

Genomics of microalgae

Pierre M Durand

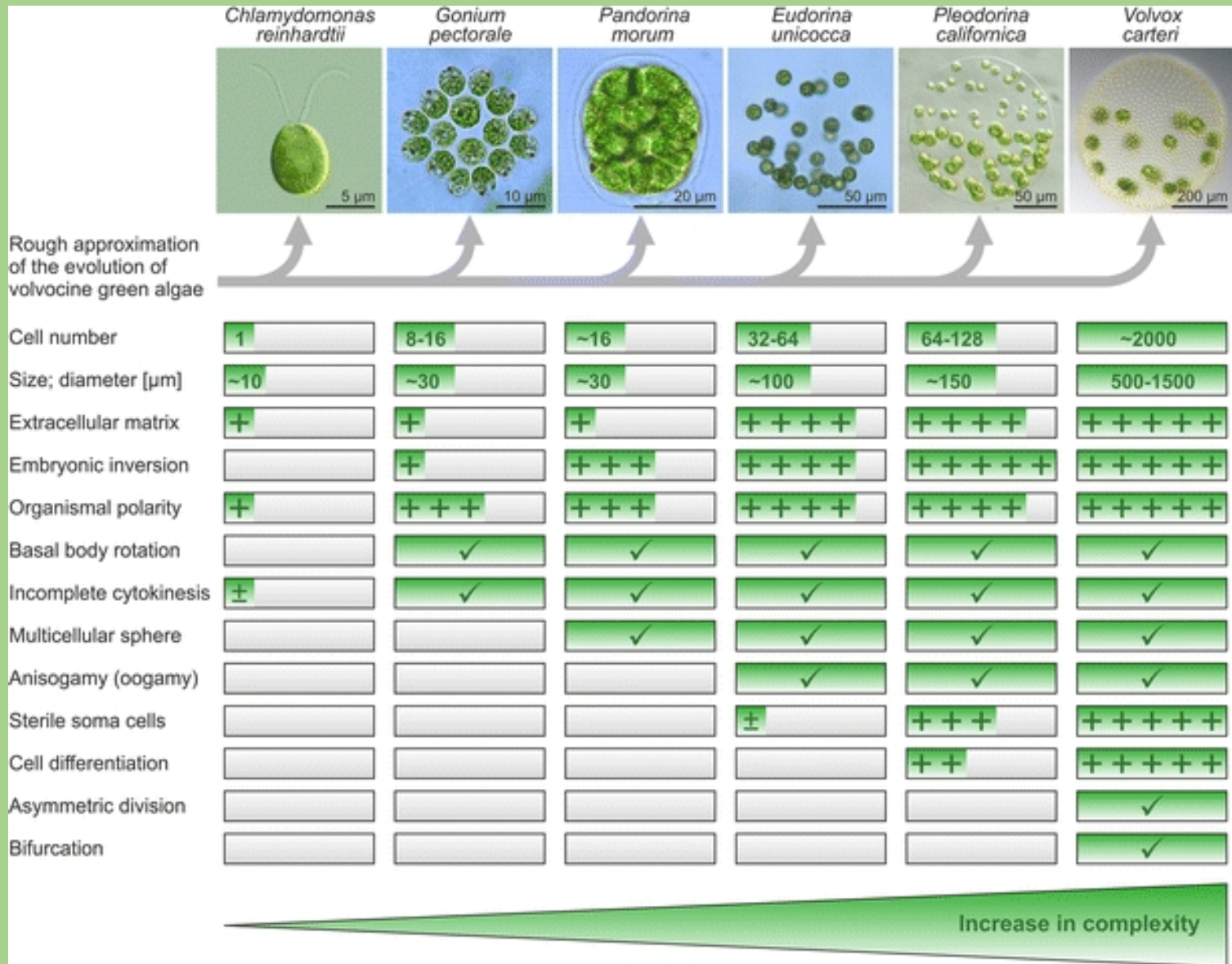
University of the Witwatersrand

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3 genomics based projects

- Genomics of the volvocines and the evolutionary transition to multicellularity
- Genomics of algal blooms
- Biodiversity and the SANPCC for microalage

