

Marciano, Alain

Working Paper

Economists on Darwin's theory of social evolution and human behaviour

Papers on Economics and Evolution, No. 0521

Provided in Cooperation with:

Max Planck Institute of Economics

Suggested Citation: Marciano, Alain (2005) : Economists on Darwin's theory of social evolution and human behaviour, Papers on Economics and Evolution, No. 0521, Max Planck Institute of Economics, Jena

This Version is available at:

<https://hdl.handle.net/10419/31799>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



0521

**Economists on Darwin's theory of
social evolution and human behaviour**

by

Alain Marciano

The *Papers on Economics and Evolution* are edited by the
Evolutionary Economics Group, MPI Jena. For editorial correspondence,
please contact: evopapers@econ.mpg.de

ISSN 1430-4716

© by the author

Max Planck Institute of Economics
Evolutionary Economics Group
Kahlaische Str. 10
07745 Jena, Germany
Fax: ++49-3641-686868

Economists on Darwin's theory of social evolution and human behaviour¹

Alain Marciano

Université de Reims Champagne Ardenne (OMI-EDJ) and Central National de la Recherche Scientifique (GREQAM—Marseille)

Postal address: Université de Reims Champagne Ardenne Faculté des Sciences Economiques et de Gestion, 57 b, rue Pierre Taittinger, F – 51096 Reims Cedex – *e-mail:* a.marciano@wanadoo.fr; *fax:* 33 3 26 91 38 69.

Abstract

The purpose of this article is to analyse the way economists interested in social and economic evolution cite, mention or refer to Darwin. We focus on the attitude of economists towards Darwin's theory of social evolution – an issue he considered as central to his theory. We show that economists refer to and mention Darwin as a biologist and neglect or ignore his theory of social and cultural evolution. Three types of reference are identified: first, economists view and quote Darwin as having borrowed concepts from classical political economists, Malthus and Smith. Darwin is then mentioned to emphasize the existence of economic theories of social evolution. Second, economists refer to and cite Darwin from the perspective of the use of biological concepts in social sciences. Darwin's biological theories are then equated with those of Spencer. From these two perspectives, Darwin's theory of social evolution is ignored and Darwin considered as a biologist exclusively. Third, economists acknowledge the existence of Darwin's general (biological and social) theory of evolution. Darwin is then considered and quoted as a biologist and a social evolutionist.

Key-words: Darwin, social evolution, evolutionary economics, bioeconomics

JEL classification: A 11, B 52.

¹ Earlier versions of this text were presented at a History of Social Sciences Seminar (Ecole Normale Supérieure de Cachan), at the 2004 HES meetings in Toronto (University of Toronto), at the Amsterdam-Cachan Workshop (University of Amsterdam) and at a research seminar at the Max Planck Institute. I am grateful to all those who cooperated in the research for this paper. For the discussions, I thank Armen Alchian, Harold Demsetz, Michael T. Ghiselin, Jack Hirshleifer, and Gordon Tullock. For further comments on earlier drafts, I thank Bruce Caldwell, Loïc Charles, Philippe Fontaine, Elias Khalil, Roger Koppl, Michael T. Ghiselin, Sophie Harnay, Jack Hirshleifer, Geoffrey M. Hodgson, Robert J. Leonard, Maud Pélissier, Jack Vromen and Ulrich Witt.

Economists on Darwin's theory of social evolution and human behaviour

1 Introduction

References to past authors, especially when these references imply crossing over disciplinary boundaries, are complex matters. In this paper, we focus on Charles Darwin and economists refer to him and to his different writings: how do economists quote Darwin? Which of his works are mentioned, when they are, and from which perspective are they referred to? More specifically, we analyse the attitude of economists towards Darwin's theory of social evolution – that is the theory he exposes in a book he publishes in 1871, the *Descent of Man* – in comparison with his theory of biological evolution as developed in the 1859 *Origin of Species*. These are indeed two of the major books Darwin wrote and published². These two books correspond to two related but nonetheless different aspects of Darwin's works.

In the *Origin of Species*, Darwin presents his well known theory of biological evolution. Inspired by Thomas Malthus, as Darwin himself acknowledges it in his notebooks, this theory exposes the concepts and mechanisms that guide biological evolution. These concepts – “natural selection” and “struggle for life” – have also been used by Herbert Spencer and other scholars to explain politics, economics, social and morals, giving birth to what is called social Darwinism. Social Darwinism can thus be described as a specific version of, a transference to human societies of Darwin's theory of biological evolution. Thus, a Darwinian or a biological theory of social evolution, this doctrine argues that the functioning and evolution of human societies follows the same mechanisms as nature or non human societies. However, to refer to “natural selection” only is too broad a way to characterise social Darwinism. In fact, a precise definition of this doctrine cannot be separated from the meaning it received in the second half of the 19th century. Now, within the context of triumphant capitalism, natural selection was closely associated with the survival of the fittest: “To the Anglo-Saxon imperialist, or to the rising capitalist produced by the industrial

² Among the 20 books Darwin wrote, 3 are of a major importance for economists and social scientists: the *Origin of Species by the Means of Natural Selection* (1859), the *Descent of Man and Selection in Relation to Sex* (1871) and the *Expressions of Emotions in Man and Animals* (1872).

revolution, natural selection meant the survival of the fittest competitor” (McConaughy, 1950, p. 397). Then, social Darwinists used “survival of the fittest” to transform Darwinism into a “quasi-ontological racial discourse” based on “a redefinition of ‘fitness’ as ‘intelligence’ and an identification of ‘intelligence’ with the ‘white’ races” (Claeys, 2000, p. 240). This is the reason why social is associated with unregulated and uncontrolled capitalism and unrestricted laissez-faire and some of its consequences such as racism, nationalism and imperialism, (see Crook, 1996; Hodgson, 2003 c; Paul 2003). And this is the way this doctrine was defined by Richard Hofstadter’s influential and much read *Social Darwinism in American Thought* (1944)³. The latter gave a specific meaning to social Darwinism (Bannister, 1973), in particular emphasizing a strong connection. Accordingly, Hofstadter emphasized a strong connection between Darwin, Spencer and social Darwinism. It thus contributed to the spreading of Darwin’s image as a social Darwinist among economists.

Now, despite its ambiguities, Darwin’s biology can certainly not be interpreted as social Darwinism defined so specifically. In particular, one of the most significant aspect of social Darwinism – the role given to “survival of the fittest” – plays a different and even minor role in Darwin’s theory of social evolution. Thus, not only this expression – repeatedly attributed to Darwin – was coined by Spencer. Also, Darwin hesitated to adopt Spencer’s concept to explain biological evolution: he adopted it in the 6th edition of the *Origin of Species*, in 1882 that is 25 years after Spencer’s first use of the phrase. And, finally, he also criticised its use to in the context of human societies. Thus, in the *Descent of Man*, Darwin explains that, “in the earlier editions of my ‘Origin of Species’ I perhaps attributed too much to the action of natural selection or the survival of the fittest” (1988).

