Kelvin, Thermodynamics and the Natural World

Volume in Design and Nature Series
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Background

In two previous volumes in the series it has been shown how essential thermodynamics is in understanding cosmic history and the evolution and behaviour of living systems ([1]-[3]). These studies also made clear that the nascent relationship between biology and thermodynamics involved considerable conflict. Two issues epitomised this conflict. The first concerned the age of the earth and specifically involved Kelvin and Huxley. The second was to do with the status of Joule's contribution to the development of the First Law of Thermodynamics, vis-à-vis Mayer. In the first Kelvin was wrong, but with mitigation (for example, [4] p61). In the second the 'North British scientists and engineers' won 'the massive extension of hostilities unleashed' ([5] p 171) by Tyndall and the other 'X-Club' biologists.

While, especially among the latter, then, Kelvin's reputation suffered, Maxwell's—they were the 'closest scientific colleagues' ([5] p 211)--has soared to 'Arguably….the greatest scientist of the nineteenth century' ([6] p85).

The Centenary of Kelvin's death is being widely celebrated, and this has occasioned a number of initiatives and studies. These should help in a redefinition of Kelvin's greatness and achievements.

Volume

This volume seeks to look afresh at Kelvin in the context of the growing synthesis between thermodynamics and biology. It will focus on two principal issues. Firstly, there is the contribution made by Kelvin to the formulation of the Laws of Thermodynamics, both personal and in the content of the scientific communications exchanged with other workers, such as Joule and Clausius. Secondly, there is his direct interest in biological matters, and interaction with biologists, especially with the two issues mentioned above.

Contents

References

[1] Mikielewicz, J.,Stasiek, J.A., & Collins, M.W., The laws of thermodynamics: cell energy transfer, *Nature and Design,* eds. M.W.Collins, M.A.Atherton & J.A. Bryant, Vol.1, International Series on Design and Nature, pp 29-62, WIT Press: Southampton, 2005

[2] Collins, M.W., Stasiek, J.A., & Mikielewicz, J., The laws of thermodynamics: entropy, free energy, information and complexity, Design and Information in Biology, eds. J.A.Bryant, M.A. Atherton & M.W.Collins, Vol.2, International Series on Design and Nature, pp 127-177, WIT Press: Southampton, 2007

[3] Collins, M.W., Stasiek, J.A., & Mikielewicz, J., The laws of thermodynamics and *Homo sapiens* the engineer, Design and Information in Biology, eds. J.A.Bryant, M.A. Atherton & M.W.Collins, Vol.2, International Series on Design and Nature, pp 179-204, WIT Press: Southampton 2007

[4] Weaire, D., William Thomson (Lord Kelvin,) 1824-1907 (Chapter 8) *Creators of Mathematics: The Irish Connection*, ed. K. Houston, University College Dublin Press: Dublin 2000

[5] Smith, C., *The Science of Energy*, Athlone Press: London, 1998

[6] Kauffman, S.A., *Investigations,* Oxford University Press: Oxford, UK, 2000

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