

**Icons of Repute: The attribution of
Lamarckian and Darwinian evolutionary mechanisms
in economics**

**WORKING PAPER SERIES
Working Paper no. 43
2007**

Rachel F. Baskerville

Associate Professor, School of Accounting and Commercial Law
Victoria University of Wellington, P O Box 600, Wellington, New Zealand

Email: rachel.baskerville@vuw.ac.nz

Tel: ++(64)(4) 463 6474

Fax: ++(64)(4) 463 5076

**Centre for Accounting, Governance and Taxation Research
School of Accounting and Commercial Law
Victoria University of Wellington
PO Box 600
Wellington
NEW ZEALAND**

Tel. + 64 4 463 5078

Fax. + 64 4 463 5076

<http://www.vuw.ac.nz/sacl/research/CAGTR/CAGTRhomepage.aspx>

Icons of Repute: The attribution of Lamarckian and Darwinian evolutionary mechanisms in economics

Rachel F Baskerville

Acknowledgments:

The assistance, encouragement and comments by Professor Michael Bradbury and Michael Keenan were much appreciated, but my debt also extends back to Professor Peter Wilson, and Stephen J. Gould, whose writings and ideas never fail to stimulate and challenge.

Abstract:

Paul David's 1986 exposition on the QWERTY keyboard configuration gave rise not only to Stan Leibowitz and Stephen Margolis's "Fable of the Keys", but also to a consideration by Stephen J. Gould of the characteristics, and correct attribution, of Lamarckian versus Darwinian mechanisms of evolutionary change. This study draws attention to the following issues from this debate: is it correct to attribute the operation of forces of change in evolutionary economics as being Darwinian in nature? How did evolutionary dynamics in economics come to be described utilising concepts and nomenclature typical of organic or biological evolution? It is suggested that it was the extension of Veblen's advocacy of Darwinism as a "scientific methodology" which led to the adoption of Darwinism as an icon of evolutionary mechanisms, and gave rise to the invocation of Darwinian evolutionary mechanisms in economic theories. The basis for such invocation is re-examined and it is suggested the Lamarckian theory provides the more appropriate mechanism for evolutionary success or fitness in economic studies.

It is one hundred and forty six years since publication of *The Origin of Species* by Charles Darwin (1859); the book itself was a slender volume, but both the intellectual legacy and scholarship from this publication continues to influence nearly all of academic enquiry. Economics has not been left out, nor it should be. For it was from economics that Darwin developed his models of diversity. As a heavy investor in industry shares, it was the industrial progress of the nineteenth century which inspired Darwin's idea of mechanisms to create diversity (Desmond and Moore 1991, 420).

In common with Herbert Spencer (a railway surveyor), such men appreciated division of labour and specialisation; "the industrial metaphor seemed to stretch to nature herself" (Desmond and Moore 1991, 420). Spencer was later laid off from the railways; but while appointed a subeditor of *The Economist* he wrote numerous essays and books in the 1850's, which led to widespread acceptance of the concept of "Social Darwinism". This concept is still influential at an academic level, and inescapable at a popular level; it was Spencer who termed the phrase: "survival of the fittest". Darwin borrowed this phrase in the fifth edition of *The Origin of Species*; in turn, Spencer seized on Darwin's syntheses to bolster his philosophy of social evolution (Graham 1999, 23). The evolution of societies, the creation of wealth and the production of species were all considered to obey similar laws (Desmond and Moore 1991, 420).

Can the resultant theories of the origin of biological species by Charles Darwin be applied to the evolution of wealth and industry? Unlike organisms, human artefacts such as markets, institutions or labour forces are not limited by structural considerations to a restricted range for opportunistic choices. Human artefacts neither procreate in their likeness nor die. The source of variation in individual organisms is

not paralleled in the sources of variation and diversity in the range of human artefacts subject to inquiry by economists. It is proposed that discourse which has the objective of construction of a clear understanding of mechanisms and drivers behind survival or failure of economic activities should reconsider its allegiance to “Darwinism”, and instead give due credit to the distinctive nature of the processes of cultural evolution which are Lamarckian in character.