Microscopy and genetic data: Kirks 12 steps, multiple 'transitional' forms, evolutionary timeline

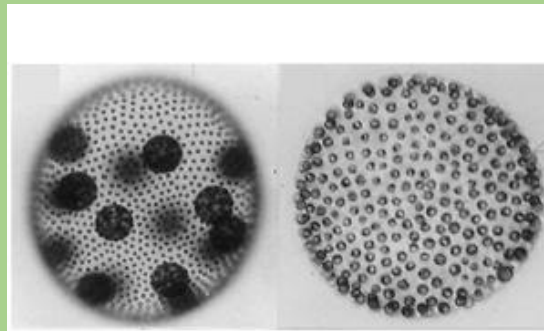


(Hallman, 2011)

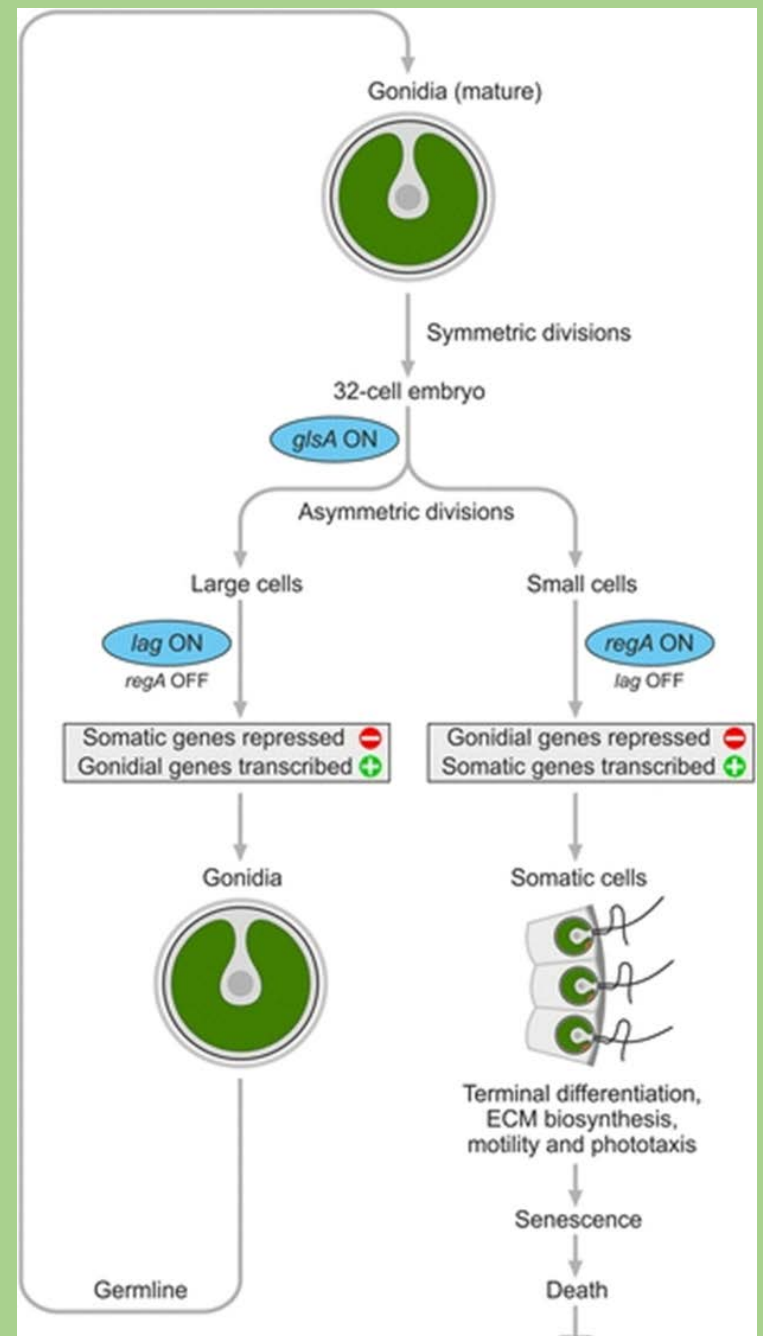
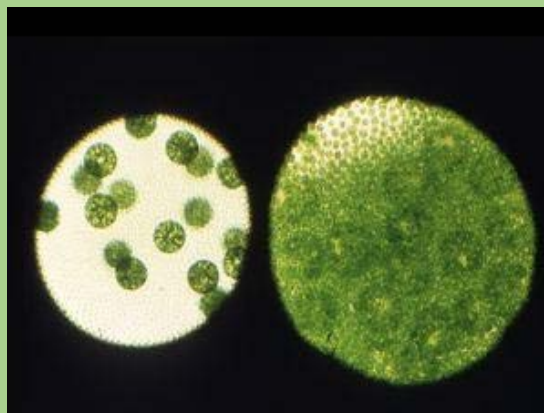
Gene level data

