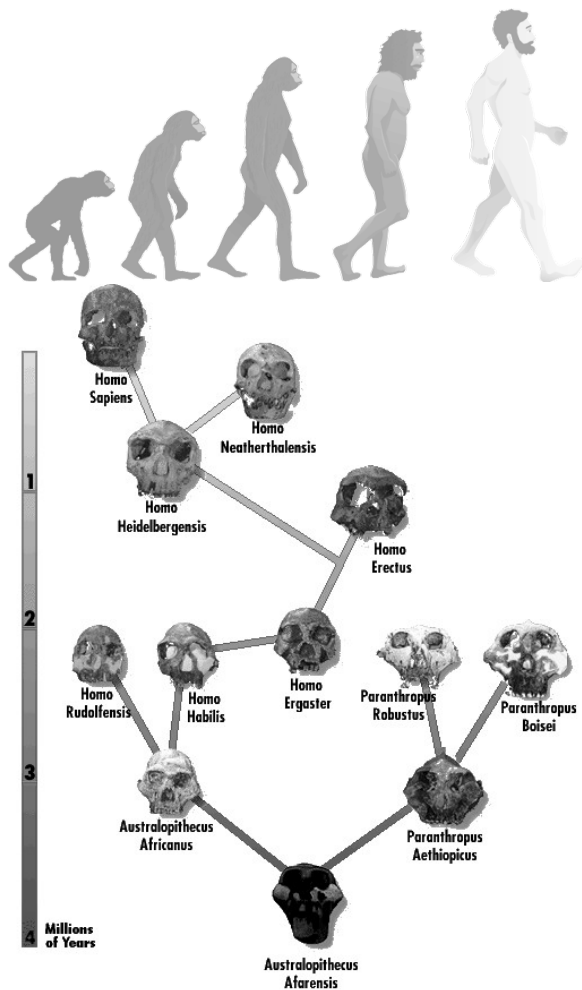


The Politics of Evolution

Dave O'Farrell



Our standard view of evolution today is to an extent coloured by cultural norms, the ubiquity of the first image above means it is often the first thing many people will think of when they hear the word evolution. The reality of human evolution is, however, far closer to the tree like structure in the second image with it's many offshoots. The fact that only one species of human exists today is actually the exception rather than the norm and for much of our evolutionary history multiple hominid species co-existed.

Even the most cursory look at the society we live in reveals great inequality. We are continually told that we live in a society in which all members of society are equal and that we all share certain fundamental rights yet these inequalities persist and in many cases grow. How can we make sense of this glaring contradiction between

what we are told and learn about society, in schools and universities, from teachers, politicians and others in places of authority, and what we see in the world around us?

There are some, Marxists included, who see this inequality as stemming from a capitalist society in which exploitation and inequality are an inherent consequence of the very structure of society yet there are more who seek to justify such inequality and justify the societal structures which allow, and perpetuate, this inequality.

In modern society one of the most powerful arguments in favour of this inequality comes from a claimed scientific basis for inequality. This supposed scientific argument takes the form of an argument based on genetic determinism, the idea that the inequalities we see around us are encoded in our genetic make up and that any notions of creating a more equal society simply cannot work as we cannot go against our so called 'human nature'. This view of the world takes a narrow view of Darwinian evolution and seeks to explain our society, with all it's attendant inequalities, in terms of our genes. This genetic determinism is generally referred to as socio-biology and seeks explanations of human behaviour in terms of a narrow view of evolutionary biology often classed as neo-darwinian.

In order to understand how such arguments arise, and perhaps more importantly how to counter them, it is instructive to place them in their relevant cultural/societal and historical contexts.

Science as a social and cultural activity

The origin of life, and in particular human life, has been a topic which has been addressed from the earliest recorded human societies and which continues to arouse debate and controversy even today.

Throughout most of recorded human history the origins of life have generally been explained in religious terms. This idealist philosophical outlook generally saw human beings as semi-divine, subject to god's will and separate from the natural world however with advancements in science, beginning with the scientific revolution in the sixteenth and seventeenth centuries, a more materialist understanding of the world emerged which challenged the prevailing views. In contrast to the idealist view of the world this materialist outlook, in general, saw human beings as being a part of the natural world, recognised that the natural world existed independently of human consciousness and believed that it was possible to gain real knowledge of how the world worked¹. By the time Marx and Engels were formulating their philosophy of dialectical materialism in the mid 1800's science had vastly improved societies knowledge of the world and Marx and Engels actively followed developments in the sciences seeing the development of science as a key aspect of their materialist world view.

Marx and Engels both shared a lifelong interest in science and were influenced by the debates in science occurring during their lifetime. In relation to the origins of life both were heavily influenced by Darwin and his theory of evolution by natural selection. With the publication of *Origin of*

Species (1859) and later *Descent of Man* (1871) Darwin revolutionised our view of how the natural world with its immense variety of species, including humans, came into existence. The depth of Darwin's influence on Marx and Engels is immediately apparent in Engels oration at Marx's funeral.

Just as Darwin discovered the law of development or organic nature, so Marx discovered the law of development of human history: the simple fact, hitherto concealed by an overgrowth of ideology...²

Marx and Engels were not however blind followers of Darwin and were highly critical of some aspects the natural sciences which they saw as idealist. Despite the great advances in the natural sciences prior to Darwin the prevailing ideology of the day still saw the world as essentially static. In the introduction to *Dialectics of Nature* Engels described this ideology.