The distance with Spencer and social Darwinism that Darwin seems cautious to put forward illustrates the difference that exists between his theory of biological evolution and his theory of social evolution, which we found in particular exposed in the *Descent of Man*. In effect, although he was convinced that “man was part of the

³ Hodgson (2003 c) shows that the definition of social Darwinism retained by economists and social scientists changes with the publication of Hofstadter’s boo. He notes that “Richard Hofstadter gave the use of the term a huge boost, in the context of a global anti-fascist war”.

evolutionary process” and therefore that his theory was likely to apply to animals and to man also⁴, Darwin nonetheless proposed a theory of social evolution that does not consist in a biological theory of social evolution. There are important differences between what happens in animal and human societies. Thus, the principle and target of selection in human societies is different as in natural selection. In effect, in Darwin’s theory of social selection the group – rather than the individual – is the target of the selection process. Thus, Darwin notes that

“with strictly social animals, natural selection sometimes acts on the individual, through the preservation of variations which are beneficial to the community [...] With the higher social animals, I am not aware that any structure has been modified solely for the good of the community [...] In regard to certain mental powers the case [...] is wholly different; for these faculties have been chiefly, or even exclusively, gained for the benefit of the community, and the individuals thereof have at the same time gained an advantage indirectly” (1988 b, p. 285-286; emphasis added).

That the group is the target of social evolution does not mean that social evolution does not rest on “natural selection”; however, the role of this principle is complemented by other factors such as moral sentiments and, more precisely, on sympathy:

“When two tribes of primeval man, living in the same country, came into competition, if (other circumstances being equal) the one tribe included a great number of courageous, sympathetic and faithful members, who were always ready to warn each other of

⁴ In his *Autobiography*, Darwin notes: “As soon as I had become, in the year 1837 or 1838, convinced that species were mutable productions, I could not avoid the belief that man must come under the same law” (p. 131). Man was then “a leitmotiv” (Herbert, 1977, p. 197) and also “an issue of its own merit” (1997, p. 197; emphasis added) for Darwin since 1837, thirty-four years prior to the publication of the *Descent of Man*, when he filled his transmutation notebooks (from 1837 to 1841). Why is it so? The importance of a theory of human behaviour for Darwin “simply” rests in the possible generalisation of his theory of biological evolution. Indeed, this early conviction indicates both his optimism and satisfaction “about the general prospects ... and ... the explanatory powers of his theory” (Herbert, 1977, pp. 201-2). The confidence thus gained led him to raise “questions concerning the evolution of instincts, emotions, language and intelligence”, and to ask “how one can explain sociability and the

danger, to aid and defend each other, this tribe would succeed better and conquer the other” (ibid., p. 322).

Thus, the theory of social evolution that Darwin indeed proposed departs (at least slightly) not only from any (including his own or Spencer’s or the ones proposed by social Darwinists) biological theory of evolution. As such, Darwin’s theory of social evolution differs from the Darwinian or biological theories of social evolution proposed by social Darwinists, as it has been stressed by many scholars (see among others, Bowler, 1990; Gruber, 1981; Roger, 1972; Kaye, 1986; Alland Jr., 1985)⁵. From this perspective, the *Descent of Man* is valuable. Furthermore, the book is also interesting with regard to the connections with classical political economy, the *Descent of Man* is interesting for it evidences a second but rarely noticed debt towards political economists. In effect, it includes references to Adam Smith’s *Theory of Moral Sentiments* – a book that Darwin actually read⁶ –, stresses the importance of sympathy and mentions precise passages from David Hume’s *Treatise of Human Nature* (see Marciano and Pélissier, 2001).

How do economists treat these differences between Darwin’s theories of biological and social evolution, and the complex links with Spencer and social Darwinism? Do they take into account the different aspects of Darwin’s works? Do they mention the many connections with classical political economists? These are the question we address in this paper. More precisely, we analyse the way economists refer to Darwin, mention his name and quote his writings to show how and how far these different aspects of Darwin’s theories were taken into account.

We then identify three ways to answer this question; that is three different modes of references to Darwin and thus three ways to depict Darwin. First, from the perspective of the origins of Darwin’s theoretical framework and, in particular, with regard to the influence of economists on his works and writings, Darwin is considered

evolution of human societies and their institutions” (Schweber, 1977, p. 232).

⁵ There have been and still are ongoing debates over social Darwinism and, more specifically, over Darwin’s social Darwinism. Many insist that there is no doubt that Darwin was social Darwinist (Young, 1985; Greene, 1981). See also Weikart in the a presentation of “a Darwin letter on social Darwinism” (1995).

⁶ Darwin read the *Theory of Moral Sentiments* in 1838 and in 1842 (“I skimmed part of the book”, Darwin writes in his notebooks).

as a biologist exclusively and quoted to evidence that his biological theory has its roots in economic theories; economists mention Darwin, refer to his writings and even quote him to remind the reader that his theory of biological evolution consists in a transposition of a theory developed in social sciences; no mention is never made to a possible theory of social evolution proposed by Darwin. Second, from the viewpoint of the possible use of biological concepts to model social evolution; then, Darwin is quoted as a biologist who inspired Spencer and social Darwinism; Spencer is mentioned as having developed a Darwinian theory of social evolution but Darwin's theory of social evolution remains ignored. Third, Darwin's general theory of evolution, and its twofold aspects – biological and social; from this perspective, Darwin is quoted as the first scholar who tried to bridge the gap between two scientific domains – economics and biology.

2 The economic origins of Darwin's theory of biological evolution: Darwin as a borrower

We first propose to analyse the image of Darwin and the way economists quote him within the framework of the discussions around the connection between economics and biology. This image can be associated with the conviction shared by many economists that their discipline “may ... count itself among the sources of modern biology” (Houthakker, 1956, p. 181). In effect, and more precisely, the credit of the foundation of modern biology is attributed to certain economists: “modern biology was in a sense founded by the world's first professor of economics, Malthus” (Tullock, 1977, p. 502). Even more precise is the belief that economists were the first to propose theories of social evolution: “one of the most satisfying evolutionary discussion that I have read is in the 15 pages of the *Wealth of Nations* in which Smith writes about the evolution of money” (Adelstein, 1982, p. 162). Therefore, the concepts proposed by economists and the theories of evolution developed in the context of social sciences at the end of the 18th century supposedly have preceded and made possible the theories of biological evolution developed during the 19th century, in particular that of Darwin. Thus, the “conceptual apparatus” (Hayek, 1958, p. 242) developed by classical political economists was ready for being transposed from one discipline to the other; it “lay readily fashioned at hand for him [Darwin] to use”

(ibid.). This allowed him to develop his theory of biological evolution⁷. In other words, in this view, Darwin is considered as a biologist – in fact, the most famous representative of modern biology – who borrowed concepts from political economy. Undoubtedly, Darwin was a biologist and the role economic theories played in the birth and development of his theory can hardly be questioned; therefore, one cannot be puzzled by the fact that economists refer to, and quotes him in such a way. Now, and this is the point we would like to make, the attempts to shed light on the economists' influence on Darwin's biological theories, that is the focus on Darwin as a biologist, cloud all the other – than biological – parts of Darwin's writings. His theory of social evolution is then ignored or evacuated. As a corollary, since Darwin's theory of social evolution seemingly does not exist, when a Darwinian theory of social evolution is evoked, it is always in connection with Spencer and social Darwinism.