In order to justify such claims, the remainder of this paper as follows:

1. The study by Paul David (1986) of the QWERTY keyboard configuration generated two significant responses, one by Stan Leibowitz and Stephen Margolis (1990), and the other by Stephen J. Gould (1987). These are described, as well as Gould’s description of the dangers of analogies between cultural and biological evolution.
2. Gould’s proposal that cultural evolution shows Lamarckian mechanisms leads to a description of Lamarckian theory. The disparaged status of Lamarck, and the critique of Lamarckism in economic theory, are evaluated.
3. The high standing of Darwinism is seen to have originated in Thorstein Veblen’s support for Darwinism, although Veblen’s advocacy was based on his belief in Darwin’s scientific methods, and his descriptors of evolutionary mechanisms were Lamarckian in nature. The paper concludes by returning to the invocation of Darwinism by Leibowitz and Margolis, and a consideration of the survival of favoured metaphors and analogies.

Paul David's scholarship on the survival of the QWERTY configuration

The starting point of argument substantiating such a proposal is Paul David's 1986 treatise on the necessity of a historical appreciation in order to understand economic realities. He demonstrated this point by a detailed description of the continuing domination of the QWERTY configuration in keyboard design. This stimulated two further discussions of the matter in disparate journals: the *Journal of Law and Economics*, and *Natural History*.

Firstly, the *Journal of Law and Economics* published a re-examination by Leibowitz and Margolis (1990) of the origin of the QWERTY configuration. They based their treatise on Cicero's plea for a continuing search for truth in historical inquiry, and provided a valuable reminder of the continuing ability of human endeavour to observe optimality where none exists. Their reading of the events surrounding the survival of the QWERTY keyboard demonstrated a very different approach to the functioning of markets, and social systems generally.

Their revision of the QWERTY myth may take hold, and successfully suppress David's interpretation, depending on how firm a foothold David's analysis had already gained. History has shown that the metaphors or analogies addressing fundamental issues in a particular discipline, such as David's account, may survive strongly if they capture the popular (or undergraduate student) imagination. The critique by Ronald Coase (1974) of the "lighthouse" in economics, and critiques by Steven Cheung (1973), David Johnson (1973), and J. R. Gould (1973) of the errors in James Meade's analysis of bees and apple orchards, may follow a similar path. In such cases, optimism of the victory of truth and logic to debunk such myths should be

cautioned by the observed “nine lives of discredited data” (Paul 1987). These fables may be around a little longer than the critics rightly expect.

Leibowitz and Margolis did not extend their discussion of the QWERTY question to the subject of the continuing survival of a more insidious fallacy in evolutionary economics: that of the invocation of “Darwinism”, fitness, survival of the fittest, and deterministic and progressive adaptation as the explanatory rubric for tried and true examples of market survival. This was considered instead as part of a second response to Paul David’s exposition: a philosophic response in 1987 on cultural and biological evolution in a regular monthly column in *Natural History* by Stephen J. Gould. Gould reviewed David’s history of the QWERTY configuration in his essay “The Panda’s Thumb of Technology”. He focused there-in on two “terrible truths” in Darwin’s world:

“First, when things do fit and make good sense...they did not arise because the laws of nature entail such order as a primary effect. They are, rather, only epiphenomena, side consequences of the basic causal process at work in natural populations – the purely “selfish” struggle among organisms for personal reproductive success. Second, the complex and curious pathways of history guarantee that most organisms and ecosystems cannot be designed optimally” (1987, 14).

Part of Gould’s interest in David’s history of QWERTY was because Gould considered imperfections to be the primary proof that evolution has occurred. Thus Gould’s perception of the implications of David’s history lay in a different direction to those of Leibowitz and Margolis. Leibowitz and Margolis had concluded that there

were few advantages in the “competitors” to the QWERTY configuration, and the history provided by Paul David was influenced by his own implicit model of market mechanisms. In contrast, Gould considered the events which led to the QWERTY norm are typical of “maddeningly quirky” history. As he concluded: streamlined optimality contains no seeds for change (1987, 23).

