



# Communications

## Report on Phylomania

(University of Tasmania's theoretical phylogenetics meeting)

Peter Jarvis\*

Phylogenetics is concerned with the problem of reconstructing the evolutionary history of extant organisms from present-day molecular data such as DNA. Currently, there is much interest in further development of the mathematics that underlies computational phylogenetic methods. Hidden from view, in software packages used by biologists, are algorithms performing statistical inference using Markov models on binary trees. The mathematics involved represents a wonderful confluence of stochastic methods and probability theory (Markov chain models), discrete mathematics (combinatorics of tree space), statistical inference (maximum likelihood and Bayesian methods) and, more recently, methods taken from algebraic geometry and the representation theory of finite and infinite (Lie) groups. The latter methods fall under the heading of the emerging field of 'algebraic statistics'. There are many important theoretical problems that arise, such as statistical identifiability of models, consistency and convergence of methods. These problems can only be solved using a multi-disciplinary approach. Phylomania sought to bring together leading bio-mathematicians in this area, with the aim of attacking some of the more pressing problems.

Phylomania was held at the School of Mathematics and Physics, University of Tasmania from 29–30 October 2009. The meeting came about as a result of the work of our group and contacts in mathematical biology and phylogenetics over the last few years. We especially acknowledge the hospitality and support provided to us by our New Zealand colleagues in our endeavours, several of whom came to Tasmania as a result. Earlier initiatives in this direction include proposals put to the organisers of the ANU Summer School series of meetings as long as ten years ago for a meeting along these lines, and also the recent activities around the bid for a biomaths ARC network.

The main goal of Phylomania was to provide an international meeting held in Australia to facilitate the development of theoretical problems in phylogenetics. Phylomania provided a much-needed bringing together of researchers in phylogenetics with a strong focus on theoretical problems. It was universally acknowledged that there is a niche for such a meeting in Australia, and indeed there are plans to run the meeting annually on a self-funded basis starting with Phylomania

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\*School of Mathematics and Physics, University of Tasmania, Private Bag 37, Hobart, TAS 7001.  
Email: [jarvis@oberon.phys.utas.edu.au](mailto:jarvis@oberon.phys.utas.edu.au)

2010. Thus the contribution of the sponsors has provided a fantastic basis for the regular continuation of this meeting. We are in touch with colleagues at the Australian Centre for Ancient DNA (University of Adelaide) who have been running the ‘Naracoorte’ series of meetings (most recently at Port Elliot) and we wish to dovetail or complement our meetings with theirs in future.

There were 12 talks of 50 minutes each over the two days, and 19 registered participants in total, with informal attendance at a couple of talks from local colleagues in the School of Plant Science (University of Tasmania) and the Institute for Antarctic and Southern Ocean Studies (IASOS). The conference was opened on behalf of the University of Tasmania by the Dean of Science, Professor Jim Reid (Plant Science). All submissions of abstracts were accepted. The breakdown of attendees was 13 local and six international (three students, four Early Career Researchers and 12 established researchers) and included three invited speakers: Stefan Gruenewald and Li Qiang (both from CAS-PICB, the Chinese Academy of Sciences Partner Institute for Computational Biology) and John Rhodes (University of Alaska).

Phylomania greatly strengthened the existing collaborations between the organisers (Jeremy Sumner and Peter Jarvis) and many of the attendees, in particular Barbara Holland (Massey University), John Rhodes (University of Alaska) and David Bryant (University of Auckland). The timetable, overheads of talks, abstracts and other details are available on the conference web pages, [http://www-theory.phys.utas.edu.au/mini\\_meeting/meeting.html](http://www-theory.phys.utas.edu.au/mini_meeting/meeting.html).

The conference included morning and afternoon teas for delegates and catered sandwich lunches. Activities included a Thursday evening counter meal, as well as a bushwalk on Mount Wellington for visitors over the weekend.

The meeting was sponsored by the University of Tasmania, the School of Mathematics and Physics, the Australian Mathematics Society, and the ARC complex systems network COSnet (the latter two each provided conference grants of \$3500). We were delighted to be able to return more than half of these funds pro rata to each of these major sponsors, because a couple of the speakers originally invited had other commitments, or illness, and others were kind enough to pay their own travel.