

¹ Jodrell Laboratory, Royal Botanic Gardens, Kew, Richmond, Surrey TW9 3AB, UK
² Institute of Botany, University of Vienna, Rennweg 14, A 1030 Vienna, Austria
³ University of North Carolina-Wilmington, 601 South College Road, Wilmington, NC 28403-3915, USA
⁴ School of Biological Sciences, University of Auckland, Private Bag 92019, Auckland, New Zealand
⁵ Estonian University of Life Sciences, 181 Riia St, 51014 Tartu, Estonia
⁶ Trump Trading Ltd, Tallinn, Estonia, www.trrump.ee
⁷ Glossopteris Web Design and Development, Sydney, Australia, www.glossopteris.com
⁸ Department of Integrative Biology, University of Guelph, Guelph, Ontario N1G 2W1 Canada

INTRODUCTION

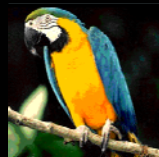
Genome size (1C nuclear DNA amount) is a key biodiversity character which varies more than 20,000-fold between eukaryotes.

For many years it was difficult to know if a genome size measurement existed for a particular taxon, and if so where to find it. Values were widely scattered in the literature or unpublished. This problem was recently overcome by the release of electronic databases for several major groups [1].

Today nuclear DNA content data for more than 10,000 species of plants, animals and fungi are freely available through three independent databases of eukaryotic genome sizes that have been either launched or re-released since 2005:



Plant DNA C-values Database
www.kew.org/genomesize/homepage.html



Animal Genome Size Database
www.genomesize.com



Fungal Genome Size Database
www.zbi.ee/fungal-genomesize/

Together these databases received over 120 visits per day in 2006, and have been cited in over 220 publications since they were launched. They provide the first comprehensive catalogue of eukaryotic genome size data and represent a much-needed resource for the genomic community.

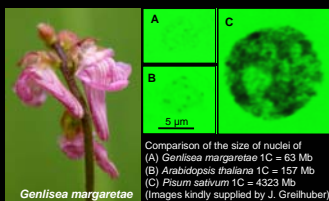
GENOME SIZE DIVERSITY IN PLANTS, ANIMALS AND FUNGI

Interest in genome size evolution and its significance is increasing as judged by the continued upsurge in the numbers of size estimates published and their use(s) [2]. New data continue to yield exciting results and extend the diversity of genome sizes encountered in the different groups of organisms.

PLANTS

Recent research has reported the tiny genome size estimate of 63 Mb for *Genlisea margaretae* - a new minimum value for flowering plants published in 2006, only 40% of *Arabidopsis thaliana* (157 Mb) [3].

Altogether the known genome sizes in plants now vary nearly 2000-fold.



ANIMALS

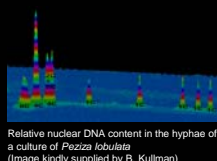
Available data show that genome size in animals varies over 4000-fold from 1C = ~30 Mb in the root-knot nematode *Meloidogyne graminicola* (left) to ~133,000 Mb in the marbled lungfish *Protopterus aethiopicus* (right) [4].



FUNGI

Compared with plants and animals, fungi have very small genomes with a mean 1C value of just 37 Mb and ~90% of available values lying between 10 and 60 Mb.

The current known range is from 6.5 Mb in the pneumonia-causing *Pneumocystis carinii* f. sp. *muris* to 795 Mb in the arbuscular mycorrhizal fungus *Scutellospora castanea* [1].



Information about all three databases is summarized in a review published this month. See Gregory *et al.* 2007. Eukaryotic genome size databases. Nucleic Acids Research Database issue, January 2007

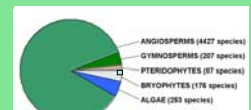


Plant DNA C-values Database (release 4.0, 2005)



The Plant DNA C-values database went live in 2001 and is hosted by the Royal Botanic Gardens, Kew, UK

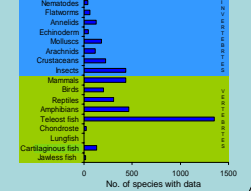
The current release of the database contains values for 5150 species.



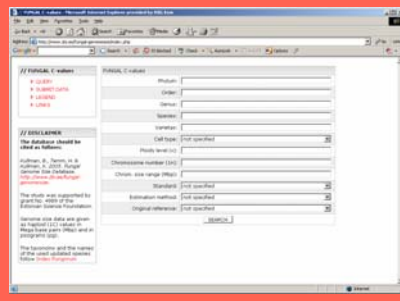
Animal Genome Size Database (release 2.0, 2005)



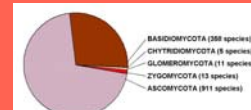
This database, maintained by T.R. Gregory, University of Guelph, Canada, first went live in 2001. It currently contains data for 4,276 species.



Fungal Genome Size Database (release 1.0, 2005)



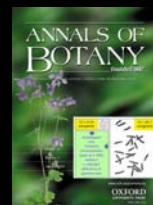
This is the most recent genome size database to be released, first going live in 2005. It is maintained by Bellis Kullman and colleagues based at the Estonian University of Life Sciences. It currently contains values for 739 species.



REFERENCES

1. Gregory TR *et al.* (2007) *Nucl. Acids Res.*: January issue
2. Bennett MD and Leitch IJ (2005) *Ann. Bot.* 95: 45-90.
3. Greilhuber J *et al.* (2006) *Plant Biol.* 8: 770-777.
4. Gregory TR (2005) in *The evolution of the genome*, ed. Gregory, T. R. (Elsevier, San Diego, CA), pp. 3-87.

RECENT PUBLICATIONS ON GENOME SIZE



'Plant Genome Size' *Annals of Botany* Special Issue, Vol. 95, Issue 1, January 2005.

'The evolution of the genome' (Ed. TR Gregory) Elsevier, San Diego, CA 2005