

The Social Relations of Evolutionary and Other Sciences: Six Historical Case Studies

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The relationships between science and society are varied and often complex. Moreover, they have changed from one era to another and with the degree to which society from time to time feels itself threatened by the advances and applications of science. Undoubtedly, science has had, and continues to have, an impact on society. This impact is more than the increase of the total stockpile of knowledge and the treasury of human wisdom. It has brought in its wake an improvement in the quality of life, demographic consequences in the form of prolongation of life, the provision of means for the better combatting of squalour, disease, malnutrition. Its applications have wrought revolutions in the way of life and the welfare of many sections of the human species. True, in the hands of unprincipled, unscrupulous and especially unbalanced persons, its impact on society has, at times, been, and may continue to be, detrimental to the survival of sections of the human species and of their health, peace of mind and adaptive capabilities. Fears of such supposedly evil effects of scientific research often outrun the plausible and the likely. Apprehensions may be out of proportion to any present or potential dangers.

However experienced or perceived, science has an impact on society. In this essay, I wish to address the opposite view – that society may have and often has had a strong impact on science. Such impact may be economic or political or ideological. Sometimes the impact of society on science is not favourable. It may frankly discourage and even prohibit the ideas and restrict and constrain the scholars engaged in a field. In this way, society's attitudes may constitute, no matter how subtly, an infraction of the freedom of science. The attitudes of society may thus be seen as one of a number of obscurantist forces or agencies which may limit the freedom of the scientist – along with more blatant forces like political and ideological infringements.

Such deterrents to the freedom of science and of the scientist were major factors in the history of science during the twentieth century. The tendencies were glaringly illustrated in the then Soviet Union with its Soviet genetics, Soviet physics and so on; in Nazi Germany with its State-sponsored, forcible,

eugenic programmes, compulsory sterilisation and ultimately the Final Solution, genocide, to rid society of strains of humanity considered by the prevailing ideology to be undesirable; and in South Africa with its race-obsessed, prescriptive and proscriptive apartheid policy which dominated the country for practically half of the twentieth century.

In the history of the infractions of freedom of thought, not all influences were as violent and sometimes even life-threatening as those three examples. Some of the developments in science aroused heated emotions and obscurantist reactions – and few more than the theory of evolution.

SCIENTIFIC RACISM AND THE CASE OF SARAH BAARTMAN

Between 1810 and 1815, Sarah Baartman, a Khoisan woman from the Cape of Good Hope, South Africa, was exhibited as a curiosity, the “Hottentot Venus”, in London and Paris. She was examined by Georges Cuvier and Etienne Geoffroy Saint-Hilaire. They were intent on determining whether the Khoisan people, of whom she was an example, were really human, or whether they had not risen sufficiently above the apes to be admitted to the exalted status of humanity. Cuvier was convinced that her brain and her external genitalia would provide the answer. After her death in Paris on New Year's Day, 1816, Cuvier dissected her. He devoted no fewer than nine out of the sixteen pages of his report to her genitalia, buttocks and breasts. In fairness to Cuvier, he did conclude that she was human – but one cannot help asking whether his conclusion was influenced to a certain degree by her pretty pouting face and her ability to learn French and English, and not only by her anatomy. I am happy to report that her remains, comprising her skeleton, and her bottled brain and genitalia, were repatriated from the Musée de l'Homme in Paris to South Africa in May 2002, following years of negotiations between the author and the French museum authorities, and between the two governments involved. She was laid to rest at Hankie, near her birthplace in the Eastern Cape Province, South Africa, on 9th August 2002.

CATASTROPHISM AND DARWINISM

Here is another nineteenth century deterrent. The theory of catastrophism was an attempt to reconcile the strange heretical notions of the high antiquity of the earth, as set out in Sir Charles Lyell's *Principles of Geology* (1832), with Judaeo-Christian beliefs in a six-day creation as recounted in the book of genesis. William Whewell, in his review of Lyell's book, coined the term *Catastrophism* to designate a philosophy based on such traditional past events as the creation of life, the creation of humans and, above all, the biblical flood. The contrasting concept was called *Uniformitarianism*, a term coined also by Whewell in the same review, and which became most closely associated with Lyell's name: Uniformitarianism referred to the belief that the same physical laws had operated as causes in the past, and in the same way, as were operating today. Ernst Mayr has shown that it embraced a much more complex set of theories. On one version of catastrophism, as held by Georges Cuvier and Louis Agassiz, after each catastrophe, new forms of life appeared on earth to take the place of those that had been extinguished by the preceding catastrophe. Inevitably catastrophism became associated in common thinking with an attempt to verify scientifically creation and the biblical flood. Thus catastrophism became one of the major deterrents to the acceptance of Darwinism.