High as the natural science of the first half of the eighteenth century stood above Greek antiquity in knowledge and even in the sifting of its material, it stood just as deeply below Greek antiquity in the theoretical mastery of this material, in the general outlook on nature. For the Greek philosophers the world was essentially something that had emerged from chaos, something that had developed, that had come into being. For the natural scientists of the period that we

¹For an introduction to the philosophical concepts of idealism and materialism see John Molyneux *The Point is to Change it: An Introduction to Marxist Philosophy* London: Bookmarks 2012 Chapter 4.

²Frederick Engels *Speech at the Grave of Karl Marx*, Highgate Cemetery, London. March 17, 1883 <http://www.marxists.org/archive/marx/works/1883/death/burial.htm>

are dealing with it was something ossified, something immutable, and for most of them something that had been created at one stroke. Science was still deeply enmeshed in theology. Everywhere it sought and found its ultimate resort in an impulse from outside that was not to be explained from nature itself.³

Darwin's theory shattered this static view of nature and replaced it with a world in which change was an essential part. Darwin, however, was still influenced by the idealist conceptions of his time which gave primacy to thought as the driver of cultural change and when discussing the evolution of modern humans emphasized thought and the development of a large brain, identifying this as the initial step in the evolution of modern humans. Engels sought to counter this view with a more materialist and dialectical analysis in his 1876 work *The Part Played by Labour in the Transition from Ape to Man*⁴. Rather than the accepted view of the day that human evolution began with the development of larger brains and intellects which in turn lead to walking upright and the use of hands to make tools, Engels argued that the first step in this transition was the ability to walk upright, which then freed the hands which were gradually adapted to tool use. This increased use of tools in turn lead to an increased control over nature with an attendant increase in sociability as our early ancestors would have required a higher level of communication which influ-

enced the evolution of larger brains which in turn further influenced the development of tools and so on. Subsequent discoveries in the fossil record have strongly supported Engels view and also lend strong support to taking a dialectical view of evolutionary science. Writing about the evolution of modern humans the evolutionary biologist Stephen Jay Gould noted that debates in science where evidence is lacking, as was certainly the case when Engels was writing *The Part Played by Labour in the Transition from Ape to Man*, are often the most open to ideological influence. Gould suggests that Engels took his formulation from the biologist Ernst Haeckel⁵ but notes that

The importance of Engels's essay lies, not in its substantive conclusions, but in its trenchant political analysis of why Western science was so hung up on the a priori assertion of cerebral primacy⁶

Indeed Gould, who had a keen interest in the history of science and regarded a knowledge of the history of science as an essential component to understanding the social basis of science, frequently revisited the question of ideological influences in science noting that

Science, since people must do it, is a socially embedded activity. It progresses by hunch, vision, and intuition. Much of its change through time does not record a closer approach to absolute truth, but the alteration of cultural contexts that influence it so strongly. Facts are

³Frederick Engels *Dialectics of Nature* London: Lawrence and Wishart 1940 p.6

⁴*The Part Played by Labour in the Transition from Ape to Man* was originally written in 1876 but never completed. It was published in its incomplete form after Engels death in 1896.

⁵An assertion which is strongly supported by Engels familiarity with Haeckel's work and the fact that he referenced it in both *Dialectics of Nature* and *Anti-Dühring*.

⁶Stephen Jay Gould 'Posture Maketh the Man' in *The Richness of Life : The essential Stephen Jay Gould*, Steven Rose & Paul McGarr ed.s London : Random House 2006

not pure and unsullied bits of information; culture also influences what we see and how we see it. Theories, moreover, are not inexorable inductions from facts. The most creative theories are often imaginative visions imposed upon facts; the source of imagination is also strongly cultural.⁷

At the same time Gould held to his materialist view point and rejected the post-modern critique of science which denies the existence of an objective external reality.

This argument, although still anathema to many practicing scientists, would, I think, be accepted by nearly every historian of science. In advancing it, however, I do not ally myself with an overextension now popular in some historical circles: the purely relativistic claim that scientific change only reflects the modification of social contexts, that truth is a meaningless notion outside cultural assumptions, and that science can therefore provide no enduring answers. As a practicing scientist, I share the credo of my colleagues: I believe that a factual reality exists and that science, though often in an obtuse and erratic manner, can learn about it⁸

That science is a social activity is of course readily apparent. People make a living from science and aside from the obvious opportunities for influence due to funding constraints which decide what research

is actually carried out, scientists cannot isolate themselves from society and as such are constantly exposed to the ideologies prevalent in society at the time. That these ideologies often reflect the views of the ruling forces in society is of no surprise to Marxists. As Marx and Engels noted

The ideas of the ruling class are in every epoch the ruling ideas, i.e. the class which is the ruling material force of society, is at the same time its ruling intellectual force. The class which has the means of material production at its disposal, has control at the same time over the means of mental production...

9

Living as we are in a capitalist society the ideas of the ruling class naturally reflect the capitalist structure of society. Theories abound to not only explain but, ultimately, to justify the inequalities inherent to capitalist society. Before we consider how these ideologies present themselves in modern society it is worth considering briefly where these ideologies come from and the basis on which they develop by reference to some historical examples.