In addition to the different perspectives on such a fundamental issue is the significance of the implicit adoption of Darwinian evolutionary mechanisms by Leibowitz and Margolis. Gould stated emphatically his reticence to invoke any analogies between a cultural episode and biological evolution, as such comparisons had done vastly more harm than good (1987, 18). “Biological evolution is a bad analogue for cultural change, because the two systems are so very different for three major reasons that could hardly be more fundamental” (1987, 18). These are that cultural evolution is significantly faster; secondly, cultural evolution is direct and Lamarckian in form; and thirdly, the basic topologies of biological and cultural change are completely different.

As an evolutionary biologist, Gould felt no hesitation in prescribing cultural evolution as Lamarckian in character, and has oft expounded on Jean-Baptiste Lamarck’s contribution to biology as a respected systematist both before and after the QWERTY essay, (1980(a), 171; 1983, 378; 1985, 36; 1999(a), (b)). For example, Gould credits that Lamarck was correct in speculating that small inconspicuous oceanic species should be immune from extinction (1993, 55), and Lamarck also made a significant contribution in recognising that a change in behaviour must precede alteration of form (1985, 36). It is not of concern in this context as to the quality or standing of

Lamarck's contribution to the biological disciplines, but Gould's advocacy that cultural evolution is direct and Lamarckian in form deserves further examination and elaboration.

What are “Lamarckian” evolutionary mechanisms?

Jean-Baptiste Lamarck's contributions were developed in the first two decades of the nineteenth century; his last major exposition was in 1815. Fundamental to his writings was his belief that only by studying nature would it be possible to learn the method the Creator used to bring living things into existence. There was no mechanism in these theories for the origins of species, as he granted that nothing came into existence except by divine will, by whatever method the Creator wished (Burkhardt 1977, 184). This fundamental tenet of his philosophy contributed to some of the loss of popularity of his theories in the latter part of the nineteenth century, as debates were at times polarized between Church and Science.

His theories advocated two factors in the process of organic change:

- (1) the natural progress of organic development; and
- (2) the modification of such progress by constraining circumstances (Burkhardt 1977, 145).

This separation into two processes was common to a number of 18th century theorists. It is also of note that the inheritance of acquired characteristics did not originate with Jean-Baptiste Lamarck, and initially he did not advocate such a mechanism. However, as his ideas developed it became a fundamental tenet of “Lamarckian” theories of organic change. Thus the second of the two factors listed above was later represented

as the process whereby what was habit for one generation became instinct for later generations, *i.e. the inheritance of acquired characters*. Thus in a changing environment, a set of habits could be a spur to adaptation, based on the doctrine of use and disuse (Gould 1999(a), 20). Common examples cited were the absence of teeth in the whale and anteater, the rudimentary eyes of a mole, and the absence of legs on a snake. Equally, the frequent use of an organ strengthens and augments its capacities e.g. long necks or long tongues of certain animals, and the hind limbs of a kangaroo. However, Lamarck did not attribute this to consciously purposive responses by organisms. With respect to biological evolution, David Hull noted:

“present-day readers are likely to view a belief in Lamarckian modes of inheritance as not only mistaken but also unscientific. Mistaken, though justified, it surely was. Unscientific it was not” (1989, 217).

Lamarckism came to be understood as a theory of directed evolution: variation originates preferentially in adaptive directions. Lamarck's original thesis of the principles driving biological evolution failed mainly through the impact of new information; data that created inconsistencies in his lifetime, long before the publication of *The Origin of Species* (Gould 1999(b), 88). In addition, the debate following Darwin's theories on the origins of species undermined purposive, deterministic and progressive attributes of evolution concomitant with Lamarckism. This did not happen overnight. Indeed, Charles Darwin had paid considerable attention to the breadth of Lamarck's scholarship in the formulation of his theories (Hull 1989, 60). Possibly part of Darwin's antagonism to some of Lamarck's ideas were because in radical medical circles Lamarckism was used to justify anti-establishment causes, something which caused deep concern to Darwin (Crook 1999,

111). Darwinism had gone through many transformations, and it was only by August Weismann's much later influence that Lamarckism was expelled from Darwinism, and the understanding and application of the principles of natural selection dominated the biological sciences (Hull 1989, 235). Nevertheless Lamarck remains one of the finest intellects in the history of biology (Gould 1999(b), 88).

