



President's column by Tony Guttman

I am sure many readers will share with me the enthusiasm I feel for the range of interesting articles in *The Gazette*. Please do encourage your colleagues to take a look, especially if they have been in the habit of leaving their precious copy enshrouded in its protective plastic mailer. Better still, put pen to paper, or fingers to keyboards, and contribute something of interest to your peers.

This is certainly an exciting time for mathematics, with a number of outstanding results being proved, or claimed to be proved. It is also interesting to see knowledge of some of these great problems entering the mainstream. Last month the *New York Times* ran an essay on the Millennium Problems, and surprisingly focussed on the most obscure, and technically difficult to grasp, the Hodge conjecture. The author's point seemed to be that most mathematicians are confounded by the problem statement, so what does it ultimately mean? More concretely, Andrew Wiles's proof of Fermat's Last Theorem is now so well known that most educated laymen are aware of it. But more recently we've had Perelman's proof of the Poincaré conjecture, that still seems to be holding up to scrutiny. Even if it turns out to be flawed, it is undoubtedly the case that his contribution will have a major impact on developments in low-dimensional topology.

One very recent result that is available on the arXiv and subject to the inspection of the mathematical community is that of Ben Green and Australia's own Terry Tao. They have a proof of a long-standing conjecture

that there exist arithmetic progressions of prime numbers of arbitrary length. Hardy and Littlewood conjectured in 1923 that the number of such k -term progressions grows as $C_k N^2 / \log^k N$, with C_k a given numerical factor. Green and Tao have obtained a lower bound $(\gamma(k) + o(1))N^2 / \log^k N$ for some very small $\gamma(k) > 0$. Terry has also kindly contributed to this issue in the Brain Drain series. I was also going to cite Arenstorff's recent claimed proof of the Twin Prime conjecture, but I see from the arXiv that this has now been withdrawn due to an error in a key lemma. Hopefully it can be repaired.

Louis De Branges de Bourcia, who proved the Bieberbach conjecture more than 20 years ago, has recently claimed to have proved the Riemann hypothesis. As he previously published a flawed proof, it is likely that it will take longer than usual for people to work through this one. At the recent Random Matrix Applications in Number Theory workshop at the Newton Institute, the mood was certainly pessimistic regarding a resolution of this problem within the next decade or two. It was posited that the Swinnerton-Dyer conjecture was intimately connected with the Riemann hypothesis, and indeed, that it was not inconceivable that they may be proved simultaneously.

Turning from great events in mathematics to local developments, I am delighted to report on the official opening of the Melbourne premises of the ARC Centre of Excellence for Mathematics and Statistics of

Complex Systems by the Minister for Science, the Hon. Peter McGauran on May 14. Minister McGauran spoke enthusiastically and knowledgeably about the importance of mathematics in general, and the Centre in particular.

Last week the Federal Government and The University of Melbourne signed an agreement to establish ICE-EM, the International Centre of Excellence for Education in Mathematics. I am both hopeful and optimistic that ICE-EM will catalyse a significant improvement in school mathematics education. While I was never a believer in the trickle down benefits Reaganomics were

supposed to spawn, I am a firm believer in the "gushing up" effect that improved school mathematics instruction will have on the improved intellectual functioning of the populace, the quality of the student intake at tertiary level and, eventually, the prosperity of the nation.

For member universities of AMSI there is an immediate prospective benefit, that of assistance with the installation of Access Grid Rooms. A workshop will be held at the ANU on July 16 to help members better understand the technology and plan accordingly for its use. See the AMSI web-site for further information.