The Central Role of RNA in Human Evolution and Development

The 2016 Ian Constable lecture by Professor John Mattick, Executive Director, Garvan Institute of Medical Research, Sydney

The genomic programming of human development has been misunderstood because of the initially reasonable, but ultimately incorrect, assumption that most genetic information is transacted by proteins. The human genome genome contains only ~20,000 protein-coding genes, similar in number as those in other animals, including simple nematodes. By contrast, the extent of non-protein-coding DNA increases with increasing developmental and cognitive complexity, reaching 98.5% in humans. Moreover, the vast majority of these sequences are differentially transcribed during development to produce tens and perhaps hundreds of thousands of short and long non-protein-coding RNAs. Noncoding RNAs show highly specific expression patterns, and increasing numbers are being shown to play important roles in human development, as well as in cancer and other complex diseases. These RNAs function at many different levels of gene expression, including translational control and guidance of the epigenetic processes that underpin development, physiological adaptation, and brain function. The latter appear to be empowered by the superimposition of plasticity on RNA-directed epigenetic processes by RNA editing, RNA modifications and retrotransposon mobilisation. Moreover there is now strong evidence for transgenerational epigenetic inheritance, also mediated by RNA, which raises the possibility that RNA is not only the underlying engine of cell biology, developmental biology and cognition, but perhaps also of evolution itself.

Event Details

When: 1 December 2016, 6-7pm
Where: Theatre Auditorium, The University Club of Western Australia, UWA
Cost: Free
Bookings: RSVP online via www.ias.uwa.edu.au/lectures/mattick

Professor John Mattick AO FAA FAHMS HonFRCPA is the Executive Director of the Garvan Institute of Medical Research in Sydney. He spent much of his career at the University of Queensland, where he was Foundation Director of the Institute for Molecular Bioscience and the Australian Genome Research Facility, Director of two ARC Special Research Centres, ARC Federation Fellow and NHMRC Australia Fellow. He was recently named by the NHMRC as one of the all-time high achievers in Australian health and medical research, and by Thomson Reuters as one of the world’s most influential scientific minds. Professor Mattick’s honours and awards include the inaugural Gutenberg Professorship of the University of Strasbourg, the Order of Australia and Australian Government Centenary Medal, Foreign Membership of the European Molecular Biology Organisation, Honorary Fellowship of the Royal College of Pathologists of Australasia, the International Union of Biochemistry & Molecular Biology Medal, the Human Genome Organisation Chen Award for Distinguished Achievement in Human Genetic & Genomic Research, and the MD Anderson Cancer Center Bertner Memorial Award for Distinguished Contributions to Cancer Research.

The Ian Constable Lecture

This annual lecture is presented by the Lions Eye Institute and the UWA Institute of Advanced Studies and honours the work of Professor Ian Constable. Professor Constable is recognised as one of the world’s leading ophthalmic surgeons. He was appointed the Lions Foundation Chair of Ophthalmology in 1975.

In 1983 Professor Constable established the Lions Eye Institute (LEI) dedicated to the prevention and treatment of blindness and eye disease. Today the LEI is a not-for-profit centre of excellence that combines world class scientific research into the prevention of blindness with the highest level of eye care delivery, combining the expertise of researchers and ophthalmologists.