From scholarship of philosophical biologists, there has been much further discussion concerning the incorrect attribution of theories described as "Darwinism" to Darwin (Hull 1989, 236, 268, 295) and "Lamarckism" to Lamarck (Gould 1980(b), 65). This issue will not be further addressed, but it is part of the critique of Richard Nelson and Sidney Winter's advocacy of Lamarckism: that their representation of it was not what Lamarck originally theorized (Vromen 1995, 115). That debate fairly rests in the realm of philosophers of biology. It is more pertinent to take the common understanding of Lamarckism as already described, and to examine its provision of mechanisms of change in economic events and artefacts. The common understanding of Lamarckism is summarised by two descriptors: that

1. variation originates preferentially in adaptive directions; and
2. what is habit for one generation becomes instinct for later generations, i.e. the inheritance of acquired characters.

The preference for Darwinism over Lamarckism in economic theories is reflected more generally in the preferences of social scientists of diverse disciplines. A reflection of this preference may be inferred from the continuing citation of Charles Darwin's scholarship in the Social Sciences Citation Indices. Irrespective of valid caveats on utilisation of a coarse citational count, it can be observed that the Social

Sciences Citation Index reflects the extent to which these two scientists retain their relative status as icons (or not). The journals in which Darwin's *Origin of Species* was cited ranged over the spectrum of social sciences, without a particular discipline dominating the citation lists:

1995: Darwin was cited 163 times, and Lamarck 2 times.

1996: Darwin was cited 207 times, and Lamarck 3 times.

1997: Darwin was cited 172 times, and Lamarck 4 times.

1998: Darwin was cited 177 times, and Lamarck 2 times.

That Lamarck's status as a reputable icon has been lost is not surprising. Lamarck's ideas were so thoroughly caricatured, and associated with both the belief in an omnipotent Creator and fraudulent scientific experiment in the nineteenth century, that his ideas are unlikely to ever enjoy a resurgence in evolutionary discourse. Gould was aware of the disparaged status of Lamarck as one of the evolutionary fathers. He noted that Lamarck suffers from "an imposed reputation as a loser not to be taken seriously for any of his ideas" (1985, 36). In spite of this, he continued to advocate the adoption of Lamarckism as providing the correct mechanism for cultural, thus economic, evolution. He uses the term in the manner in which it is commonly understood: that Lamarckism is a theory of directed evolution (variation originates preferentially in adaptive directions) and as such provides the appropriate modeling of mechanisms for the evolution of human artefacts and institutions.

The Critique of Lamarckism in Economic Theory

Darwinian evolution is epitomised in mottos such as natural selection, fitness, survival of the fittest and adaptation. An example of the utilisation of Darwinism can

be found in theories of the firm: “survival of the fittest” was described by Jack Vromen as a useful tautology, and with “agency costs are minimised”, provided building blocks for creating a theory of organisation (Vromen 1995, 51). One assumption is that a prevailing type of organisation is common because it has proven its efficiency through “survival processes” in competitive markets (Vromen 1995, 56).

Such prevalent ideas have been subject to criticism by Richard Nelson and Sidney Winter (1982). They argued that there are other evolutionary mechanisms, and that their evolutionary theory is “unabashedly Lamarckian”. However, Vromen provided further detailed synopsis of the Darwinian theory of natural selection, with separation into the three mechanisms of selection, inheritance, and mutation, and made a detailed critique of Nelson and Winter’s advocacy of Lamarckian theory. Vromen eventually argued that Nelson and Winter’s claim to be unabashedly Lamarckian would be better represented as a dualism in evolutionary theory, seeing natural selection and adaptive learning as two mechanisms both operating in economic change (1995, 27 and 205).

