Language DNA & Thermodynamics

What is the relationship between intelligence and the material world? In confirmation of John 1:1, "In the beginning was the Word," there is a top-down flow of control such that the thermodynamics of DNA is essentially governed by software in a similar way to how man-made digital computers are controlled by programmed algorithms originating from intelligent minds. This session will examine how the language of DNA connects with thermodynamics and show how a Christian worldview provides a framework for new research. It is shown that the remarkable efficiency of information transfer in DNA is close to the minimum possible.

Andy McIntosh now retired, is an emeritus Professor of Thermodynamics at the University of Leeds, and is also an adjunct Professor at Liberty University, Virginia. He has lectured and researched in these fields for over 30 years. He has a PhD in Combustion Theory from the Aerodynamics Department of what was then Cranfield Institute of Technology (now Cranfield University), a DSc in Applied Mathematics from the University of Wales and worked for a number of years at the Royal Aircraft Establishment. He is a Fellow of the Institute of Mathematics and its Applications, the Institute of Energy, the Institute of Physics, and the Royal Aeronautical Society. A chartered mathematician and engineer, and author of over 200 papers, articles, and patents, his research has been in combustion in fluids and solids and his work has also included the investigations into the fundamental link between thermodynamics and information. He has also extended to the area of biomimetics where the minute combustion chamber of the bombardier beetle has inspired a patented spray technology. That research was awarded the 2010 Times Higher Educational award for the Outstanding Contribution to Innovation and Technology. He now lectures widely on origins, and has authored the book *Genesis for Today* (Day One, 6th Edition, 2017), *Genesis 1-11 – a verse by verse commentary (Day One, 2016), Wonders of Creation – Design in a fallen world (with Stuart Burgess and edited by Brian Edwards, Day One, 2017),* and contributed to the books *In Six Days* (Master Books, 2009), *Should Christians Embrace Evolution?* (IVP, 2009), and *Origins – Examining the evidence* (Truth in Science, 2011) and co-authored the booklet *Is it true? – Evidence for Creation*. He is co-director of the UK education think tank Truth in Science and married, with 3 children and 6 grandchildren.

I. The Laws of Thermodynamics

Implications of the laws of thermodynamics

Work, Entropy and the arrow of time

II. Open Systems

Just add energy?

Entropy and uphill thermodynamics

The principle of thermodynamics in non-isolated systems

III. Machines and Free Energy

Definition of a machine – a device for raising locally or storing free energy

Illustration of a dam storing water ready to drive turbines to produce electricity

The irreducible nature of living systems – many machines operating together

An example - the polymerization of DNA

IV. The Connection of Information to Thermodynamics

Information constrains and holds the thermodynamics in non-equilibrium

V. Top down and bottom up systems – the presence of intelligence.

VI. Laws of Information Exchange

VII. Laws of Information Interaction with Matter

VIII. Landauer limit for the encoding of one bit of information on a substrate.

IX. The remarkable thermodynamic efficiency of DNA

Suggested Readings:

In the beginning was Information, Werner Gitt, New Leaf, 2006

Signature of the Cell, Steve Meyer, HarperOne 2009

McIntosh, A.C. *Information and Entropy—Top-down or Bottom-up Development in Living Systems*?, Int. J. of Design & Nature and Ecodynamics 4(4):351–385, 2009.

Dawkins R., *The Information Challenge. Chapter 2.3 in: A Devil's Chaplain; Selected Essays by Richard Dawkins,* Ed. Latha Menon, Phoenix, 2003.

McIntosh, A.C., *Information and Thermodynamics in Living Systems,* Proc. of Symposium 'Biological Information – New Perspectives', Cornell University, 31st May – 3rd June 2011, pp.179 – 201, DOI: 10.1142/9789814508728_0008, World Scientific, July 2013
Available for download -- The complete conference is available for download at https://www.worldscientific.com/doi/pdf/10.1142/8818 with ACM paper at page 200.
For ACM specific paper only go to
https://www.worldscientific.com/doi/pdf/10.1142/9789814508728_0008

McIntosh, A.C. 2023. *Language, Coded Instructions and the Interaction with Thermodynamics,* in J.H. Whitmore (editor), Proceedings of the Ninth International Conference on Creationism, pp. 316-326. Cedarville, Ohio: Cedarville University International Conference on Creationism.

McIntosh, A.C. 2023. *The Fingerprint of Intelligence: Thermodynamics and Information,* Chapter 4. Biblical Creation on Solid Ground, Stockholm, Sweden: STH Förlag, 117-143

Other relevant books

Dembski, W. *No Free Lunch: Why Specified Complexity Cannot Be Purchased without Intelligence.* Lanham, MD: Rowman & Littlefield, 2007. ISBN 978-0-7425-1297-9.

Marks, Robert II R.J. Marks II, William A. Dembski and Winston Ewert, *Introduction to Evolutionary Informatics*, World Scientific, Singapore, 2017, ISBN 978-9813142145