Within this context, references to Darwin are not aimed at evidencing his theoretical contribution. They rather remind the readers of the economic origins of his biological theory. Thus Darwin is named to stress the influence of classical political economists: Malthus's theory of population 'inspired' (Hayek, 1991, p. 262) or "partly inspired ... Charles Darwin's work on evolution, according to his own statement" (Houthakker, 1956, p. 181); alternatively, it is argued that "economists often take pride in the fact that Charles Darwin came to his theory of evolution as a result of reading Thomas Malthus and Adam Smith" (Coase, 1985, p. 73). Furthermore, because the role of past economists is particularly important, Darwin is also named to insist that they were his predecessors. This is exactly what Hayek suggests when he claims that "Hume may be called a precursor to Darwin in the field of ethics" (1967, p. 107) because

"what he produced (...) became the basis of his case for liberty and the foundation of the work of the great Scottish moral philosophers, of Adam Ferguson, Adam Smith and Dugald Stewart, who are recognised as the chief ancestors of modern evolutionary anthropology" (ibid. p. 106)

⁷ This debt to political economists has been subject to controversial debates. It ranges from opinions assuming that the influence is almost negligible (de Beer, 1958) to statements about the "enormous impact of Malthus on Darwin's work" (Herbert, 1977, p. 216) and that

and may even be considered as “Darwinians before Darwin” (1973, p. 153). Obviously, Darwin’s theory is not important as such but because it helps to bring economists’ into light⁸. Thus, there is not need to enter into its details nor to quote precisely any of Darwin’s writings. A reference to Darwin’s name is, most of the time, considered as sufficient. Sometimes, either direct or indirect precise references are used. They strengthen and clarify Darwin’s image. For instance, Hayek’s perception of Darwin is illustrated and supported by the indirect references he utilises: Gladys Bryson’s *Man and Society: The Scottish Inquiry of the Eighteenth century* (1945) and Henry F. Osborn’s *From the Greeks to Darwin* (1894). These two books present Darwin as a biologist who made use of economic concepts (Bryson) and played a relatively minor role in the development of a modern theory of evolution (Osborn)⁹. Alternatively, when direct references to Darwin’s writings are added, besides mentions to his notebooks, economists and other social scientists almost exclusively quotes his biological works, that is the *Origin of species* (see among others, Vorzimmer, 1969; Young, 1969; Herbert, 1971, 1977; Schweber, 1977, 1980; Jones, 1989).

Very rare but nonetheless significant are the references made to the *Descent of Man*. And, in this regard, the presence of a mention is at least as significant as its absence. In effect, within the context of the influence of economists’ writings on Darwin, to refer to a book in which Darwin quotes Hume and Smith would obviously have served to give more weight to the idea that there indeed exists a connection between the former and the latter, showing that their influence goes beyond his theory

“biology remains permanently indebted to the field of political economy” (ibid).

⁸ This perception echoes an image well and long established among biologists, namely that Darwin imported the scientific methodology used by Scottish 18th century scholars in social sciences and thus can be considered as responsible of the transformation of biology into professional and scientific biology (Merton, 1938; Manier, 1978, 1987). Thus, during the first third of the 20th century, Darwin’s theory was considered only as “an interesting but unworkable intellectual gambit that warranted a footnote in the history of ideas but needed to be quietly put aside while the real mechanics were worked out” (Brace, 1997, p. 106).

⁹ It is interesting to note that Osborn’s book dates back to a time when Darwin’s image has not yet changed under the influence of the synthetic theory of evolution. Now, although Hayek by 1958 was particularly well aware of this change, since he met, in particular, Julian Huxley when participating in the preparation of the Darwin centennial celebration organised in Chicago in 1959 (Caldwell, 2000; Angner, 2002), he nonetheless sticks to a quite old-fashioned image of Darwin as a marginal contributor to modern biology.

of biological evolution. It would also undeniably have thrown light on Darwin's theory of social evolution. He then could have been presented both as a biologist and a social evolutionist, these two dimensions complementing each other. Now, this is seemingly impossible. Thus, when the book is mentioned, it is always in passing. For instance, Schumpeter stresses how important the *Origin of Species* and also the *Descent of Man* are – “their secular importance for mankind's cosmic conceptions is comparable with that of the heliocentric system” (1954, p. 445); but he derives no conclusion as to a possible theory of social evolution elaborated by Darwin. Significantly, even a remarkably detailed account of the relationships between Darwin and political economists such as Schweber's (1977), based on a large use of the different notebooks filed up by Darwin but also his books, refers to the *Descent of Man* but only in a footnote (p. 278, n. 108). There, Schweber recalls that in 1909 Hoffding established a connection between Darwin, and Shaftsbury, Hutcheson, Hume and Smith and then notes: “this attribution is, however, based primarily on Darwin's moral philosophy as expressed in the *Descent*” (ibid.; emphasis added). Thus, when the connection between Smith's *Theory of Moral Sentiments* and Darwin's *Descent of Man* is noted, one insists that there is no need to pay attention to it. This is explained by the fact that the *Theory of Moral Sentiments* is “peripheral to political economy” (Gordon, 1989, p. 451). Even Hayek notes that Darwin probably read the *Theory of Moral Sentiments* and certainly not the *Wealth of Nations*; he nonetheless continue to link Darwin, as a biologist, with Smith as an economic theorist (1988, p. 10; also the appendix). There is nothing to gain from a reference to the *Descent of Man* since it does not add to the representation of Darwin as a biologist. In other words, what reveals this way of citing Darwin is that this image of a biologist prevents economists to acknowledge the existence of other elements in his writings. Economists stick to the image of a biologist influenced by the reading of economists and, more specifically, of their economic writings. This emphasis even leads them to reject other Darwin's works, especially those on social evolution.

Not that any Darwinian theory of social evolution is deemed as impossible. However, it is not that of Darwin. It may exist under the form developed by other scholars, such as Spencer or other social Darwinists as a sequel of Darwin's theory. Thus, and this is revealed by the way Darwin is quoted in reference to past economists, there is another aspect of his image among economists: the link between

his biology and Spencer or social Darwinism. This image clearly appears from the concepts used to characterise his theory of biological evolution, that economists describe rather narrowly around elementary ‘concepts’, one may even say catchwords. Furthermore, the elements associated with Darwin’s name indifferently belong to Darwin’s theoretical framework – “natural selection” – or more to that of Spencer’s and social Darwinists’ – “survival of the fittest”. Thus, no difference is made between Darwin and Spencer or social Darwinism. Edith Penrose insists that “The idea of the survival of the fittest ... was suggested to Darwin by a work in social sciences – Malthus on population” (1952, p. 809, n. 14). On his side, Anatol Rapoport explains that “the fundamental idea in the theory of natural selection, credited largely to Darwin and Wallace, stems from an idea posed by Malthus in a social context: more are born that can survive. From this principle came the notion of struggle for existence and survival of the fittest” (1960, p. 74). These quotations are significant. They confirm that Darwin is considered as a biologist who inherited concepts from economists and transposed them from one context, or one discipline, into another one. They also show that Darwin is viewed as the precursor of biological theories of social evolution such as Spencer’s. Therefore, as a biologist, Darwin stands in the middle of a tradition of social evolutionists that stretches from classical political economists to social Darwinism. “Adam Smith, Darwin, Spencer, William Graham Sumner, and to a certain extent, John Stuart Mill and even Alfred Marshall” are considered as “the prophets” of

“values that set property higher than life (the life of nonproperty owners, that rated freedom higher than equality, that considered competition as of divine ordination and *caveat emptor* as a matter of course, that believed that fighting for one’s own interest led to the best result for the community at large, and that looked at money-making as such as a worth-wile occupation” (Redlich, 1951, p. 272)¹⁰.