Historical materialism

Historical materialism is the name given to the Marxist theory of history, the basic premise of which is that history is made by real human beings and their activity. In fulfilling their basic needs, for food, shelter, companionship etc., human beings must, through their physical organisation, actively change their environment in order to produce their means of subsistence and

⁷Stephen Jay Gould *The Mismeasure of Man*, revised edition, New York : W.W. Norton 1996 p.53

⁸Ibid.

⁹Karl Marx & Frederick Engels *The German Ideology* 1845 <http://www.marxists.org/archive/marx/works/1845/german-ideology/>

in this process they are themselves transformed. Proceeding from this observation it follows that when analysing any society we must begin by analysing the social organisation of people by which they fulfill the conditions necessary to their existence. In analysing these conditions Marxists look at two, closely related, concepts termed the forces and relations of production. In broad terms the forces of production are the generally prevailing levels of technology (and the knowledge behind them) available to a society in fulfilling its needs while the relations of production are the social relations under which the members of a society organise to fulfill these needs. How a society organises is, in the first instance, conditioned¹⁰ by the forces of production and then by the social relations of production (the relations entered into by people in the production of their material needs) which arise from these forces¹¹.

Using this framework we can now look at two examples from previous class societies where inequalities within those societies were justified by reference to ‘nature’ or some form of ‘natural law’.

Ancient Greek society, where the forces of production, the general level of technology available, imposed the requirement of a large workforce in order to sustain itself (for example a large workforce was needed to produce food for the population, to mine the metal required for the armies of the various city states and to build the great temples and other buildings of Greek society) This need for a large workforce combined with the availability of a vast pool of labour in the form of societies conquered

by Greek armies in the course of various wars, resulted in the social relation of slavery. Ancient Greek society was heavily dependant on slavery for the production of its material needs and this use of slavery was often justified in naturalistic terms. For example the Greek historian Heraclitus saw it as an inevitable and natural consequence of war,

War is the father of all and the king of all; and some he has made gods and some men, some bond and some free.¹²

While Aristotle found justification in a ‘natural order’

But is there any one thus intended by nature to be a slave, and for whom such a condition is expedient and right, or rather is not all slavery a violation of nature?

There is no difficulty in answering this question, on grounds both of reason and of fact. For that some should rule and others be ruled is a thing not only necessary, but expedient; from the hour of their birth, some are marked out for subjection, others for rule.

And there are many kinds both of rulers and subjects (and that rule is the better which is exercised over better subjects - for example, to rule over men is better than to rule over wild beasts; for the work is better which is executed by better

¹⁰It is important to note that the forces of production do not determine exactly the relations of production. The relations of production arising out of the forces may vary but they are constrained by the overall ability of a society to produce its material needs which is determined by the forces.

¹¹For a more thorough explanation of these concepts see John Molyneux *The Point is to Change it: An Introduction to Marxist Philosophy* London: Bookmarks 2012 Chapter 6.

¹²*Fragments of Heraclitus*, John Burnet (translator) 1912. Fragment 53, http://en.wikisource.org/wiki/Fragments_of_Heraclitus

workmen, and where one man rules and another is ruled, they may be said to have a work¹³); for in all things which form a composite whole and which are made up of parts, whether continuous or discrete, a distinction between the ruling and the subject element comes to light. Such a duality exists in living creatures, but not in them only; it originates in the constitution of the universe; even in things which have no life there is a ruling principle, as in a musical mode¹⁴

Both Heraclitus and Aristotle were members of a very privileged class of ancient Greek society and their privilege rested on the foundations of that society which required the institution of slavery for the production of its material needs. Viewed from this standpoint the ideological and cultural basis for their views are obvious as without slavery their own position within society would have become untenable.

Similarly European feudal society, largely constrained to agricultural subsistence by the forces of production (simple tools such as wooden ploughs, a lack of knowledge of practices of crop rotation etc.), with social relations based on patronage, with feudal lords able to call upon groups of armed men to impose their will over their domain, was dependant on the social relation of serfdom for its material sustenance. This relation resulted in a large portion of the population eking out a living from subsistence level agriculture while paying dues or levies to a local lord

who lived, by comparison, a very comfortable existence.

Here too, as in ancient Greece, the structure of society and the social relation of serfdom was justified in naturalistic terms. For example the English philosopher Thomas Hobbes, in his work *Leviathan*, argued that the state of nature was a 'war of all against all' To overcome this 'natural state' a strong central source of authority was required and in arguing for such a source of authority, in Hobbes case a feudal lord or King to whom every member of society ceded some element of freedom in return for protection from this 'natural state' of humanity, he described a society in which this central authority was lacking.

In such condition, there is no place for industry; because the fruit thereof is uncertain: and consequently no culture of the earth; no navigation, nor use of the commodities that may be imported by sea; no commodious building; no instruments of moving, and removing, such things as require much force; no knowledge of the face of the earth; no account of time; no arts; no letters; no society; and which is worst of all, continual fear, and danger of violent death; and the life of man, solitary, poor, nasty, brutish, and short.¹⁵

Despite aspects of Hobbes work relating to subjects such as social contracts and representative power, often seen today as fundamental aspects of liberal democracy, he remained a supporter of absolutist

¹³n Aristotles terminology "to have a work" means that this relation has a use or in Aristotle's terminology an "end".

