R.A.Fisher: The Thoughtful Eugenist

I
POSITIVE EUGENICS

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For the members of Fisher's college
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The Caius undergraduate is introduced to Eugenics

In October 1909 Ronald Aylmer Fisher, aged nineteen, won a scholarship in mathematics to Gonville and Caius College in Cambridge University. In June the University had celebrated Charles Darwin's centenary and the half-centenary of his *Origin of Species*. Fisher was already no stranger to the book, or to its sequel *The Descent of Man*, for at Harrow School he had chosen the complete works of Darwin in thirteen volumes as a school prize. Fascinated by the theory of natural selection and its application to man he stepped into an atmosphere not only Darwinian but the new Mendelian, for Cambridge was the home of William Bateson, the champion of Gregor Mendel's long-neglected paper which had resurfaced in 1900. The new century was facing a scientific revolution and in Britain Cambridge was its base.

In 1906 Bateson had introduced the name *genetics* for the new subject of the physiological basis of inheritance. In London he presided over The International Conference on Hybridisation and Plant Breeding, which changed its name in the course of the Conference to the Third International Conference on Genetics. In time for the Darwin Celebration, Cambridge University Press published Bateson's major book *Mendel's Principles of Heredity*, though two of his young assistants had got theirs out first: R.C.Punnett with his brief *Mendelism* (1905) and R.H.Lock with his remarkable *Recent Progress in the Study of Variation, Heredity, and Evolution* (1906). Punnett and Lock were both young Fellows of Gonville and Caius College, and they were both members of the London-based Eugenics Education Society. So was Sir Charles Sherrington, later to be celebrated as Caius's first Nobel Laureate.

Lock was the son of the Bursar J.B.Lock, many generations of whose descendants have been educated at Caius. Father and son are memorialised in the handsome Lock Jug which they presented to mark their simultaneous Fellowships. R.H.Lock presented the second edition of his book to the Library in July 1909; Fisher matriculated in October, and there is much evidence that he read it. Chapter X 'Eugenics' was new for this edition. It and the last part of the 'Concluding Chapter' XI give a remarkable account of contemporary views of eugenics promulgated by Francis Galton, Karl Pearson, Sidney Webb, Bernard Shaw – and the unknown Mr McDougal whom we shall meet again below. Their language is no longer regarded as acceptable, but 'The past is another country; they do things differently there', and we have a duty to allow for that.

In Chapter X Lock explains that eugenists seek to confront the 'dangerous differences in the incidence of the birth-rate' among the groups identified by Pearson, but quotes Thomas Huxley: 'Who is competent to do the necessary selecting?' and himself adds another objection 'The ruthlessness necessary for the carrying out of the method of deliberate selection is in itself so unsocial a quality that, if it were ever to

arise, society would probably be far worse off than before'. So what is to be done? Lock describes some suggestions, but 'It must not be supposed that the writer is a special advocate of all or any of the suggestions which have been mentioned above'. There was plenty for Fisher to think about.

It seems likely that Punnett will have told Fisher about the Society and perhaps even floated the idea that a Cambridge branch might be started. Fisher and some student friends lobbied senior members of the University with the idea and in 1911 the Cambridge University Eugenics Society was founded, with substantial support among the dons. One of them was the Regius Professor of Physic Sir Clifford Allbutt, like Punnett and Lock a Fellow of Caius. Professor A.C.Seward, the Professor of Botany, was President, Fisher was the undergraduate chairman and the young John Maynard Keynes the Senior Treasurer.

Fisher's early papers

Fisher's academic work flourished. He took a First Class in Part I of the Mathematical Tripos in 1911 and another in Part II in 1912. During this time his interest in statistical theory was sparked by one of his Caius teachers, the astronomer F.J.M Stratton, leading to his first publication 'On an absolute criterion for fitting frequency curves' in the latter year. He was later to call the criterion to which he referred 'likelihood', and the method he advocated 'the method of maximum likelihood'. This was his entry into theoretical statistics, to be magnificently expanded into 'On the mathematical foundations of theoretical statistics' ten years later. His second publication, during his Wollaston studentship year 1912-13 at the Cavendish Laboratory, was a long essay 'Application of vector analysis to geometry'.