But in discussing the impact of Darwin’s theory, Vromen saw some overlap in the two approaches: “many economists have been inspired by Darwinian (and Lamarckian) evolutionary theory” (Vromen 1995, 5). Furthermore, Vromen examined Gould’s representation of biological versus cultural evolution and Gould’s arguments that cultural evolution operates in the ‘Lamarckian’ mode. Vromen then opened up Richard Dawkin’s “*Selfish Gene*” arguments and its relationship to evolutionary game theory (1995, 156). His concern with the units of selection is important, because evolutionary economics can be approached from the perspective of evolutionary holism or evolutionary atomism. The correct identification of the implicit level at

which selection is assumed to operate is important in evolutionary debate (Watkins 1998). However, Vromen did not further expand on the significance of Gould's description of human evolution being cultural, not biological, in nature. This example of Vromen's advocacy of Darwinian principles, and his critique of Lamarckian theory, may be typical of the continuing loyalty to Darwinism by economic theorists. Darwin has been lifted to a rarefied level of iconography, whereas Lamarck languishes in oblivion. The origins of the allegiance to Darwinism are therefore to be further examined.

The Origin of Darwinism in Veblen's Scholarship

To untangle both the source and status of Darwinism as a reputable icon of evolutionary processes in evolutionary economics, let us depart from Paul David, QWERTY, Gould, and Leibowitz and Margolis, and turn instead to a major theorist in evolutionary economics: Thorstein Veblen, an early advocate of the Darwinian approach. However, Veblen did not espouse that there was a dynamic in economic change which paralleled biological evolutionary change. Veblen advocated a Darwinian approach, as to him, Darwin's method of scientific inquiry was an exemplar for economic studies.

Veblen had considered at length the quality of inquiry by economic scholars at the turn of the century. In his 1898 essay on "Why is economics not an evolutionary science" Veblen argued for the development of a close-knit body of theory, based on evaluation of facts with a scientific impartiality (1990, 58-60). He did not discuss Darwinian theory; but only chided the Historical School in Classical Economics for following the lines of pre-Darwinian speculation (1990, 72). Veblen advocated

approaching a question on the Darwinian basis of cause and effect, and analysis in terms of habit and response to stimuli (1990, 443).

In a 1936 reprint of Veblen's writings, Wesley Mitchell's Introduction described Veblen as a good Darwinian in respect of making only slight use of measurements, and mainly utilising qualitative analysis (1936, xxx). Mitchell described Veblen as having moulded his notions of human nature on Darwin, William James, and anthropological studies (1936, xxvi), and his basic criticism of economics was that the prevailing concepts and methods of inquiry were pre-Darwinian (1936, xxiii). None of this discussion of Veblen, and his advocacy of the Darwinian method, referred to evolutionary processes which were adaptive, progressive, or deterministic. Indeed, in 1936 Mitchell described the Darwinian approach as advocated by Veblen being characterised by:

- 1) blindly cumulative causation, in which there is no final term, no consummation;
- 2) a less metaphysical approach (1936, xlviii); and
- 3) a speculative system uniting a vast range of observations into a thoroughly consistent whole (1936, xxxvi).

Referring to Veblen, Mitchell described that:

“Having climbed to Darwin's mountain peak, his eyes ranged over a vast stretch of human experience. About many matters quite invisible to economists immersed in the 19th century he thought intensively” (1936, xxxii).

However over the next fifty years, the meaning of the term Darwinian shifted. By the time Jerry Simich and Rick Tilman prepared their 1985 reference guide to studies of

Veblen's contribution to economics, there were references to more than twenty studies, most of which described that Veblen was emphatically and fundamentally a Darwinian, and that Veblen introduced Darwinian evolutionary analysis into economics. In the midst of these studies were a few in the 1940's and 1950's describing Veblen's Darwinism as a façade; that Veblen misunderstood Darwinian evolution. However, these studies did not undermine an increasingly strident invocation of Darwinian evolution as illustrating the mechanisms of evolution in economics. For example, in the Introduction to the 1990 reprint of Veblen's writings, Warren Samuels described Veblen as adopting a "Darwinian conception of change as an unfolding sequence without necessary ultimate meaning" (1990, xiii). Post-Darwinian science focused on the processes of causation, and Veblen advocated an evolutionary science of economics which was based on theories of cultural growth as determined by economic interests, i.e. cumulation, variation and selection (1990, xiv).