¹⁴Aristotle *Politics* http://www.cleverley.org/areopagus/docs/aristotle/aribk1_4_6.html.

¹⁵Thomas Hobbes *Leviathan* 'Chapter XIII.: Of the Natural Condition of Mankind As Concerning Their Felicity, and Misery' 1651

monarchy throughout his life. That he could hold this defence of absolutism is best understood in terms of his social position.

Hobbes father was a vicar but he was raised mainly by a wealth merchant uncle who provided him with a private education. He later made a living as a tutor to the children of various members of the English nobility including, during his time in exile between the English civil war and the restoration, the future Charles II. Despite a brief period under the protection of the revolutionary government in England after the civil war when some of the exiled royalists found aspects of his writings disagreeable he was dependant on the aristocracy for his living eventually, in the period after the restoration, being called to the court of Charles II and granted a pension.

Again and again, throughout history, we can find examples of ideologies and philosophies used to justify existing social orders and time and time again we can see the inbuilt societal basis for the ideologies and philosophies used. Our purpose in examining these ideological biases is not to suggest that those who held them consciously constructed their theories to justify them but to show how these all pervasive views within a given society can have a deep and profound influence on the views of those living in these societies. We no more suggest that Aristotle wrote his *Politics* to justify a personal desire for slavery than we suggest that Darwin proposed his theory of evolution to justify a view of the supremacy of thought over action. With this framework in mind we now turn our attention to the modern 'scientific' justifications of inequality.

Biological determinism: A crude materialism

The modern scientific justification for social inequalities, through the field of sociobiology (and its related fields including subjects such as Darwinian anthropology, human behavioural ecology and evolutionary psychology), is based on an interpretation of Darwinian evolution by natural selection perhaps best summed up in the terminology of one of it's leading public proponents, the evolutionary biologist, Richard Dawkins. Dawkins outlined his view of evolution in his 1976 book *The Selfish Gene*, to Dawkins

We are survival machines - robot vehicles blindly programmed to preserve the selfish molecules known as genes...¹⁶

This view of Darwinian evolution builds on what is termed the 'modern synthesis', that is the combination of Darwinian evolution by natural selection with Mendelian genetics¹⁷ which had its origins in the beginning of the twentieth century and came to largely dominate the study of biology by the mid twentieth century and to a significant extent still dominates modern evolutionary science. This view of evolution has been criticised for being highly adaptationist, excessively reductionist, and also for it's over overemphasis of genes as not only the units of replication but also the units of evolution. We will return to these terms and the criticism of this view of evolution later.

Sociobiology as a field of scientific study first gained public prominence with

¹⁶Richard Dawkins *The Selfish Gene* Oxford University Press 1976

¹⁷Gregor Johann Mendel (1822-1824) was an Augustinian Friar who is now known as the founder of the science of genetics. Although he first published his results on the inheritance of certain traits from one generation to the next, based on a study of pea plants, in 1866 it went largely ignored until it was independently confirmed and then rediscovered in the early 20th century.

the publication of E.O. Wilson's book *Sociobiology: The New Synthesis*¹⁸ in 1975 and, broadly speaking, seeks to understand human behaviour from the assumption that human behaviour is the result of evolutionary selection. Building on a narrow interpretation of Darwinian evolution sociobiology attempts to explain the actions and behaviours of individuals in terms of their genes and then to extend these individual behaviours to an explanation of society as a whole. The criticism of sociobiology rests jointly on a scientific criticism of these underlying assumptions and also on a criticism of the ideologies and cultural influences behind the concept of biological determinism.

In general Marxists recognise the arguments underlying this biological determinism as a form of 'crude materialism'. The analysis is materialist in the sense that it recognises the objects of study, in this case human beings and their genetic make up, their genes, as a part of nature and attempts to gain knowledge about them in order to better understand them. The analysis is 'crude' in that it takes these elements and isolates them from the rest of nature. The basis of a Marxist critique of such crude materialism is found in Marx's *Theses on Feuerbach* written in 1845. This short piece sets out, in broad terms, Marx's criticism of the materialist philosophy of his day in the form of a series of short observations and criticisms of the German materialist philosopher Ludwig Feuerbach who was an influence on Marx's through his materialist critique of the idealist philosopher Hegel

(who's work on dialectics was also an influence on Marx¹⁹). In the first of his observations on Feuerbach's materialism Marx notes

The chief defect of all hitherto existing materialism - that of Feuerbach included - is that the thing, reality, sensuousness, is conceived only in the form of the *object or of contemplation*, but not as *sensuous human activity, practice*, not subjectively. Hence, in contradistinction to materialism, the *active* side was developed abstractly by idealism which, of course, does not know real, sensuous activity as such.²⁰

To Marxists this removal of the object of study from a real sensuous human activity is the equivalent of viewing it in abstract idealist terms. In removing it from the rest of the natural world a full understanding of the object of study is lost as important interactions from sources outside of the object in question cannot be considered. We shall see later how the criticisms already listed of this view of genes in relation to evolution and human society falls into this category by means of a brief critique of the ideological as well as the scientific bases underlying such a position.