Single gene mutants associated with specific phenotypes

eg: *glsA*



regA



(Hallman, 2011)

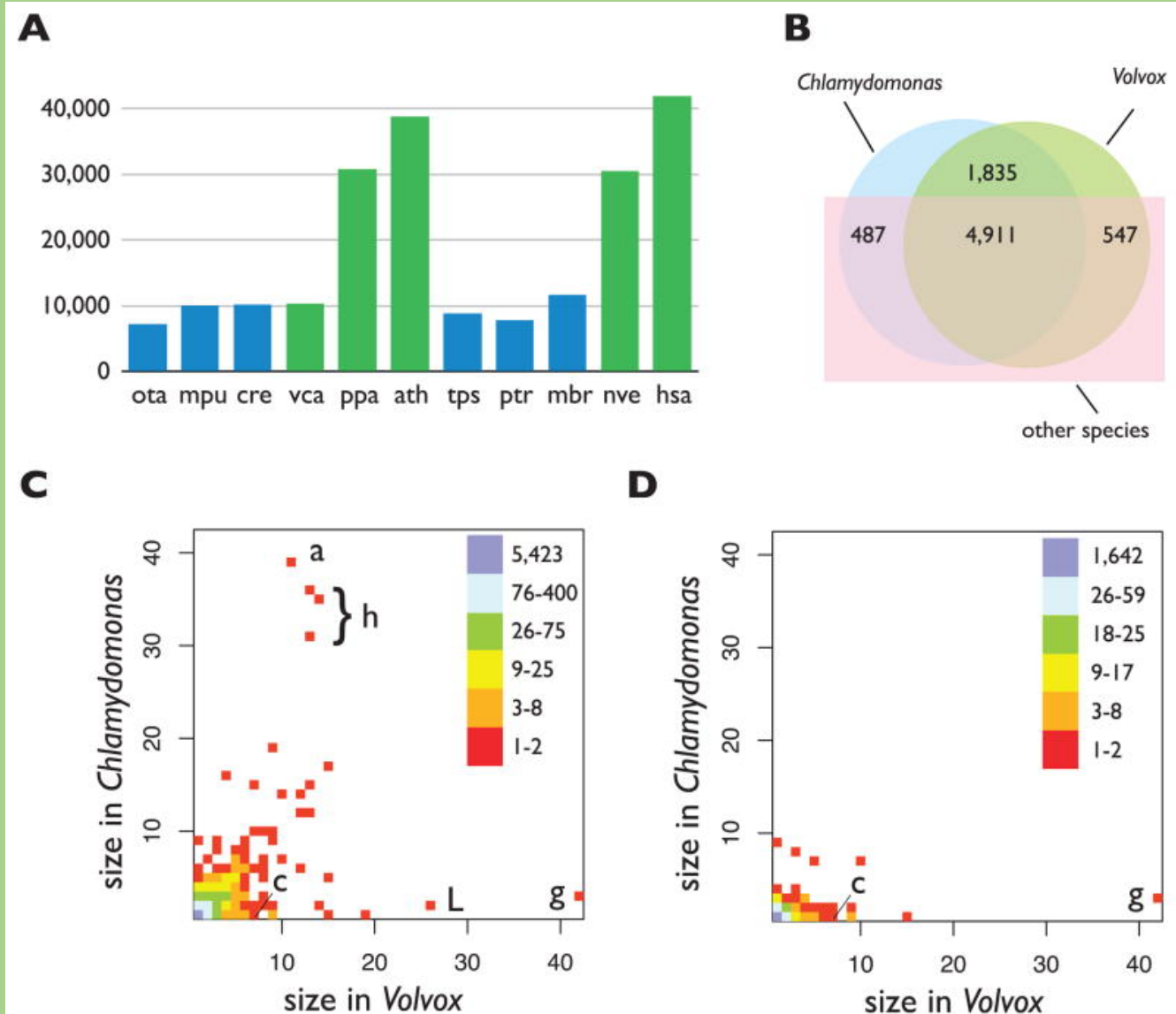
Comparative genomics

The *Chlamydomonas* Genome Reveals the Evolution of Key Animal and Plant Functions

Sabeeha S. Merchant,^{1*} Simon E. Prochnik,^{2*} Olivier Vallon,³ Elizabeth H. Harris,⁴ Steven J. Karpowicz,¹ George B. Witman,² Astrid Terry,² Asaf Salamov,² Lillian K. Fritz-Laylin,⁴ Laurence Marechal-Drouard,⁷ Wallace F. Marshall,⁸ Liang-Hu Qu,⁷ David R. Nelson,¹⁰ Anton A. Sanderfoot,¹¹ Martin H. Spalding,¹² Vladimir V. Kapitonov,¹³ Qinghu Ren,¹⁴ Patrick Ferris,^{2,5} Erika Lindquist,² Harris Shapiro,² Susan M. Lucas,² Jane Grimwood,¹⁶ Jeremy Schmutz,¹⁶ *Chlamydomonas* Annotation Team,¹ JGI Annotation Team,¹ Igor V. Grigoriev,² Daniel S. Rokhsar,^{2,6,4} Arthur R. Grossman^{17,4}

Genomic Analysis of Organismal Complexity in the Multicellular Green Alga *Volvox carteri*