¹⁰ This seems to be the point of view defended by Hayek. He considered as “unfortunate” (1958, p. 233) the use of biological concepts in theories of social evolution as in Spencer’s or Bagehot’s social Darwinist theories. Hayek did not want to insist on a possible connection between classical political economists and social Darwinism because he wanted to avoid to “lead the reader to think that he [Hayek] is borrowing from biology” (Caldwell, 2001, p. 545).

However, Darwin is not a social evolutionist himself.

The alleged lack of difference between Darwin's theory of biological evolution and Spencer's theory of social evolution is the major feature of another of Darwin's image among economists, that of a social Darwinist.

3 Darwinian biological concepts in economics: Darwin as a biologist

The second and complementary Darwin's image among economists that we present emerges from the references to Darwin made in discussions about the (possible and necessary or, by contrast, impossible and detrimental) transposition of certain biological concepts in the social sciences. Now, historically, the first attempts to build theories of social evolution on biological concepts date back to the mid-nineteenth and are associated with Spencer: "This approach is already found in cruder form in the social philosophy of Herbert Spencer, who relied heavily on analogies drawn between biological and social evolution" (Rapoport, 1960, p. ix). Now, and this is implicit in Rapoport's remark, Spencer's achievements were possible because there already existed biological theories, and in particular that of Darwin. As a consequence, the way economists perceive Darwin is associated with the conviction that Spencer has been the first social scientist having modelled the functioning and evolution of human societies with biological tools. Thus, the sequence is described as follows: "the principles of biological evolution and natural selection were first put forth in a comprehensive form by Darwin" (Penrose, 1952, p. 809) and the "application of these principles to society" (ibid.) was initiated by "Spencer and his followers" (ibid.). In other words, Darwin is considered as a biologist who first proposed a biological theory of evolution and thus set up the conceptual matrix for social Darwinism.

To be more precise, Hayek "only" criticized social Darwinism but did not reject the use of biological concepts in economics *as such*. To the contrary, he considered that the use of Darwin's biological ideas could be of interest to understand and model social evolution. Thus, it is possible to say that Hayek expressed a clear affinity to the idea of socio-biology as a modern version of Darwinism (see for instance, Hayek, 1971, 1988; I thank Ulrich Witt for having suggested me to insist on this point). It even led him to propose a theory of social evolution that is not so different from Darwin's own theory of social evolution (see Marciano and Pélissier, 2003). However, Hayek only insisted on Darwin's biology and never mentioned his theory of social evolution. This is where lies a difference between Hayek and the scholars whose works are analysed in the fourth section of this paper.

However, Darwin did not apply his theoretical framework to human societies: social Darwinism and the explicit development of biological theories of social evolution is due, in particular, to Spencer. More precisely, economists look on these two complementary branches of social Darwinism, Spencer's and Darwin's theories of evolution as identical. They are based on the same concepts or principles and use the same mechanisms to explain how natural, on the one side, and human, on the other side, societies evolve and function. Spencer's theory is viewed as the counterpart of Darwin's theory of biological evolution in terms of social evolution. Therefore, and this is the argument that we develop in this section, no Darwinian theory of social evolution exists that could be different from Spencer's and that would have been developed by Darwin. Social scientists and economists consider Spencer's theory as the only existing Darwinian theory of social evolution.

Within this context, references to Darwin are still not made to insist on his own contribution but rather to stress that his biological theory of evolution connects to that of Spencer. Thus Darwin is named in association with concepts such as "survival of the fittest", thereby revealing that a social theory of evolution based on Darwinian concepts is not different from that of Spencer. Karl Pribram thus notes that "most adherents of the German Historical school ... applied the Darwinian principle of the survival of the fittest to an alleged struggle waged between conflicting nations" (1953, p. 256). Similarly, Morell Heald evokes the "social Darwinian concept of the survival of the fittest" (1953, p. 301) when discussing the business attitudes towards European immigration in the USA. The same year, another economic article associates "an unfettered Darwinian struggle" with "survival of the fittest" (Adams, 1953, p. 489)¹¹. Finally, let us mention Van R. Potter who also refers to the "the Darwinian concept of survival of the fittest" (1962, p. 4). Thus, as these quotations show it, Spencer's concept of "survival of the fittest" is openly and visibly associated with Darwin's name. These statements are not false but nonetheless ambiguous especially because and when no mention is made to Spencer. Now, references to Spencer rather increase

¹¹ In a very different perspective, Solow discusses the evolution of economic theory in terms of "survival". Presenting himself as "a good Darwinian" (p. 373), he "believe[s]" that because "Survival in the literature is a test of fitness, if an imperfect one" (ibid.), and "if mathematical techniques continue to produce good economics" (ibid.) and "predict[s]... that most people interested in economics will as a matter of course learn some mathematics" (p. 374).

than decrease the ambiguity; or, more precisely, they show that Darwin theory is indeed equated with Spencer's. Thus, one reads that "Darwin constantly referred to the struggle for existence and quickly adopted the phrase coined by Spencer – the survival of the fittest" (Potter, 1962, p. 3; emphasis in original). It would have been difficult to find a precise reference acknowledging how "quick" Darwin was to adopt Spencer's principle – since, as stressed above, it is only in a late edition of the *Origin of Species* that this phrase appears. By contrast, it would have been possible to illustrate Darwin's hesitations towards Spencer's explanation of social evolution in the *Descent of Man*.

There is in one domain in which the references to Darwin's biology in Spencerian terms has been qualitatively even if not quantitatively important, namely economic theories of the firm. Thus, as stressed by Sydney Winter, "in discussions on the role of profit maximisation in the economic theory of the firm, reference is often made to the Darwinian principle of 'survival of the fittest'" (1964, p. 592). This dates back to the publication, in 1950, of Armen Alchian's "Uncertainty, Evolution and Economic Theory". Even if Alchian's reference to a "Darwinian natural selection" is not rare in the 1950s, his article is interesting because it marks the rediscovery of Darwinian biological concepts in economics; and also because it gave birth to debates about the question of the use of biological analogies in economics. With regard to the question analysed in this article, Alchian's article provides a clear illustration that to name Darwin to remind that "natural selection" and "survival of the fittest" are biological principles is sufficient. Thus, Alchian proposes "alternative" to the standard neo-classical theory of firms' behaviour and profit maximisation based on "the principles of biological evolution and natural selection" (1950, p. 211). He proposes a combination between "a Marshallian type of analysis ... and ... the essentials of Darwinian evolutionary natural selection" (ibid., p. 213, fn 7). Alchian's explanation consists in arguing that markets function rests on a "survival of the fittest" principle: certain firms ("better than their actual competitors", 1950, p. 211) survive in the market competition (they "are the survivors; those who suffer losses disappear", ibid.)¹². Darwin is named but no precise reference is used. As Alchian explains, "I

¹² Stephen Enke (1951) and then Milton Friedman (1953) extended and generalized Alchian's conclusion. Enke was then member of the RAND Economics Division. On his side, Alchian

thought everyone knew about Darwin and no reference was required ... I grew up in the mid 1920s and remember well the big debate about evolution. My father was a convinced Darwin enthusiast” (Alchian to author, 7 may 2003). Some concepts are so obviously Darwinian that no precision is required. Furthermore, one may add that Darwinian concepts in the social context do not only refer to Darwin’s biology but also to social Darwinism. From this perspective, Alchian does not want to lead the reader to think that his approach belongs to social Darwinism. He thus insists that that analogy plays a secondary role in his analysis. It is “merely expository, designed to clarify the ideas in the theory” (1952, p. 601), which “stands independently of the biological analogy” (ibid.)¹³. Therefore, a more elaborate reference to Darwin is not only useless (because Darwin is perfectly well known); it is also possibly harmful (by pointing out a connection with social Darwinism)¹⁴.