Biology as Ideology

What exactly do we mean when we speak of biology as ideology? As we all know

¹⁸E.O. Wilson *Sociobiology: The New Synthesis* Harvard University Press 1975, The term sociobiology can be traced back to the 1940's but it was only with the publication of Wilson's book that it was recognised as a field of study in its own right.

¹⁹For a brief discussion of the influence of both Hegel and Feuerbach on Marx see James O'Toole 'Marx and Self Emancipation' *Irish Marxist Review*, Issue 2, <http://www.irishmarxistreview.net/index.php/imr/article/view/17/17>

²⁰Karl Marx *Theses On Feuerbach* 1845 <http://www.marxists.org/archive/marx/works/1845/theses/theses.htm>

from our day to day lives science can often be evoked as a powerful argument for or against any particular viewpoint or proposed course of action. In some cases people on either side of an argument can look at the results of one or more studies and find in them a satisfactory justification for their starting point. The problem here is not science per se but the attendant, socially moderated, interpretations and uses to which it can be put. We have already discussed earlier how science through the scientists who study and interpret the world can be influenced by their position in society and we now look at the ideological influences of sociobiology.

In his book *The Doctrine of DNA: Biology as Ideology*²¹ Richard Lewontin outlines a useful definition of the ideology of biological determinism and a materialist analysis of the ideology behind it. Beginning with the observation that our modern society was ‘born, at least politically, in revolutions of the seventeenth century in Britain and the eighteenth century in France and America’ he notes the glaring gap between the ideology of these revolutions, ‘libert, galite, fraternit’ or ‘that all men are created equal’, and the resulting societies which to a large degree maintained the inequality of the preceding political system. He then notes that in answering the question of how we might explain such a disconnect by suggesting that

We might say that it was all a fake, a set of slogans meant to replace a regime of aristocrats with a regime of wealth and privilege of a different sort, that inequality in our society is structural and an integral aspect of the whole of our political and social life. To say that,

however, would be deeply subversive, because it would call for yet another revolution if we wanted to make good on our hopes for liberty and equality for all. It is not a popular idea among teachers, newspaper editors, college professors, successful politicians, indeed anyone who has the power to help form public consciousness.²²

The alternative to this view is, he suggests, the view which has been taken since the beginning of the nineteenth century; to replace the equality of *result* with the equality of *opportunity*. This change in outlook is well summarised by reference to Richard Herrnstein, a Harvard psychologist whom Lewontin regards as ‘one of the most outspoken modern ideologues of natural inequality’.

the privileged classes of the past were probably not much superior biologically to the downtrodden which is why revolution had a fair chance of success. By removing artificial barriers between classes, society has encouraged the creation of biological barriers. When people can take their natural level in society, the upper classes will, by definition, have greater capacity than the lower.²³

Taking this view of equality of opportunity and that the differences in outcomes or results among individuals are in fact down to genetic differences inherent to each individual and assuming that this view does actually describe the reality of

²¹ Richard Lewontin *The Doctrine of DNA: Biology as Ideology* Penguin 1993

²²Ibid p.20

²³Quoted in ibid p.21

the world in which we live he then posits some simple questions which one might ask about the inequalities we see in the world and if indeed they are as unavoidable in human society as those who defend them would have it. Such simple questions as how do we explain the passage of social power from parent to offspring if we indeed live in a meritocracy? Or even if innate difference in our genes do lead to different abilities why should we have a system which links accomplishments to our social rewards? Seem to cry out for an answer outside of simply an individuals genetic make up and Lewontin asserts, extremely convincingly, that

To meet this objection to an unequal society there has been developed a biological theory of human nature that says that while the differences between us are in our genes, there are certain inborn similarities among us all. These similarities of human nature guarantee that differences in ability will be converted into differences in status, that society is naturally hierarchical, and that a society of equal reward and status is biologically impossible. We might pass laws requiring such equality, but the moment the vigilance of the state was relaxed we would return to ‘doing what comes naturally’

These three ideas that we differ in fundamental abilities because of innate differences, that those innate differences are bi-

ologically inherited, and that human nature guarantees the formation of a hierarchical society - when taken together, form what we can call the ideology of biological determinism²⁴ [emphasis in the original]

The scientific gloss aside this ultimately boils down to one of the most common arguments against Marxism or even an equal society in any form, that of human nature. This argument, as in Lewontin’s example above, involves reducing human nature to a set of constant and unchanging characteristics and asserting that because of this ‘things have always been this way and will always be this way’. As many historical examples show this notion of a constant human nature is simply not true, human nature is nothing more than the manifestation of how human beings, in their social context, fulfil their material needs and this will vary from time to time and from society to society²⁵. As Marx put it

All history is nothing but a continuous transformation of human nature²⁶

It has been noted that ideological biases such as we have just discussed are overwhelmingly likely to act in favour of the status quo, again something which shouldn’t come as a surprise to Marxists, and examples of such bias are readily found in scientific literature. In fact they are far too common to address even a tiny percentage of them in this article however we will take one example which may helpfully illustrate such bias. In their book, *The*

²⁴Ibid p.23

²⁵For a full Marxist analysis of the arguments about human nature see John Molyneux, as above, Chapter 8.