THE TAUNG SKULL AND THE TENNESSEE MONKEY TRIAL

In the early 20th century, Raymond A. Dart's article announcing the discovery of the Taung skull, the holotype of *Australopithecus africanus*, appeared in *Nature* on 7th February 1925. Even without the benefits of television, the news of the discovery, and of Dart's claim that it represented a veritable 'missing link', caused a major stir throughout the world. Fast and furious debates followed. Nowhere do they seem to have been faster or more furious than in the state of Tennessee in the United States of America. Within weeks the state legislature enacted a ban on the teaching of evolution in Tennessee schools. In my mind that enactment was a direct response to the revelation of the Taung skull and the widespread press and radio coverage that ensued. The Great Monkey Trial in Dayton, Tennessee, followed a short while later. John Thomas Scopes, a schoolteacher, had broken the new state law against the teaching of man's descent from a lower form. The Presidents of Harvard and Yale Universities, leading clergymen and a host

of scientists offered to appear for the defence. The judge declined their help. The historical confrontation between Clarence Darrow and William Jennings Bryan was the highlight of the trial. Darrow – the wits declared – made a monkey of Bryan, who had placed his reputation, faith and biblical knowledge at the service of the prosecution. Scopes was convicted and sentenced to pay a paltry fine (\$100). Many years were to pass before radio broadcasting in the U.S.A. would venture to deal with evolution on the air.

THE BANNING OF "EVOLUTION" IN SOUTH AFRICA

In South Africa, well into the second half of the twentieth century, museum exhibits dealing with evolution had to be counterpoised by exhibits on the biblical creation story. The word "evolution" was banned from the air waves, and from an exhibition at Cape Town in 1952 to mark the tercentenary of the first European settlement at the Cape of Good Hope. The teaching of evolution in schools was banned until recently – in the very country which up to 1960 had yielded 90% of the world's evidence on human evolution from non-human animals. For some ten years, I was one of two regular anchor-men in a weekly radio programme, "The Voice of Science", presented by the South African Broadcasting Corporation. Although I was permitted to speak about *Australopithecus* and *Homo erectus*, I was adjured not to use the word "evolution" and had to resort to bland euphemisms like "development"! Eyebrows were raised in certain quarters when, in 1971, during a commemorative lecture to the Royal Society of South Africa, on the centenary of Charles Darwin's *Descent of Man*, I declared that 100 years without evolution in our schools was enough! Happily, I have lived long enough to see it become respectable to teach South African children about hominid phylogeny and to hear the new democratic government speak with pride of our country's and our continent's contributions to hominid evolution.

EVOLUTION, THEOLOGY AND CREATIONISM

Of the great religions in the Judaeo-Christian traditions, as far as I am aware, only the Roman Catholic Church has a defined attitude towards evolution. The Papal encyclical "De Humani Generis" of the early 1950s declared, in effect, that the Church's concern was with the soul and spirit of man. As to what had happened to human bodies and bones in

times past, it was for scientists to ascertain by the methods of science. Following meetings of the Pontifical Academy of Sciences, in 1982 and 1990, to which I had the privilege of being invited, another Papal encyclical was issued towards the end of the twentieth century, which elevated the evolutionary hypothesis to virtual fact. These decisions made it legitimate for orthodox Catholics to accept evolution and to work in the field of palaeontology – although, truth to tell, Catholics and Catholic prelates had made major contributions to archaeology and palaeontology for more than a century: the names of the Abbé Henri Breuil and Teilhard de Chardin come readily to mind.

It is trite to point out that there are still tensions between evolution and theology. The “Creation Science” movement in the U.S.A. has made inroads into public and student understanding of evolution. In a recent survey, I have been told, it was found that over 50% of United States university students do not “believe in” evolution. Undoubtedly one of the deterrents against the acceptance of *Australopithecus* and of Dart’s claims for it, was the feeling of a large section of the community that evolution was the work of the Devil. Dart was condemned by one of his critics to roast in the quenchless fires of hell! This was but one of a number of factors that delayed the acceptance of *Australopithecus* for a quarter of a century.

