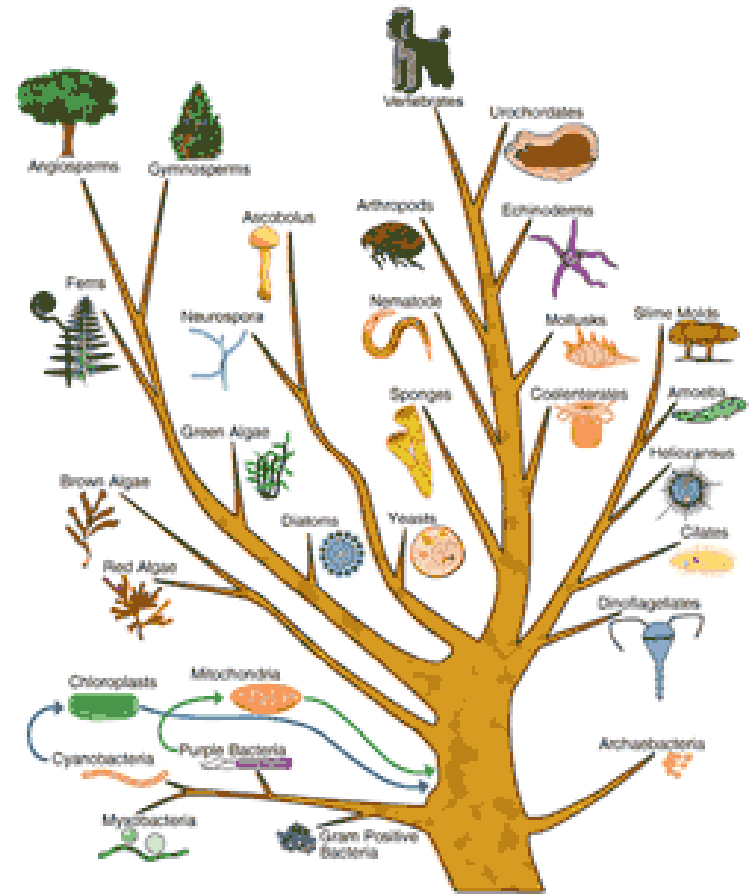
Safety Issues

- **Human and Animal Health**
 - No adverse effect reported with the approved GM-crops
- **Environmental**
 - Already a long list of beneficial effects
 - No alarming scenario was confirmed
 - Long term ecological effects can be lower than those of traditional agriculture



Lessons from Molecular Evolution

- The living world is one large gene-pool of functional and pseudogenes
- This gene-pool is permanently evolving, this is the base of evolution
- Nature is one big genetic laboratory
- It is very misleading to talk about human gene, pig gene, rat gene etc.



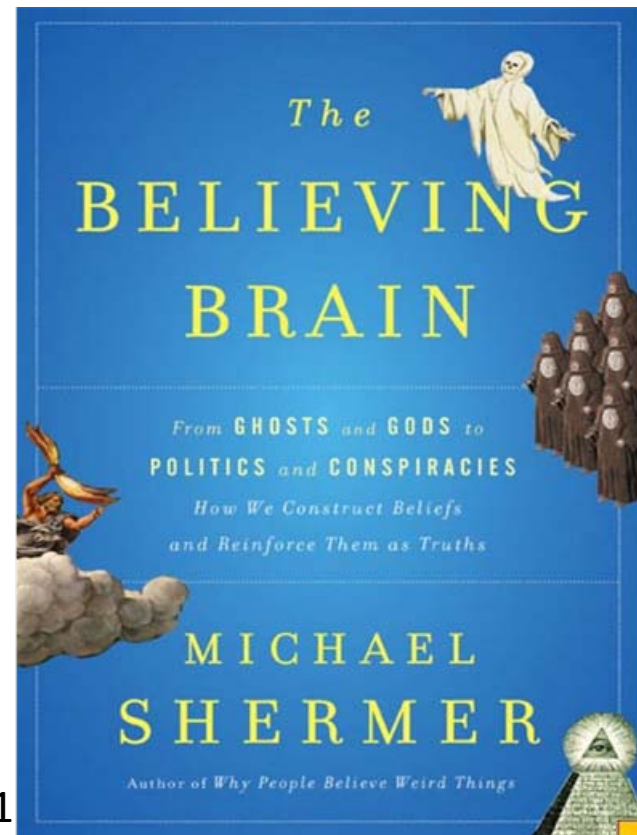
The danger of misinformation



Acceptance and Decisions

Believes come first, the explanation for the beliefs follow

- The difference between true and false patterns
- How to avoid cognitive bias pitfalls?



Times Books, Henry Holt and Co., New York 2011

Short rotation plantations for fuel and fibre

- Wood producing plants e.g. poplar
- CO₂ captation in cell walls





21st Century Plants will be GM-Plants





In a better Environment

World Bamboo Congress - April 10, 2012



In a better Environment



World Bamboo Congress - April 10, 2012