In Rick Tilman's review of the contribution by Veblen to the development of economic theory, he reviewed Veblen's Darwinism versus Critical School Dialectics, suggesting that scholars such as Herbert Marcuse, Max Horkheimer and Theodor Adorno viewed Veblen's roots lying in American pragmatism, a major weakness of which was reliance on the natural sciences as models for philosophical analyses. Adorno suggested that "the concept of adaptation is the *deus ex machina* through which Veblen tried to bridge the gap between what is and what ought to be"; and Veblen's adamant commitment to Darwinian empiricism meant that for Veblen, "all social change is the result of mere animal-like adaptation, devoid of conscious decision making concerning means and ends" (Tilman 1991, 191).

Veblen's failure to make policy recommendations was

“logically consistent with his evolutionary, Darwinian perspective that saw the instrumentally adaptive efforts of the community always falling short of what was needed, since institutional reforms would be obsolete by the time they could be implemented” (Tilman 1991, 264).

However, in Malcolm Rutherford's review of Tilman's *magnum opus* of the intellectual legacy of Veblen, he claimed Veblen's use of an analogy to natural selection is closer to a Lamarckian process than a Darwinian one. Indeed, the most detailed description of evolutionary mechanisms may be observed in Veblen's 1925 *The Theory of the Leisure Class*, particularly in Chapters 8 and 13. For example, Veblen described “the situation of today shapes the institutions of tomorrow through a selective, coercive process, by acting upon men's habitual view of things, and so altering or fortifying a point of view or mental attitude handed down from the past” (1970, 132). This clearly reflects Lamarckian processes, and throughout that essay Veblen did not refer either to Darwinism or any other particular evolutionary theorist, thus substantiating Rutherford's attribution.

Was Veblen the only founding father in economics who may have incorrectly been perceived as utilizing “Darwinism” to model the appropriate mechanisms of evolutionary change? Some authors have also suggested that Schumpeter's contribution to the development of economic theory showed the usefulness of Darwinian theory for economics, and “the precise nature of evolutionary forces at work in economic systems” (Kelm, 1977). This claim remains contentious. Geoffrey Hodgson (1997) believed that Schumpeter rejected biological metaphors and

analogies, and Schumpeter was not a “Darwinian”. As described, Veblen advocated Darwinism because “Darwinian” equated with a “scientific” method based on extensive observation of data and an appreciation of the merits of a qualitative approach. It was an objective of this paper to draw attention to the distinction between these two *modi operandi*, and that the casual invocation of Darwinism, rampant in research addressing issues in evolutionary economics, might be lessened.

Conclusion

The manner in which Leibowitz and Margolis invoked Darwinian dynamics is typical of issues to which this paper has drawn attention:

“If standards are chosen largely through the influence of those who are able to internalise the value of standards, we would expect in a Darwinian fashion, the prevailing standard to be the fittest economic competitor” (1990, 5).

At the start of this century Darwinism was the hallmark of a scientific method. There was no consensus that human artefacts and institutions should show adaptive behaviour in the manner of the earthworm or the barnacle.

At the end of this century Darwinism is the rubric of cultural or social evolutionary processes far removed from the manner in which Darwinism is applied in the biological sciences. Based on differential survival of the most fit, it is observed that those cultures, human artefacts or social processes which survive show essential characteristics of fitness. The behavior of the most successful is seen as being opportunistically adaptive both during environmental change and also in periods of environmental stability.

It is necessary to draw the threads of this analysis together; they appear an “entangled bank” but contain fertile ideas nevertheless. With Leibowitz and Margolis’ claim of a fundamental error in Paul David’s model, they suggest markets are fertile but a rich receptiveness to ideas means some errors are undetected and incorporated. One such idea is the reason for the continuation of the QWERTY configuration; the other, the Darwinian model of adaptation and survival in market dynamics.