SCIENCE, BOMBS AND SOCIETY

The impact of society on science has long been a live issue. Those who lived through the horrors of the Second World War will recall how society was clamouring for curbs to be placed on scientists, because of the public’s fear of the power that new scientific discoveries and applications – or should that be misapplications? – had placed in the hands of scientists. The man in the street was smarting under the effects of bombs, rockets and V2’s released on London during the “Blitz”, and the effects of high explosive and incendiary bomb air-raids on Germany and German-occupied Europe. Above all, sheer terror and fear were generated by the atomic and hydrogen bombs which had been detonated over Hiroshima and Nagasaki in August 1945. As a student I recall voices crying out, “Stop all science for ten years to give ethics a chance to catch up” and even, “Stop the world: I want to get off!”.

In an attempt to steady the extreme views, Jacob Bronowski, celebrated as a scientist and a man of letters, asked a simple question: Had science taken more lives than it had saved?

THE PRICE OF SCIENCE

Bronowski calculated that, on the debit side, the number of people killed in Great Britain in six years of war by bombs, flying bombs and V2’s was sixty thousand. He computed that this would have lowered the average span of life by less than one tenth of one per cent, that is, less than two weeks. On the credit side, in the previous hundred years, science had increased the average span of life by twenty years. In *The Common Sense of Science*, Bronowski summed it up tersely: “That is the price of science, take it or leave it – a fortnight for twenty years of life.”

Fifty years later, there are scholars who would hold that the need to do such societal arithmetic is still with us. The thought may still be raised – do the consequences of the applications of science outweigh those of its misapplications? It would be tragic if societies and governments and the public were to judge science, not by its potential to uplift society and human life – but by such misapplications of its discoveries.

What I have tried to show here is that, not only does science have an enormous effect on society – a trend that has been evident for a very long time, perhaps for two million years, since the first human artefacts appeared in the fossil record – but also society has a great impact on science. That impact may be censorious and proscriptive, and it may be healthy and encouraging. Scientists have an obligation to recognise their societal responsibilities, not only to ensure that they themselves act conscientiously in their researches, but also and especially to inform and educate the public on the meaning of science and scientific methods. Moreover, it is the scientists’ inescapable duty, with integrity, and without hyperbole, to convey to society the fruits of their researches and their potential for good, for health and for peace.

This contribution appropriately ends with another quotation from that lucid thinker and writer, Jacob Bronowski: “The layman’s key to science is its unity with the arts. He will understand science as a culture when he tries to trace it in his own culture. It has been one of the most destructive modern prejudices that art and science are different and somehow incompatible interests.”

KEYWORDS Racism. Catastrophism. Creationism

ABSTRACT Not only does sciences have a perceived and measureable effect on society, but society may have strong impact, economic, political or ideological, on science. This was especially

true during the twentieth century, when the attitudes of society often impinged so markedly on the concepts and practice of science as to constitute ready encroachments on the freedom of science and scientists. Four "case histories" in this essay have to do with evolution: the role of catastrophism as a deterrent to the acceptance of Darwinism; the Tennessee legislation against the teaching of evolution, which the author shows was probably a direct consequence of the discovery of the Taung child skull in South Africa; the politico-ideological proscription of the use of the term "evolution" in South Africa over most of the second half of the twentieth century; and the effect of theology and creationism in delaying the acceptance of *Australopithecus* and of evolution in general. The other two "case histories" deal with the impact of modern human society, including political forces, on science: the lamentable case of the Khoi-san lady,

Sarah Baartman, in the early nineteenth century, and the repatriation of her surviving bodily parts to her birthplace in the Eastern Cape Province, South Africa, early in the twenty-first century; and the clamour that arose in the middle of the twentieth century for curbs to be placed on the activities of scientists, in response to the dropping of the atomic and hydrogen bombs on Hiroshima and Nagasaki, Japan, in August 1945. It is concluded that scientists have an obligation to recognize their societal responsibilities, not only to ensure that they act conscientiously and ethically in their researches, but also and especially to inform and educate the public on the meaning of science, scientific methods, the fruits of their researches, and the potential of their scientific results for good, for health and for peace.

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 Human Ecology Special Issue No. 12: 227-230 (2004)

Societal Responsibilities in Life Sciences
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