2005 Australian Academy of Science Medals

The Australian Academy of Science has announced its Medallists for 2005. There are three medals for the mathematical and statistical sciences, see http://www.science.org.au/awards.
The 2005 awardees are

Lyle Medal: Prof. Tony Guttmann, UMB

The Lyle Medal recognises the contribution of Sir Thomas Ranken Lyle, FRS, to Australian science and industry generally and in particular to his own fields of physics and mathematics. The purpose of the medal is to recognise outstanding achievement by a scientist in Australia for research in mathematics or physics.

Professor Guttmann is a leading authority on the generation and analysis of power series expansions in statistical mechanics and fluid dynamics. He is the author of the most widely used method for analysing such series, the method of differential approximants. He is a leading figure in the interchange of ideas between statistical mechanics and algebraic combinatorics. His recent results, based on this fusion, include a polynomial time algorithm for the generation of series coefficients for the susceptibility of the Ising model, a conjectured scaling function for the perimeter-area generating function of self avoiding polygons and a powerful, elegant, unexpected numerical method enabling the analytic structure of the solution of unsolved lattice enumeration problems to be conjectured (and subsequently proved.) He has made major contributions to both the mathematics community and the mathematical education community and has been instrumental in the establishment of both AMSI and MASCOS and helped write the successful grant application for ICE-EM.

Hannan Medal: Prof. Richard Brent, ANU

The Hannan Medal recognises the achievements in time series analysis of the late Professor E.J. Hannan, FAA. Because of Professor Hannan's broad interests in the mathematical sciences the award is made in one of three areas in turn at two-yearly intervals–pure mathematics; applied and computational mathematics and statistical science.

Richard Brent is a world figure in computational mathematics. He is renowned for his research on problems involving exact computations including integer factorisation, the Euclidean algorithm, algorithms for formal power series, and computations over finite fields. He is responsible for many of the best (in both asymptotic and practical senses) algorithms for important problems, such as high-precision computation of elementary functions and constants such as π and γ, enumeration of nontrivial zeros of the Riemann zeta function, computations involving composition and reversion of formal power series, enumeration of irreducible trinomials of given degree, etc. He was elected FAA in 1982, and is also a Fellow of the ACM, AustMS, BCS, IEEE and IMA.

Moran Medal: Dr Mark Blows, UQ

The Moran Medal recognises the contributions to science of the late P.A.P. Moran, FAA. Its purpose is to recognise outstanding research by scientists 40 years and under, except in the case of significant interruptions to a research career, in one or more of the fields of applied probability, biometrics, mathematical genetics, psychometrics and statistics. The award is normally made every two years.

Dr Blows has been developing new approaches to the analysis of the genetic basis of quantitative traits, and how this genetic basis is associated with the fitness surface and evolutionary divergence. This work has three main components. First, new analytical and visualization procedures have been developed for the representation of fitness surfaces based on thin-plate splines, and the canonical analysis of the quadratic response surface. Second, matrix projection and subspace comparison techniques have been adapted for use in the direct comparison of the additive genetic variance-covariance (**G**) matrix and the quadratic fitness surface. Third, a technique has been developed to decompose phenotypic divergence (represented by the variance-covariance (**D**) matrix of population means), into adaptive and neutral vectors, which are then applied to determine how the eigenstructure of the **G** matrix may influence evolutionary trajectories as a consequence of adaptive and neutral processes.