Besides mentions to Darwin’s name, direct references to his works are very rare not to say absent. When references are needed, they are indirect and rather involve Spencer or other authors that have insisted on a connection between Darwin’s biology and Spencer’s theory of social evolution. Two examples can be used to illustrate this point. First, in his *Fights, Games and Debates*, Rapoport ignores Darwin’s own attempts to develop a theory of social evolution. Obviously, Darwin appears to be famous for his theory of biological evolution and Spencer worth being quoted for the application of these concepts to human society. As a consequence, Rapoport mentions Darwin twice in the book; in one of these two references, he puts him on the same

was also associated to the Rand Corporation. Enke is the sole person thanked by Alchian for “criticisms and stimulation leading to improvements in both content and exposition” (Alchian, 1950, p. 211, fn 1). Enke, formerly professor at UCLA, has been hired by the RAND Corporation thanks to Alchian.

¹³ In a later commentary, he even acknowledges that the reference to biology, absent in a first version of the paper, was made explicit on the suggestion of readers of the earlier draft who “urged that the analogy be included as helpful to an understanding of the basic approach” (Alchian, 1952, p. 601, fn 4).

¹⁴ That Darwinism and social Darwinism are not only connected but also particularly negative theories can be illustrated by many books that were published in the 1950s in which capitalism – under the form it took in post-bellum America – was compared as ‘a vast human caricature of the Darwinian struggle for existence and survival of the fittest’ (Hofstadter, 1944, p. 32). Businessmen were then considered as social Darwinists: social Darwinism “was a balm to their impaired conscience to be told they enjoyed the riches simply because of the working of natural laws over which neither they nor anyone else had control” (Holbrook, 1953, p. 320). See Wyllie, 1953 for a more detailed and discussed presentation of this thesis.

footing as a novel character: “The distinction between Darwin and *Sherlock Holmes* is more in their specific preoccupations than in the workings of their minds” (1960, p. 212; emphasis added). Therefore, part of social memory, Darwin does not need to be quoted with much precision. He does not appear in the list of references. By contrast, Spencer’s *Principles of Sociology* does (1960, p. 74). A second illustration is provided by Penrose’s contribution to the debate around the use of biological analogies in social sciences and, in particular, in the theory of the firm (1952). In this article, Penrose criticises the use of biological analogies in economic reasoning – they “tend to confuse the nature of the important issues” (ibid., p. 804) and then “add to rather than subtract from the difficulties of understanding social institutions” (ibid., p. 818). The problem here is specifically that biological analogies are Darwinian and, as such, imply a connection to Spencer and social Darwinism. In other words, a theory of social evolution based on biological analogies unavoidably connects to Darwin and therefore to Spencer and social Darwinism. In other words, Penrose sticks to the image of Darwin given by Hofstadter: a biologist who invented concepts utilised by others – ‘Spencer and his followers’ – in conservative, pro laissez-faire doctrines. This is no surprise since Penrose does not use references to Darwin’s nor even Spencer’s writings to fuel her analysis. She ‘reads’ Darwin and Spencer through Hofstadter’s *Social Darwinism in American Thought*, which appears in the references used in the paper.

Therefore, it appears from the debates about the use of biological analogies in economics that Darwin is considered and quoted as the predecessor of any doctrine of social evolution based on biological concepts. No direct bibliographical references are used to evidence a connection between biology and social sciences. Darwin’s name only is mentioned and then associated with concepts that rather are those of Spencer, the first to develop a biological or Darwinian theory of social evolution. Then, when references are needed, they are found in Spencer’s writings or in any work that correspond to this perspective. There is no need to look into Darwin’s writings to find what has already be found in Spencer’s.

4 Darwin's theory of human behaviour accepted: Darwin as a bioeconomist

A third image can be put forward and discussed from the way economists cite Darwin within the frame set by the debates around the reciprocal transfers of concepts or tools between economics and biology that is proposed in bioeconomics or sociobiology – two approaches respectively based upon Michael T. Ghiselin's *The Economy of Nature and the Evolution of Sex* (1974) and Edward O. Wilson's *Sociobiology: The New Synthesis* (1975)¹⁵. The perspective then adopted goes beyond that of the use of analogies in either sciences. This rather corresponds to the argument that the use of economic tools to understand what happens in natural and animal societies or, conversely, of biological tools in the context of human societies is possible, legitimate and fruitful because nature and culture share the same features and that their functioning obey to the same mechanisms. Now, because of the similarities that are observed or assumed between nature and culture, economics (or social sciences) and biology should no longer be envisaged as separate and even antagonistic disciplines. To the contrary, “there is such a striking similarity between the basic problems attacked by economics and by social biology, we can expect to find parallels in the corresponding logical structures of thought” (Hirshleifer, 1978 b, p. 320; emphasis in original). Economics and biology have thus to be considered from the perspective of a unified theoretical framework, that is of a single discipline in which “*natural economy* (biology) and “*political economy* (economics) ... constitute a single branch of knowledge ... which we may call *general economy*” (Ghiselin, 1978, p. 233). Now, this approach has its roots in Darwin's theory. Thus, Hirshleifer considers that sociobiology proceeds to the “recent revival of Darwinian evolutionary theory” (ibid.); and on his side, Ghiselin argues that his 1974 book is “an up-dated version of

¹⁵ In fact, the first articles in sociobiology or bioeconomics were published earlier (Hamilton, 1964; Alexander, 1974; Trivers, 1971; 1974; Tullock, 1970, 1971 a, 1971 b). Tullock's attempts are anterior to the actual birth of sociobiology and bioeconomics, which dates to the publication of Ghiselin's *Nature of Sex* (1974) and Wilson's *Sociobiology* (1975). In 1994, Tullock recalls: “One specific piece of writing I did at that time, however, was never published. I produced a book manuscript titled ‘Coordination without Command: The Organization of Insect Societies’ which was an effort to use economic tools to analyze the internal social structure of ants and termites and a few other species ... Thus, in a way, it is too bad the book was not published. If it had come out well before Wilson, the uproar which came from this attempt to draw lessons from animal societies would have been much less significant” (1994, p. vii).

the *Descent of Man*” (Ghiselin to author, 5 June 2003). In other words, the way economists perceive Darwin is associated with the conviction that his theory anticipated sociobiology and bioeconomics. He is considered as the first scholar having attempted both to use economic concepts in biology and, reciprocally, biological concepts in the social context. He is thus viewed, on the one hand, as a biologist who borrowed concepts from economists; his theory of biological evolution illustrates the possible transfers from economics to biology. On the other hand, it is also considered that Darwin extended his own framework to develop a theory of social evolution; his theory of social evolution evidences the transfers from biology to social sciences. As a consequence, it is no longer sufficient to mention Darwin’s name only. It becomes important to refer precisely to his writings to demonstrate the twofold connection between bioeconomics and Darwin.