²⁶Karl Marx *The Poverty of Philosophy* 1847

²⁷ Richard York and Brett Clark, *The Science and Humanism of Stephen Jay Gould* New York: Monthly Review Press 2011

*Science and Humanism of Stephen Jay Gould*²⁷, Richard York and Brett Clark examine Gould's analysis of two studies purporting to demonstrate a link between intelligence 'assessed' by, respectively, skull volume and brain size and race. Having already dealt with a case of blatant dishonest and falsification of results in a separate study²⁸ they note Gould's inability to find any deliberate falsification of data but rather his discovery of a confirmation bias in the subjective measurements made. In the case of measurement of skull volume the measurement was made by packing the skulls with seed, the density of packing of the seed and thus the measurement itself was a subjective measurement and the scientist knew before hand the race of the individual whose skull was being measured.²⁹ The case of measurements of brain size is strikingly similar, again the measurer knew before hand the race of the person whose brain he was measuring, indeed his data fit his expectations so neatly his mentor decided to repeat the measurements without prior knowledge of which race the brain under consideration came from and discovered a systematic over and under measurement of the sizes of the brains of white and black subjects respectively.³⁰

The Panglossian Paradigm: A critique of the modern synthesis

Many prominent scientists have criticised both sociobiology and the evolutionary assumptions which underpin it. Some of the

most notable names in the public criticism of these theories include Stephen Jay Gould, Richard Lewontin, Richard Levins, Steven Rose and Leon Kamin. One of the most elegant critiques of the narrow view of evolution on which sociobiology rests came in the form of a paper published in 1979 by Stephen Jay Gould and Richard Lewontin, *The Spandrels of San Marco and the Panglossian Paradigm: A Critique of the Adaptationist Programme*³¹ This work was written to critique and challenge what Gould and Lewontin viewed as an excessive and reductionist view of Darwinian evolution which

regards natural selection as so powerful and the constraints upon it so few that direct production of adaptation through its operation becomes the primary cause of nearly all organic form, function, and behavior.³²

Already in this quote we can see the germ of the credo behind sociobiology in the view that Gould and Lewontin are seeking to critique and the paper serves as an excellent and instructive starting point for our brief criticism of the evolutionary assumptions underpinning sociobiology. In place of what they term the adaptationist programme or the Panglossian paradigm they seek to advocate a return to a more pluralist view of evolution. This pluralist view is not a deviation from the Darwinian theory and indeed Gould and Lewontin argue very convincingly, using Darwin's own words and explicit responses to attempts to reduce his theory to 'the evolution of

²⁸Ibid p.114

²⁹Ibid p.115-117

³⁰Ibid p.117-118

³¹Stephen Jay Gould and Richard Lewontin, *The Spandrels of San Marco and the Panglossian Paradigm: A Critique of the Adaptationist Programme.* in *The Richness of Life : The essential Stephen Jay Gould*, Steven Rose & Paul McGarr ed.s London : Random House 2006 available online at <http://faculty.washington.edu/lynnhank/GouldLewontin.pdf>.

³²Ibid. p.419

species to extreme variation guided only by natural selection'³³, that it is a return to the more pluralist theory advocated by Darwin.

The central points of the paper relevant to us here are related to a pre Darwinian tradition in evolutionary science. This tradition is often termed as structuralist and studied similarities between different species in terms of their *Bauplan* (a German word which translates as building plan or blueprint but which is often translated as body plan). The *Bauplan* includes such aspects of an organism as its symmetries, number of body segments and number of limbs and similarities between the *Baupläne* are seen as an indication that the respective organisms were related somehow. Gould in particular saw a great deal of merit in structuralist theories, while clearly recognising the validity of Darwinian theory and the error of much of the structuralist theory, and saw in the various *Baupläne* shared by many organisms common structural constraints imposed on disparate organisms by common evolutionary heritage or indeed by the simple fact of a shared subjection to basic physical laws. While the neo-darwinian emphasis is firmly rooted in adaptation, the explanation of all characteristics of an organism by reducing the organism to individual traits and seeking an explanation for the natural selection of each trait (these theories are often termed as functionalist), Gould and Lewontin, building on the structuralist theories, recognised other possible explanations for the traits displayed by organisms.

As is typical of writers of the quality of Stephen Jay Gould and Richard Lewontin the choice of metaphor, analogy or even

phrase is often quite deliberate and deeply insightful. The title of the paper we are now considering is no exception and indeed it is worth looking closely at the terms used.

The *Spandrels of San Marco* referred to in the paper are architectural features from St Marks Cathedral in Venice. They are features which arise due to the placing of a dome on four supporting arches. The physical outcome of this structure involving four arches meeting each other at right angles is four tapering triangles where the arches meet, these are the spandrels, empty spaces produced by the physical constraints of the architecture. Of course in St Marks, or indeed many other similar buildings the spandrels are not left as empty space but are utilised as areas for elaborate artistic embellishment which for Gould and Lewontin is

so elaborate, harmonious and purposeful that we are tempted to view it as the starting point of any analysis, as the cause in some sense of the surrounding architecture³⁴

Using this observation as an analogy Gould and Lewontin appropriate the term spandrel and use it to describe a feature of an organism arising not from adaptation facilitated directly by natural selection but forced on the organism by physical structural constraints. They also note that such spandrels may later be adapted by the organism for a particular use without any natural selection for such a trait. Gould later termed such adaptation, not due to natural selection, as *exaptation* in a paper written with Elisabeth Vrba³⁵. In *The*