The founding theorists of evolutionary economics did not expound on Lamarckian versus Darwinian processes, nor did they endorse biological analogies for market mechanisms. Veblen had advocated the evolutionary approach, in so far as “evolutionary” was intended to imply the scientific “matter-of-fact” approach, and his description of evolutionary processes was Lamarckism in character. In the current surge of activity in institutional economics examining processes by which institutions evolve, it will be necessary to continue to test theories on the basis that institutions are human artefacts, subject to evolutionary processes characteristic of cultural evolution. These evolutionary processes and mechanisms are Lamarckian, not Darwinian, in nature. Lamarckian mechanisms incorporate the capacity of the institution, the firm, or the market to not only grow and expand incorporating characteristics acquired since its establishment, but also that the evolutionary changes accumulate and accelerate in a deterministic, progressive and purposive direction. It is a model of evolutionary change closer to our hopes and aspirations.

Charles Darwin himself found optimism in the achievements of industry last century, but his theories of the mechanisms of biological evolution allowed no such optimism

of purpose, progress or self-determination in organic evolution. It is Lamarckism that allows hope for the survival of the human species, of each culture or society, and the survival of our knowledge and industry. As noted by Gould in his epilogue on human culture, the “uniquely and distinctively Lamarckian style of human cultural inheritance gives our technological history a directional and cumulative character that no natural Darwinian evolution can possess” (1996, 222).

The discipline of economics is cultural, rather than a biological, in nature. Economic events and institutions are human artefacts; and theories in economics are subject to assessment on the basis of referring to cultural, rather than biological, events or processes. The QWERTY keyboard is a case in point: subsequent generations of typists inherited a configuration determined by a previous generation to be the most beneficial for whatever reason, whether it was faster, less likely to jam, or from the ‘vitality of rivalry’. Our favored metaphors and analogies in economic textbooks are like the QWERTY keyboard: they retain their popularity due to various preferences of previous generations of textbook writers, and thus are inherited by each new generation of scholars. The advocacy of Darwinism in evolutionary economics is espoused by each new generation of scholars, but Lamarckism deserves to be better recognised as providing the correct understanding of evolutionary drivers to the selective, purposive, adaptive, and deterministic evolution of our markets, institutions, or firms.

References:

- Burkhardt, Richard W. *The Spirit of System – Lamarck and Evolutionary Biology*.
Cambridge and London: Harvard University Press, 1977.
- Cheung, Steven N. S. “The Fable of the Bees: An Economic Investigation.” *Journal of Law and Economics* 16, no. 1 (April 1973): 11–34.
- Coase, Ronald H. “The Lighthouse in Economics.” *Journal of Law and Economics* 17, no. 2 (October 1974): 357–376.
- Crook, Paul. “Recent Historical Writing on Darwinism: A Review Article.” *The Australian Journal of Politics and History* 45, no. 1 (March 1999): 110–118.
- Darwin, Charles. *The Origin of Species*. Harmondsworth: Penguin, 1968 (originally published 1859).
- David, Paul A. “Understanding the Economics of QWERTY: the Necessity of History.” pages 30–49 in *Economic History and the Modern Economist*. (Editor: W. N. Parker). New York: Basil Blackwell, 1986.
- Dawkins, Richard. *The Selfish Gene*. Oxford: Oxford University Press, 1976.
- Desmond, Adrian and James Moore. *Darwin*. London: Michael Joseph, 1991.
- Gould, J. R. “Meade on External Economies: Should beneficiaries be taxed?” *Journal of Law and Economics* 16, no. 1 (April 1973): 53–66.
- Graham, Peter W. “Darwin's Origin Transforms Culture.” *World and I*, 14, no. 8 (August 1999): 18–26.
- Gould, Stephen J. “A Quahog is a Quahog.” pages 170–177 in *The Panda's Thumb*. Harmondsworth: Penguin, 1980(a).