Within this context, references to Darwin are first aimed at reminding that he inherited his biology from the theories developed by past economists. Thus, economists still quote Darwin to remind us of the economic foundations of Darwin’s theory of biological evolution and to insist that economists invented the concepts used in biology. For instance, when Kenneth Arrow justifies the reprint of an article written by Wilson¹⁶ in the December 1978 issue of the *American Economic Review*, he explains that human and natural societies share the same features: “Resource scarcity is a common characteristic of the biological world of which human are parts. It is therefore not surprising that the same modes of analysis find applications in both biology and economics” (1978, p. 25) and stresses that this idea was transferred from Malthus to Darwin: “After all, Charles Darwin has reported that the idea of natural selection came to him from a reading of Malthus” (ibid.). Similarly, Tullock stresses that “Malthus was both the first official Professor of Economics and a major influence on Darwin and Wallace” (1978, p. 3)¹⁷. Along the same lines, Jack Hirshleifer

¹⁶ Entitled “The Ergonomics of Caste in the Social Insects”, the article had previously published in the *American Naturalist* in 1968.

¹⁷ From Tullock’s perspective, references to Darwin are not that important. Tullock remains sceptical as to what biological concepts may teach us about the functioning of human societies work: “we are unlikely to learn very much about human society by studying animal societies” (ibid., p. 10). Rather, what may be fruitful is the utilisation of economic tools to analyse natural problems: “I have myself been writing articles, notes, comments etc. in biology ... [and] ... it could be argued that I have never left economics, that all my ‘biological’ articles

mentions Malthus and Smith as predecessors of Darwin (1977, p. 2). In other words, it is still admitted, and put forward that Darwin used economic concepts and tools to analyse natural phenomena. From this perspective, the *Origin of Species* cannot but be viewed as an example of a transfer of ideas from economics to biology.

However important it is, such a transfer is only partial; it only acknowledges that, although he was a biologist, Darwin had understood and accepted economic concepts. Now, bioeconomics or sociobiology are synthetic analyses which also require a transfer of ideas from biology to economics. To put it in other words, Darwin can be considered as a bioeconomist if and only if it can be shown that he has developed a theory of social evolution based on biological concepts. Therefore, other Darwin's writings are important to mention because they evidence that Darwin indeed was a bioeconomist or a sociobiologist. Hence, it is important to refer, in particular to the *Descent of Man*. From this perspective, Hirshleifer is thus probably the first economist making an explicit reference to Darwin's theory of social evolution, even mentioning *The Descent of Man* (1978 a, p. 240), although the book still does not appear in the list of references (see also 1978 b, 1982, 1985). Hirshleifer thus presents Darwin's book as a crucial reference for both economists and biologists: he writes that "biologists, in a long tradition starting with Darwin's *Descent of Man* and recently flowering as a topic under the heading of sociobiology, have been better economists than we" (1980, p. 652). Thus, Hirshleifer does not only utilise a reference to Darwin's book to justify his own approach by a connection with attempts made by a celebrated biologist; he also stresses Darwin's attempts to develop a theory of social evolution. This is explained by the fact that "Darwin though like an economist" (Hirshleifer, 1978 b, p. 1) as it is, particularly, illustrated by the fact that Darwin makes a frequent use of expressions like 'the economy of Nature' (which appears 13 times in the *Origin of Species*) as well as by Darwin's opinion that "natural selection is trying to economise on every part of the organisation" (1859, chap. 5)¹⁸. In other words, Hirshleifer is the

are simply economics articles in which I have rather unusual sets of entities maximising a rather unusual utility function" (1979, p. 2). In other words, Tullock does not propose to use biological and Darwinian concepts to shed new lights on economic phenomena. He rather suggests that it is possible to use economic tools to understand natural problems.

¹⁸ See the *Concordance to Darwin's Origin of Species* (Barret, Weinshank and Gottleber, eds. 1981). I thank Jack Hirshleifer for having signaled me this reference.

first, and still one of the rare, economist to use a direct reference to the *Descent of Man* to stress the existence and explain Darwin's theory of social evolution. More precisely, in 1985, in his article about *The Expanding Domain of Economics*, Hirshleifer insists on the fact Darwin's theory of social evolution differs from his theory of biological evolution. He notes the role that moral sentiments played in social evolution and that Darwin had already pointed to the vexed question of altruism in natural selection: "Darwin argued that, in primitive times, human group whose members were 'courageous, sympathetic, and faithful' would have a selective advantage. But he already appreciated that a free-rider problem would be at work: *individual selection* for effective pursuit of self-interest would tend to subvert *group selection* for benevolent traits" (1985, p. 65).

Therefore, Darwin's theories can then be considered as illustrations of the twofold connection between economics and biology – a connection that Darwin has then been the first to propose and put in an explicit shape. The first aspect of the connection is methodological while the second is much more substantive: not only Darwinism put forward the possibility to use economic concepts such as scarcity and competition and optimization to understand how nature works but, on the other hand, it also implies that human capacities and preferences are themselves the outcome of mankind's biological heritage. As a consequence, rather than considering that Darwin's theory of social evolution is an aside to his theory of biological evolution, bioeconomists considered it as a part of it. Therefore, besides the *Origin of Species*, the *Descent of Man* and the *Expression of Emotions* are put together to be considered as great Darwin's books. This perspective has led many economists interested in social evolution to include references to Darwin's theory of social evolution (see for instance, Frank, 1988; Rubin, 2000). A more complete and precise image of Darwin has emerged among economists.

5 Conclusion

In this paper, we have shown that economists adopt three complementary ways to refer to Darwin and cite or quote his books. First, Darwin is quoted as a biologist who used the theories of social evolution developed by classical political economists at the end of 18th century. Darwin is named to explicitly put forward this connection. From

this perspective, Darwin's theory of social evolution. There nonetheless exists a Darwinian theory of social evolution, proposed by Spencer and seemingly identical to Darwin's theory of biological evolution. This feature forms the core of a second image of Darwin's work among economists: that of a biologist who indeed developed a theory of biological evolution that has then been transposed by others in the context of human societies. Darwin is, in this perspective, named as a biologist and associated with Spencer or rather "Spencerian" concepts; that is with social Darwinism. Finally, another image emerges within the context of sociobiology or bioeconomics. From this third perspective, Darwin is viewed as a biologist who borrowed concepts from economists to develop his theory of biological evolution and also developed a theory of social evolution. Darwin's books are quoted to evidence this two aspects of his analyses.

Obviously, as we have seen it, these three images are complementary. Darwin may be viewed as a biologist who borrowed concepts from classical political economists to develop a biological theory that, in turn, was transposed by Spencer in social contexts. Furthermore, Darwin may also be considered as a biologist influenced by Malthus or Smith and also as the promoter of a theory of social evolution. The complexity of Darwin's image then depends on the aspect economists choose to emphasize. However, it remains that Darwin remains most of the time considered as a biologist exclusively, author of one book only, the *Origin of Species*. Undoubtedly true, such statement nonetheless leaves in the dark one important aspect of Darwin's work and also authorizes ambiguous and controversial associations with social Darwinism.