³³Ibid p.426

³⁴Ibid p.417

³⁵Stephen J. Gould, Elisabeth S. Vrba (1982) 'Exaptation a missing term in the science of form' *Paleobiology* 8 (1): 415

*Structure of Evolutionary Theory*³⁶ Gould cites an example of such an exaptation³⁷. Snails that grow by coiling a tube around an axis must generate a cylindrical space, called an umbilicus, along the axis. While some species utilise this space as a brooding chamber to protect their eggs the majority of species do not. The fact that this utilisation is only found in a few more recently arising species and not among older species suggests that this use did not arise from adaptive reasons but was co-opted as an exaptation among the few species of ‘umbilical brooders’.

The *Panglossian paradigm* of the title is a reference to Dr. Pangloss, a character in Voltaire’s novel *Candide*. Throughout the novel Pangloss’s refrain is that ‘all is for the best in the best of all possible worlds’ He also utilises quasi scientific stories as a means of explaining various occurrences as exemplified in the following quote.

It is clear, said he, that things cannot be otherwise than they are, for since everything is made to serve an end, everything necessarily serves the best end. Observe: noses were made to support spectacles, hence we have spectacles. Legs, as anyone can plainly see, were made to be breeched, and so we have breeches. . . . Consequently, those who say everything is well are uttering mere stupidities; they should say everything is for the best.³⁸

That these explanations are not in the least scientific is readily apparent, they are

reminiscent of the ‘Just So’ stories of Rudyard Kipling. Gould and Lewontin utilise the explanations of Pangloss to show the dangers in the adaptationist way of thinking, identifying one of the traits of this school of thought as a search for a plausible theory to justify the adaptation of a trait by an organism by natural selection. Gould and Lewontin object to this way of reasoning on the grounds that if an argument is presented to counter such an explanation then another explanation can always be substituted.

We would not object so strenuously to the adaptationist programme if its invocation, in any particular case, could lead in principle to its rejection for want of evidence. We might still view it as restrictive and object to its status as an argument of first choice. But if it could be dismissed after failing some explicit test, then alternatives would get their chance. Unfortunately, a common procedure among evolutionists does not allow such definable rejection for two reasons. First, the rejection of one adaptive story usually leads to its replacement by another, rather than to a suspicion that a different kind of explanation might be required. Since the range of adaptive stories is as wide as our minds are fertile, new stories can always be postulated. And if a story is not immediately available, one can always plead temporary ignorance and trust that it will be

³⁶Stephen Jay Gould *The Structure of Evolutionary Theory* Cambridge, Mass. Harvard University Press 2002

³⁷Ibid p.1259-1260

³⁸Voltaire *Candide*

forthcoming...³⁹

Gould also stressed this point, with a particular emphasis on sociobiology's use of such explanations, in a *New Scientist* article in 1978, *Sociobiology, The Art of Storytelling*⁴⁰. One example of such reasoning leading to false conclusions given by Gould is the large antler size of the Irish Elk⁴¹. York and Clark give examples of some of the common 'just so' stories to explain the enormous size of the antlers of the Irish Elk, which could measure up to 12 feet across. Suggestions ranged from use as weapons to use in displays either for avoiding conflict or in mating rituals⁴². In the 1930's the biologist Julian Huxley suggested that the large antler size may have simply been a result of allometric growth. Allometric growth or allometry refers to differential growth rates in different parts of animals. Since deer have a readily observable allometric relationship between body and antler size with relatively large deer also having relatively large antlers and the Irish Elk was the largest deer known this seems a plausible explanation. This explanation also had a distinct advantage over the adaptationist explanations in that it could be empirically tested. Despite this obvious advantage Huxley's hypothesis wasn't tested until 1974 when Gould measured the skulls and antlers of some 79 individuals. Gould found that there was indeed an allometric relation between body size, characterised by a measurement of skull size, and antler size with the antlers growing at a rate approximately 2.5 times that of the elk. Thus the large

antler size is a necessary result of having a larger deer, if evolutionary pressures were selective for larger deer then the larger antlers were nothing more than a physical constraint of selection for a larger body size.

Towards a Pluralist Theory of Evolution

These examples of a more pluralist approach to evolutionary theory and the use of forces other than natural selection as explanations for the features of many animals help to illustrate the flaws of seeing evolution purely in adaptationist terms. We now seek to explain the remaining criticisms of the narrow approach to evolutionary science, namely, excessive reductionism and an over emphasis on genes as not only the units of replication but also the units of evolution. By reductionism we mean the breaking up of the object of study into individual components and the study of each component in a effort to understand the whole. This is a common scientific method which can be very powerful but which conversely may act to obscure the whole as the study of each individual component may not give an accurate picture of the whole, in a very real sense the whole may be more than the sum of it's individual components. Engels describes this duality of both the strength and weakness of reductionism in *Anti-Dühring*

The analysis of nature into its individual parts, the grouping of the different natural pro-

³⁹Ab Cit. Stephen Jay Gould and Richard Lewontin, *The Spandrels of San Marco and the Panglossian Paradigm: A Critique of the Adaptationist Programme*.