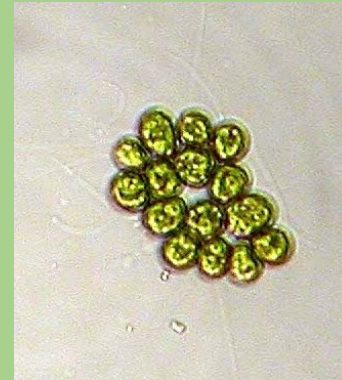
Simon E. Prochnik^{1,*}, James Umen^{2,*},†, Aurora M. Nedelcu³, Armin Hallmann⁴, Stephen M. Miller⁵, Ichiro Nishii⁶, Patrick Ferris², Alan Kuo¹, Therese Mitros⁷, Lillian K. Fritz-Laylin⁷, Uffe Hellsten¹, Jarrod Chapman¹, Oleg Simakov⁸, Stefan A. Rensing⁹, Astrid Terry¹, Jasmy Panglilan¹, Vladimir Kapitonov¹⁰, Jerzy Jurka¹⁰, Asaf Salamov¹, Harris Shapiro¹, Jeremy Schmutz¹¹, Jane Grimwood¹¹, Erika Lindquist¹, Susan Lucas¹, Igor V. Grigoriev¹, Rüdiger Schmitt¹², David Kirk¹³, and Daniel S. Rokhsar^{1,7,†}



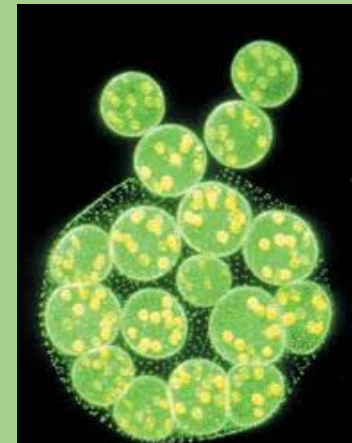
(Prochnik et al, 2010)

What is the molecular basis for increasing complexity in the volvocines?

Whole genome and proteome data being obtained for the following organisms



(Micrographs from
VIP, Volvocales
Information project,
2013)



Harmful algal blooms