6 References

- [1]. Alchian, Armen A. 1950. "Uncertainty, Evolution and Economic Theory", *Journal of Political Economy*, 57: 211-221.
- [2]. Alchian, Armen A. 1953. "Biological Analogies in the Theory of the Firm: Comment", *American Economic Review*, 43: 600-603.
- [3]. Alexander, Richard D. 1974. "The Evolution of Social Behaviour", *Annual Review of Ecology and Systematics*, 5: 325-383.
- [4]. Alland, Alexander Jr. 1985. *Human's Nature. Darwin's View*, New York, Columbia University Press.

- [5]. Angner, Erik. 2002. "The History of Hayek's Theory of Cultural Evolution", *Studies in History and Philosophy of Biological and Biomedical Sciences*, 33: 695-718.
- [6]. Bannister, Robert C. 1973. "William Graham Sumner's Social Darwinism: A Reconsideration", *History of Political Economy*, 5: 89-109.
- [7]. Barret, Paul H., Donald J. Weinshank and Timothy T. Gottleber (eds). 1981. *Concordance to Darwin's Origin of Species*, Ithaca, Cornell University Press.
- [8]. Bowler, Peter J. 1990. *Charles Darwin. The Man and its Influence*, Oxford, Basil Blackwell.
- [9]. Brace, C. Loring. 1997. "The Intellectual Standing of Charles Darwin, and the Legacy of the 'Scottish Enlightenment' in Biological Thought", *Yearbook of physical anthropology*, 40: 91-111.
- [10]. Bryson, Gladys. 1945. *Man and Society: The Scottish Inquiry of the Eighteenth Century*, Princeton (NJ): Princeton University Press.
- [11]. Caldwell, Bruce. 2000. "The Emergence of Hayek's Ideas on Cultural Evolution", *Review of Austrian Economics*, 13: 5-22.
- [12]. Caldwell, Bruce. 2001. "Hodgson on Hayek: A Critique", *Cambridge Journal of Economics*, 25: 539-553.
- [13]. Claey's, Gregory. 2000. "The 'Survival of the Fittest' and the Origins of Social Darwinism", *Journal of the History of Ideas*, pp. 223-240.
- [14]. Coase, Ronald H., 1985. "The New Institutional Economics", *American Economic Review*, 88: 72-74.
- [15]. Crook, Paul. 1996. "Social Darwinism: The Concept", *History of European Ideas*, 22: 261-274.
- [16]. Darwin, Charles. 1859 [1988]. *The Origin of Species by the Means of Natural Selection*, London, Encyclopaedia Britannica.
- [17]. Darwin, Charles. 1871 [1988]. *The Descent of Man and Selection in Relation to Sex*, London, Encyclopaedia Britannica.
- [18]. Darwin, Charles. 1872. *The Expressions of Emotions in Man and Animals*, New York,
- [19]. Darwin, Charles. 1989. *The Autobiography of Charles Darwin*, in Nora Barlow (ed.) *The Collected Works of Charles Darwin*, vol. 29, New York, NYU Press.
- [20]. Darwin, Charles. 1993. *Correspondence*, Cambridge, Cambridge University Press, vol. 8 [1860].
- [21]. Darwin, Charles. 1993. *Correspondence*, Cambridge, Cambridge University Press, vol. 11 [1863].
- [22]. Enke, Stephen. 1951. "On Maximizing Profits: A Distinction Between Chamberlin and Robinson", *American Economic Review*, 41: 566-578.
- [23]. Fontaine, Philippe. 2000. "Making Use of the Past: Theorists and Historians on the Economics of Altruism", *European Journal of History of Economic Thought*, 7: 407-422.

- [24]. Frank, Robert. 1988. *Passion within Reason*, New York: Norton.
- [25]. Friedman, Milton. 1953. "The Methodology of Positive Economics" in *Essays in Positive Economics*, Chicago, University of Chicago Press, pp. 3-43.
- [26]. Ghiselin, Michael T. 1974. *The Economy of Nature and the Evolution of Sex*, Berkeley, University of California Press.
- [27]. Ghiselin, Michael T. 1978. "The Economy of the Body", *the American Economic Review*, 68: 233-238.
- [28]. Gordon, Scott. 1989. "Darwin and Political Economy: The Connection Reconsidered", *Journal of the History of Biology*, 22: 437-459.
- [29]. Green, John C. 1981. "Darwin as a Social Evolutionist", in *Science, Ideology and World View: Essays in the History of Evolutionary Ideas*, Berkeley, University of California Press, pp. 95-127.
- [30]. Gruber, Howard E. 1981. *Darwin on Man. A Psychological Study in Scientific Creativity*, Chicago, Chicago University Press.
- [31]. Hamilton, W. D. 1964. "The Genetical Evolution of Social Behaviour", *Journal of Theoretical Biology*, 7: 1-16, 17-52.
- [32]. Hayek, Friedrich A. 1931. "Richard Cantillon (c. 1680-1734)", reprint in Hayek 1991.
- [33]. Hayek, Friedrich A. 1952. *The Sensory Order*, London, Routledge
- [34]. Hayek, Friedrich A. 1958. "Freedom, Reason and Tradition", *Ethics*, 68 (4): 229-245.
- [35]. Hayek, Friedrich A. 1960. *The Constitution of Liberty*, Chicago, University of Chicago Press.
- [36]. Hayek, Friedrich A. 1967. "The Legal and Political Philosophy of David Hume (1711-1776)", reprint in Hayek 1991.
- [37]. Hayek, Friedrich A. 1971. "Nature vs. Nurture Once Again", *Encounter*, 36, 3, pp. 81-83.
- [38]. Hayek, Friedrich A. 1973. *Law, Legislation and Liberty*, vol. 1, Chicago, University of Chicago Press.
- [39]. Hayek, Friedrich A. 1988. *The Fatal Conceit: The Errors of Socialism*, London: Routledge.
- [40]. Hayek, Friedrich A. 1991. *The Tend of Economic Thinking*, in William W. Bartley (ed.) *The Collected Works of F. A. Hayek*, Chicago, University of Chicago Press.
- [41]. Heald, Morrel. 1953. "Business attitudes towards European immigration: 1880-1900", *The Journal of Economic History*, 13 (3), 291-304.
- [42]. Herbert, Sandra. 1971. "Darwin, Malthus and Selection", *Journal of the History of Biology*, 4: 437-459.
- [43]. Herbert, Sandra. 1977. "The Place of Man in the Development of Darwin's Theory of Transmutation", Part (II), *Journal of the History of Biology*, 10: 155-227.