⁴⁰Stephen Jay Gould, Sociobiology: the art of storytelling. *New Scientist* 80 (1129): 530-533 available at <http://www.stephenjaygould.org/bibliography.html>

⁴¹Stephen Jay Gould, 'The Origin and Function of "Bizarre" Structures: Antler Size and Skull Size in the "Irish Elk", *Megaloceros Giganteus*'. *Evolution* 28:191-220 1974 available online at <http://www.stephenjaygould.org/bibliography.html>

⁴²Ab cit. York and Clark 2011 p.57

cesses and objects in definite classes, the study of the internal anatomy of organic bodies in their manifold forms these were the fundamental conditions of the gigantic strides in our knowledge of nature that have been made during the last four hundred years. But this method of work has also left us as a legacy the habit of observing natural objects and processes in isolation, apart from their connection with the vast whole; of observing them in repose, not in motion; as constants, not as essentially variables, in their death, not in their life. And when this way of looking at things was transferred by Bacon and Locke from natural science to philosophy, it begot the narrow, metaphysical mode of thought peculiar to the preceding centuries.⁴³

By genes as the unit of replication we mean that genes are the quantities which are passed along to the next generation and as such have the ability to influence the development of the next generation. By the unit of evolution we mean the unit upon which selective evolutionary pressures act. The analysis of all three terms is, to a degree, linked and we will attempt to understand them in terms of Gould's general framework of evolutionary thought. This framework includes many powerful concepts which taken together make a strong case against the narrow view of evolutionary theory espoused by Dawkins and others.

Stephen Jay Gould originated many powerful concepts in the field of evolutionary science and we will now, very briefly, examine some of these concepts and how they relate to the neo-darwinian theories and genetic determinism. As has already been noted Gould's evolutionary theory sought to counter some aspects of the modern synthesis and particularly its extended form where every aspect of evolution is reduced to simply changing gene frequencies regulated by natural selection to the exclusion of other forces. Gould's pluralist theory allows for additional selective forces such as constraints imposed by basic body shape and physical forces, such as the exaptation and spandrels mentioned earlier, which mean that genetic mutation in organisms may not be equally likely in all directions. In structuralist terms, put simply, certain mutations are simply barred to the organism by its basic physical properties. His theories also allow for a hierarchy of evolutionary units, while accepting the role of genes as the unit of replication mentioned earlier, he argued against the purely reductionist concept that these genes were also the unit of evolution. In place of this assertion Gould recognised Darwin's view of the individual organism as a unit of evolution, after all it is the individual organism that must meet the needs of its survival and interact with the rest of nature in the process, regardless of the relative frequencies of its 'selfish genes' and their influences, but he also went further, recognising the species as a unit of evolution. Considered as a whole species have many of the same properties as individual organisms: they have a birth (the point of speciation, where a new species delineates itself from the old), a death (extinction) and, in between, a relatively stable existence. Indeed it can be argued that certain proper-

⁴³Frederick Engels Introduction to *Anti-Dürhing*, 1877 <http://www.marxists.org/archive/marx/works/1877/anti-duhring/introduction.htm>

ties often attributed to individuals are in fact really a property of the species, for example the wide geographic spread of humans is not the property of any single human being but rather of the species as a whole.

Indeed this characterisation of a species as the unit of selection is linked to another theory of Gould, formulated together with Niles Eldredge⁴⁴, known as punctuated equilibria which deals with the tempo of evolutionary change. This theory holds that, contrary to a Darwinian gradualism, species generally experience long periods of relative stasis with little or no apparent evolution with brief (in geological time⁴⁵) periods of significant evolutionary change usually at the point of speciation. This tallies well with observations of the fossil record which tends to show species emerging and disappearing relatively quickly with a long period of relative stability in between (again in geological time). Punctuated equilibria is also linked to another concept to which Gould devoted a great deal of time, contingency. In broad terms contingency refers to the haphazard nature of history which is often shaped to some degree by chance happenings. This concept is key to Gould's emphasis of a lack of direction, and certainly

a lack of overall purpose, in evolution and also with events such as the asteroid impact at the end of the Cretaceous period now known to have caused the mass extinction which killed the dinosaurs along with a large percentage of life on the planet. A key implication of contingency is that life could have turned out other than it has, if we turned the clock back and re ran the evolution of life on earth it would most likely not turn out as it has for us. For example if an asteroid had not impacted the earth and resulted in the mass extinction of the dinosaurs it is unlikely that our early rat like mammal ancestors could ever have evolved as they did.

Conclusions

While it is impossible to give anything but the most cursory of treatments to the massive volume of work that is our modern understanding of evolutionary theory we hope we have at least been able to give a brief flavour of the complexity, subtlety and ultimately the power of the theory. The many faceted and nuanced possibilities offered by the theory have hopefully illuminated the narrow reductionist view of the genetic determinism espoused by sociobiology and we hope its ideological biases have been similarly laid bare.

⁴⁴Eldredge, Niles and S. J. Gould (1972). 'Punctuated equilibria: an alternative to phyletic gradualism' In T.J.M. Schopf, ed., *Models in Paleobiology*. San Francisco: Freeman Cooper. pp. 82-115.

⁴⁵The time span over which the earth changes as opposed to ecological time spans over which individual organisms change.