- . "Shades of Lamarck." pages 65–71 in *The Panda's Thumb*. Harmondsworth: Penguin, 1980(b).
- . "Quaggas, Coiled Oysters and Flimsy Facts." pages 376–385 in *Hen's Teeth and Horse's Toes*. Harmondsworth: Penguin, 1983.
- . "The Flamingo's Smile." pages 23–39 in *The Flamingo's Smile*. Harmondsworth: Penguin, 1985.
- . "The Panda's Thumb of Technology." *Natural History* 96, no. 1 (January 1987): 14–23.
- . "Losing a Limpet." pages 52–60 in *Eight Little Piggies*. Harmondsworth: Penguin, 1993.
- . "An Epilog on Human Culture." pages 217–230 in *Life's Grandeur – The Spread of Excellence from Plato to Darwin*. London: Jonathan Cape, 1996.
- . "A Division of Worms." *Natural History* 108, no. 1 (January, 1999(a)): 18–22, 76–80.
- . "Branching through a wormhole." *Natural History* 108, no. 2 (February, 1999 (b)): 24–27, 84–89.
- Hodgson, G. M. "The Evolutionary and Non-Darwinian Economics of Joseph Schumpeter." *Journal of Evolutionary Economics* 7, no. 2 (June 1997): 131–145.
- Hull, David L. and Michael Ruse. *The Philosophy of Biology*. Oxford: OUP, 1998.
- Hull, David L. *The Metaphysics of Evolution*. Albany: State University of New York Press, 1989.
- Johnson, David B. "Meade, Bees and Externalities." *Journal of Law and Economics* 16, no. 1 (April 1973): 35–52.

- Kelm, M. "Schumpeter's Theory of Economic Evolution: A Darwinian Interpretation." *Journal of Evolutionary Economics* 7, no. 2 (June 1997): 97–130.
- Leibowitz, Stan J. and Stephen E. Margolis. "The Fable of the Keys." *Journal of Law and Economics* 33, no. 1 (April 1990): 1–26.
- Mitchell, Wesley C. *What Veblen Taught – Selected Writings of Thorstein Veblen with an introduction by Wesley C. Mitchell*. NY: Viking Press, 1936.
- Nelson, Richard R. and Sidney G. Winter. *An Evolutionary Theory of Economic Change*. Cambridge, Massachusetts: Belknap Press of Harvard University Press, 1982.
- Paul, Diane B. "The Nine Lives of Discredited data. Old textbooks never die – they just get paraphrased." *The Sciences* 27, no. 3 (March 1987): 26–30.
- Rosenberg, Bernard. *Thorstein Veblen; Selections from his work with an introduction and commentaries by Bernard Rosenberg*. New York: Thomas Y. Cromwell & Co., 1963.
- Rutherford, Malcolm. "Review of Rick Tilman: "The Intellectual Legacy of Thorstein Veblen: Unresolved Issues." *Journal of Economic Issues* 32, no. 1 (March 1998): 244–247.
- Samuels, Warren J. "Introduction" in Thorstein Veblen. *The Place of Science in Modern Civilisation and other essays*. New Brunswick and London: Transaction Publishers, 1990.
- Simich, Jerry. L. and Rick Tilman. *Thorstein Veblen – A Reference Guide*. Boston: G. K. Hall and Co., 1985.
- Tilman, Rick. *Thorstein Veblen and his Critics, 1891–1963. Conservative, Liberal and Radical Perspectives*. New Jersey: Princeton University Press, 1991.

Veblen, Thorstein. *The Place of Science in Modern Civilisation and Other Essays*. New Brunswick and London: Transaction Publishers, 1990 (Originally published in 1919).

---. *The Theory of the Leisure Class—An Economic Study of Institutions*. London: Unwin Books, 1970 (Originally published in 1925).

Vromen, Jack J. *Economic Evolution – An enquiry into the foundations of new institutional economics*. London and New York: Routledge, 1995.

Watkins, John P. “Towards a Reconsideration of Social Evolution: Symbiosis and its implications for economics.” *Journal of Economic Issues* 32, no. 1 (March 1998): 87–105.