

## Information Sheet:

# *Physical History and Economics*

2<sup>nd</sup> Edition (BETA VERSION), Copyright 2009 by Mark Ciotola

**Target Audience:** Faculty, students and professionals in the fields of history, economics, ecology and public policy.

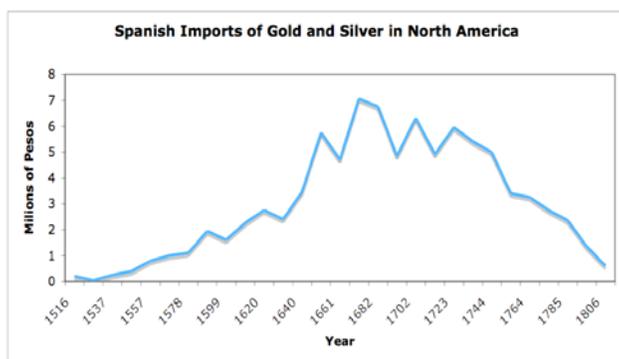
**Description:** *Physical History and Economics* portrays life and civilization in the context of bridging thermodynamic potentials, and describes how to develop historical and economic models by utilizing methodologies constraints imposed by the laws of thermodynamics. Most of this text is accessible to the lay reader, but contains some optional material where an understanding of basic calculus is helpful.

## Excerpt from Chapter 1:

Imagine the hot sun shining brightly upon the Earth situated in cold space. Much light is reflected back from the Earth into space, but that does not concern us yet. The remainder of the light hits the Earth and is converted into heat. Nature abhors temperature differences, and tries to rectify the situation as quickly as possible by having the Earth emit its heat into space. Yet the Earth's atmosphere is quite a good insulator. To bypass that insulation, great blobs of hot air at the surface rise wholesale into the upper cooler atmospheric regions, the escape of heat is greatly increased, and nature is pleased.

Yet the light that gets reflected from the Earth is not heat and does nothing to warm the coldness of space. Nature does not gladly tolerate that rogue light. So living organisms develop upon the Earth that can photosynthesize and capture some of the rogue light. Those organisms release heat or are consumed by other organisms that produce heat. Nature is still not satisfied and demands greater haste. Intelligent organisms form that can release heat faster, and civilizations form that can release heat yet faster, favoring nature.

Nature is greedy and demands all that it can seize. Just as great blobs of air rise through the atmosphere, dynasties and empires form in succession one after another, release heat that is otherwise inaccessible. History is literally a pot of water boiling on a hot stove in a cold kitchen, with dynasties and empires forming and bubbling up to the surface. Is there more that nature can yet demand? New technologies and untapped sources of energy? New forms of civilization? Or the yet totally unknown?



**Figure from Chapter 12** Illustrating empire dependent upon fixed resource.

## Detailed Table of Contents and Chapter Descriptions

- Chapter 1. Introduction.** Provides a general perspective to the field of physical history and economics (PHE).
- Chapter 2. The Big Bang.** Describes the beginning of the known universe and the thermodynamic background that allows for PHE.
- Chapter 3. Thermodynamics.** Concepts such as heat, energy and work are introduced, along with the 1<sup>st</sup> and 2<sup>nd</sup> Laws of Thermodynamics.
- Chapter 4. Fast Entropy and the eth Law.** A Second and A Half Law of Thermodynamics, also known as Fast Entropy, is introduced along with evidence of that law and several of its implications.
- Chapter 5. Formation and Endurance of Life.** How fast entropy makes life more probable is introduced.
- Chapter 6. Statistical and Evolutionary Intelligence.** The concept of random intelligence is introduced, as well as how it is favored by fast entropy.
- Chapter 7. Smarter Intelligence.** The development of more complex forms of problem is introduced, as well as how it is favored by fast entropy.
- Chapter 8. Development of Civilizations.** How fast entropy makes the development of civilizations more probable is introduced.
- Chapter 9. Emergence of Regimes.** The concept of the regime is introduced, and fast entropy makes the development of regimes more probable is discussed.
- Chapter 10. Bubbles and Flows.** The concepts of and distinctions between bubble and flows are discussed, and how societies can be modeled using a combination of these two concepts.
- Chapter 11. Meta-Mechanics.** Introduces a mechanical framework for analyzing societies utilizing derivatives and weighting.
- Chapter 12. Modeling History and the Future.** Discusses several approaches for modeling past and future societies and provides several real-life examples.
- Chapter 13. Economic Bubbles.** Discusses modeling economic business cycles and business growth curves.
- Chapter 14. Psychology Versus Fast Entropy.** Discusses the paradox that fast entropy has evolved human psychology to deny the existence of fast entropy, but how both views are required for a more complete understanding of human society.
- Chapter 15. Great Escapes.** Suggests strategies and approaches for mitigating the effect of physical constraints.
- Chapter 16. Conclusion.** Discusses PHE in a broad framework and future trends, work and opportunities in the field.

A supplement will also be available that will include exercises, projects, recommended additional reading, solutions to selected exercises, and programming examples. An extended edition will likely include an introduction to physics, relevant philosophy, examples of real life heat engines, biological and ecological approaches, standard forecasting methods, and system dynamics.

**About the Author:** Mark Ciotola is the CEO of the Pavilion of Research and Commerce, a product development firm focusing on energy and innovation-related products, including Time Travel Systems forecasting software and consulting. He holds degrees in Economics, Physics and Law, a graduate certificate in Space Studies, and teaches part time at San Francisco State University. He has worked in the aerospace, biotechnology, financial, hardware and software, industries.

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