- [44]. Hirshleifer, Jack. 1977. "Economics from a Biological Viewpoint", *Journal of Law and Economics*, 20: 1-52.
- [45]. Hirshleifer, Jack. 1978 a. "Competition, Cooperation, and Conflict in Economics and Biology", *American Economic Review*, 68: 238-243.
- [46]. Hirshleifer, Jack. 1978 b. "Natural Economy versus Political Economy", *Journal of Social Biology and Structure*, 1: 319-337.
- [47]. Hirshleifer, Jack. 1980. "Privacy: Its Origin, Function, and Future", *Journal of Legal Studies*, 9: 649-664.
- [48]. Hirshleifer, Jack. 1982. "Evolutionary Models in Economics and Law: Cooperation versus Conflict Strategies", *Research in Law and Economics*, vol. 4: 1-60.
- [49]. Hirshleifer, Jack. 1985. "The Expanding Domain of Economics", *American Economic Review*, 75: 53-75.
- [50]. Hodgson, Geoffrey M. 1999. *Evolution and Institutions. On Evolutionary Economics and the Evolution of Economics*, Cheltenham, Edward Elgar.
- [51]. Hodgson, Geoffrey M. 2002. "Darwin, Veblen and the Problem of Causality in Economics", *History and Philosophy of the Life Sciences*, 23: 383-422.
- [52]. Hodgson, Geoffrey M. 2003 a. "Darwinism and Institutional Economics", *Journal of Economic Issues*, 37: 85-97.
- [53]. Hodgson, Geoffrey M. 2003 b. "Hayekian Evolution Reconsidered", *Cambridge Journal of Economics* (forthcoming).
- [54]. Hodgson, Geoffrey M. 2003 c. "Social Darwinism in Anglophone Academia: A Brief History of the Term", mimeo.
- [55]. Hofstadter, Richard. 1992 [1944]. *Social Darwinism in American Thought*, Boston, Beacon Press.
- [56]. Holbrook, Stewart. 1953. *The Age of the Moguls*, Garden City, Doubleday.
- [57]. Jones, L. B. 1989. Schumpeter versus Darwin: In re Malthus, *Southern Economic Journal*, 56, pp. 410-422.
- [58]. Kaye, Howard L. 1986. *The Social Meaning of Modern Biology. From Social Darwinism to Sociobiology*, New Heaven, Yale University Press.
- [59]. Manier, Edouard. 1978. *The Young Darwin and His Cultural Circle: A Study of Influences which Helped Shape the Language and Logic of the First Draft of the Theory of Natural Selection*, Dordrecht: Reidel.
- [60]. Marciano, Alain and Maud Pélisser. 2000. "The Influence of Scottish Enlightenment on Darwin's Theory of Cultural Evolution", *Journal of the History of Economic Thought*, 22: 239-249.
- [61]. Marciano, Alain and Maud Pélisser. 2003. "La théorie de l'évolution culturelle de Hayek à la lumière de La Descendance de l'homme de Darwin", *Economies et Sociétés*, 12, pp. 2121-2143.
- [62]. Mc Cannaghy, Gloria. 1950. "Darwin and Social Darwinism", *Osiris*, 9, pp. 397-412.

- [63]. Nelson, Richard R. And Sidney G. Winter. 1982. *An Evolutionary Theory of Economic Change*, Cambridge, Harvard University Press.
- [64]. Osborn, Henry. F. 1894. *From the Greeks to Darwin. An Outline of the Development of the Evolution Idea*, New-York, Macmillan.
- [65]. Paul, Diane B. 2003. "Darwin, Social Darwinism and Eugenics", in Jonhatan Hodge and Gregory Radick (eds), *The Cambridge Companion to DARWIN*, Cambridge, Cambridge University Press, pp. 214-239.
- [66]. Penrose, Edith T. 1952. "Biological Analogies in the Theory of the Firm", *American Economic Review*, December, 42: 804-819.
- [67]. Penrose, Edith T. 1953. "Rejoinder", *American Economic Review*, 43: 603-609.
- [68]. Potter, Van R. 1962. "Bridge to the Future: The Concept of Human Progress", *Land Economics*, 38 (1), pp. 1-8.
- [69]. Pribram, Karl. 1953. "Patterns of economic Reasoning", *The American Economic Review*, 43 (2), pp. 243-258.
- [70]. Rapoport, Anatol. 1960. *Fights, Games and Debates*, Ann Arbor, University of Michigan Press.
- [71]. Redlich, Fritz. 1951. "Sanctions and Freedom of Enterprise", *The Journal of Economic History*, 11 (3), Part 1, pp. 266-272.
- [72]. Roger, James. 1972. "Darwinism and Social Darwinism", *Journal of the History of Ideas*, 33,
- [73]. Rubin, Paul. 2000. "Group Selection and the Limits to Altruism", *Journal of Bioeconomics*, 2 (1): 9-23.
- [74]. Schumpeter, J. A. 1954. *History of Economic Analysis*, New York, Oxford University Press.
- [75]. Schweber, Silvan S. 1977. "The Origin of the *Origin* Revisited", *Journal of the History of Biology*, 10: 229-316.
- [76]. Schweber, Silvan S. 1980. "Darwin and the Political Economists: Divergence of Character", *Journal of the History of Biology*, 13: 195-289.
- [77]. Smith, Adam. 1759 [1976]. *The Theory of Moral Sentiments*, Indianapolis, Liberty Press.
- [78]. Smith, Adam. 1776 [1979]. *An Inquiry into the Nature and Causes of the Wealth of Nations*, Oxford, Clarendon.
- [79]. Solow, Robert. 1954. "The survival of mathematics", *Review of Economics and Statistics*, 36 (4), pp. 327-374.
- [80]. Spencer, Herbert. 1855. *The Principles of Psychology*, London: Longmans.
- [81]. Spencer, Herbert. 1857. "Prograss: Its Law and Causes", *The Westminster Review*, 67 (April 1857), pp 445-465.
- [82]. Spencer, Herbert. 1862. *First Principles*, London: Williams and Norgate.
- [83]. Trivers, Robert. 1971. "The Evolution of Reciprocal Altruism", *Quarterly Review of Biology*, 46: 36-57.

- [84]. Tullock, Gordon. 1970. "Switching in General Predators: Comment", *Bulletin Ecological Society of America*, 51: 21-24
- [85]. Tullock, Gordon. 1971 a. "The Coal Tit as a Careful Shopper", *American Naturalist*, 105: 77-80.
- [86]. Tullock, Gordon. 1971 b. "Biological Externalities", *Journal of Theoretical Biology*, 33: 379-392.
- [87]. Tullock, Gordon. 1977. "Economics and Sociobiology: A Comment", *Journal of Economic Literature*, 15: 502-506.
- [88]. Tullock, Gordon. 1978. "Altruism, malice and public goods", *Journal of Social and Biological. Structure*, 1, pp. 3-9.
- [89]. Tullock, Gordon. 1979. "Sociobiology and Economics", *Atlantic Economic Journal*, 7: 1-10.
- [90]. Tullock, Gordon. 1994. *The Economics of Nonhuman Societies*, Tucson, Pallas Press.
- [91]. Vorzimer, P. J. 1969. "Darwin, Malthus, and the Theory of Natural Selection", *Journal of the History of Ideas*, 30: 527-542.
- [92]. Weikart, Richard. 1995. "A Recently Discovered Darwin Letter on Social Darwinism", *Isis*, 86 (4), pp. 609-611.
- [93]. Wilson, Edward O. 1975. *Sociobiology: The New Synthesis*, Harvard, Bellknap Press.
- [94]. Wilson, Edward O. 1978. "The Ergonomics of Castle in the Social Insects", *American Economic Review*, 68: 25-35.
- [95]. Wyllie, Irvin G. 1959. "Social Darwinism and the Businessmen", *Proceedings of the American Philosophical Society*, 104 (5), pp. 629-635.
- [96]. Young, Robert M. 1969. "Malthus and the Evolutionists: The Common Context of Biological and Social Theory", *Past and Present*, 43: 109-141.
- [97]. Young, Robert. 1985. "Darwinism Is Social", in *the Darwinian Heritage*, ed. David Kohn, Princeton, Princeton University Press, pp. 609-638.