

# Volvox, Rolling out from under the Shadow of *Chlamydomonas* with Support from the AGA

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*Chlamydomonas reinhardtii* is a science superstar. This diminutive green alga with 1 cell and 2 lively flagella, and the nickname Chlamy, consistently punches above its weight in the arena of big research (Harris 2001). When not basking in freshwater ponds, it is found in laboratory beakers, helping researchers answer essential questions about the evolution and physiology of cells. In 2007, Chlamy became one of the first algae to have its genome sequenced (Merchant et al. 2007); it has its own 1000-page textbook (Harris 2009); and it even has its own biennial meeting, the International Conference on the Cell and Molecular Biology of *Chlamydomonas*, which started as a small, intimate gathering in 1983 and has grown to become a large, international assembly.

The popularity of *Chlamydomonas* has brought needed attention to other chlamydomonadalean algae, such as *Chlorogonium* and *Dunaliella*, but, in some ways, has also overshadowed them. One of the best-studied close relatives of Chlamy is *Volvox carterii*: a stunning spherical alga, comprising hundreds of flagellated somatic cells held together in a transparent matrix, through which the bright green reproductive cells are visible (Coleman 2012). Known as the “fierce roller,” *Volvox* spins through the water like a miniature planet and is large enough to be seen with the naked eye. Among the first eyes to describe *Volvox* were those of van Leeuwenhoek (1700) more than 300 years ago. *Volvox* has since gone on to become a model species, used to study topics as wide ranging as the origins of multicellularity to the physics of spinning through water (Kirk 1998; Rushkin et al. 2010). But in recent decades, it has played second fiddle to its unicellular cousin Chlamy. Its genome was sequenced 3 years after that of Chlamy’s (Prochnik et al. 2010) and, until recently, one of the only venues for *Volvox* researchers to meet and discuss their work was the Chlamy Conference.

Now this is changing. With support from the American Genetic Association (AGA), Aurora Nedelcu, from the University of New Brunswick, Canada, and 8 other scientists organized the First International *Volvox* Conference at Biosphere 2, outside Tucson, AZ, in 2011 ([www2.unb.ca/vip/IVC/](http://www2.unb.ca/vip/IVC/)). Although small, the meeting was a success, drawing *Volvox* gurus from across North America and from as

far away as Germany and Japan. The presentations covered everything from *Volvox* development and cell differentiation to the mechanics of being multicellular. There was also a workshop run by Simon Prochnik, from the US Department of Energy Joint Genome Institute, on new bioinformatic resources devoted to the *Volvox* genome.

Scientific meetings often lose momentum after 1 round, but it looks like the *Volvox* one is here to stay, scheduled to happen every 2 years, alternating with the Chlamy Conference. I recently returned from the Second International *Volvox* Conference at the University of New Brunswick, July 31 to August 3, 2013 ([www2.unb.ca/vip/IVC2013/](http://www2.unb.ca/vip/IVC2013/)). Like the first *Volvox* gathering, it attracted topnotch scientists who are using volvocine algae to test and develop far-reaching hypotheses on the evolution of multicellularity and development. Highlights from the conference included a steamy talk by Jim Umen, from the Donald Danforth Plant Science Center, St Louis, on the origins of sexual dimorphism (sperm and egg) in *V. carterii*. Phycologist extraordinaire Annette Coleman, Brown University, described a volvocine jackpot in South China’s Shenzhen Reservoir, where mud samples revealed an unprecedented diversity of volvocine species. Bradley Olson, Kansas State University, described the genome of the colonial alga *Gonium pectorale*, which holds important clues to understanding the shift from unicellular to multicellular lifestyles within the volvocine lineage. One of the most exciting talks was by Matt Herron, University of Montana, who, along with his collaborators, is generating multicellular forms of *Chlamydomonas* in the lab.

But it is not all about colonial and multicellular algae. The *Volvox* conference is becoming a platform for research on all types of chlamydomonadalean algae, especially those that have undergone major transitions in evolution. Adrian Reyes-Prieto, a fellow of the Canadian Institute for Advanced Research, described genome evolution in *Polytoma*: a free-living unicell that can no longer perform photosynthesis. He is trying to understand how and why certain algae become photosynthetic burnouts.

The meeting also featured art and poetry competitions, all centered around *Volvox*, of course. The conference logo,



**Figure 1.** The Second International *Volvox* Conference logo, designed by Matheus Lima, University of Sao Paulo, Brazil.

designed by Matheus Lima, University of Sao Paulo, Brazil, was a crowd favorite (Figure 1), as was the sonnet *An ode to Volvox*. Before the final banquet, we watched a 1970s educational video by *Volvox* research pioneer Richard Starr, showing gorgeous, though faded, footage of a mating and dividing *Volvox*, with crackly play-by-play audio to boot. When I went to refill my wine glass I asked the young bartender if she was enjoying the movie. “That’s not how I roll,” she said. “But if I were to study algae, I’d certainly pick *Volvox*—it’s like something from outer space.”

Plans for the Third International *Volvox* Conference are already underway, with a likely venue of Cambridge, UK, home of Ray Goldstein’s lab, which uses *Volvox* to understand the physical aspects of multicellularity—details will be posted online at the *Volvox* Information Project ([www2.unb.ca/vip/](http://www2.unb.ca/vip/)). If you are interested in attending and learning more about volvocine algae, we invite you to join our team of fierce rollers.

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