At the end of this academic year he repeated a paper 'Some hopes of a eugenist' to the Eugenics Education Society (on 2 October 1913, presumably in London) that he had given to the Cambridge branch in November 1912, adding an important reference. It was published in *Eugenics Review* in 1914 (**5**, 309-315), Fisher's first publication in eugenics. It must be this paper of 1914 which Fisher was to call 'ephemeral' in *The Genetical Theory of Natural Selection* of 1930. Since it was originally delivered in 1912 at the age of 22, he might indeed wish us to regard it as ephemeral juvenilia, but we should note its importance and make allowance for its youthful exuberance.

It needs to be read in its entirety in order to appreciate the impact of the Cambridge environment favourable to eugenics on the mind of a student well-read in Darwin, Galton and Karl Pearson as well as the books by Bateson, Punnett and Lock. A brief quotation will set the scene: 'From the moment we grasp, firmly and completely, Darwin's theory of evolution, we begin to realise that we have obtained not merely a description of the past, or an explanation of the present, but a veritable key of the future'. Fisher's rolling English oratory is soon interrupted by a paragraph which starts by giving the important reference additional to his Cambridge talk:

> What appears to be the underlying principle in the decadence of civilized races has been revealed in an article ['Human fertility'] by Mr. J.A.Cobb, which appeared in the EUGENICS REVIEW last January [1913, **4**, 379-382]; an article which, if my faith in it is justified, must be regarded as containing the greatest addition to our eugenic knowledge since the work of Galton.

The full 1914 version of the paper 'Some hopes of a eugenist' is the basis of Fisher's argument for a kind of 'positive eugenics'. In it he had already pointed out, probably first in the 1912 original, 'In the present time in this country the evidence appears to be conclusive that we are breeding more from the worse than from the better stocks'. This well-known – and at the time much-discussed – association in

Britain between lesser achieved fertility and greater wealth was seen to have important long-term consequences. So far the discussion had been limited to the immediate effect on the composition of the population and the increasing preponderance of the unskilled that it entailed. Cobb, however, pointed out that the problem was not just the class-differential rates of reproduction themselves but their population-dynamic consequences:

> If, however, as I shall try to show, there is a natural tendency under modern conditions for the more intelligent to become less fertile, the problem is a more serious one.
>
> If variations in fertility are inherited and the wealthier classes have for generations been put through a process of selection by which members of small families have been given an advantage over members of large families, we should expect that the wealthier classes would, as a whole, be less fertile than the poorer classes.

Fisher seized on the idea, and with the engaging enthusiasm (and language) of his 22 years, explained the principle and its harmful consequences:

> Mr Cobb points out that in any society which is so organised that members of small families enjoy a social advantage over members of large ones, the qualities of all kinds, physical, mental, and moral which go to make up what may be called "resultant sterility" tend, other things being equal, to rise steadily in the social scale; so that in such a society, the highest social strata, containing the finest representatives of ability, beauty, and taste which the nation can provide, will have, apart from individual inducements, the smallest proportion of descendants; and this dysgenic effect of social selection will extend throughout every class in which any degree of resultant sterility provides a social advantage.

We may here note that the argument is not between classes but 'throughout every class'. It is not a static picture of class differentiation in fertility but of a continuum as in the social scale. The effect described is a dynamic one of social mobility involving the whole population. Geneticists call such a continuum a *cline*, though exactly what might be the measure of the 'scale' of the social cline is open to debate. However, no-one doubts its existence.

Fisher continues:

> It is this principle, vital in its importance and almost universal in its application, which explains to us why civilisations in the past, with one notable exception, and especially urban civilizations, in which the value of wealth is greatly accentuated, have ultimately collapsed owing to the decay of the ruling classes to which they owed their greatness and brilliance. And it is this principle which must underlie the reconstruction of our own civilisation if it is not to share the fate of those which have preceded it. (In a footnote, Fisher says the 'one notable exception' is provided by the Nordic civilization of the 10th century.)

The paper is incidentally also remarkable for its ending, in which Fisher introduces the notion later called 'inclusive fitness' and developed by J.B.S.Haldane, W.D.Hamilton and others to explain the evolution of altruism. He advocates 'versatility' 'So that not only in youth, but throughout life, we may retain full sympathy for our fellow men'.

His next paper after 'Some hopes of a eugenist' is 'Frequency distribution of the values of the correlation coefficient in samples of an indefinitely large population' (1915), in which he proved by a novel geometric argument the equation of the distribution function of the coefficient, which hitherto had only been approximated. Knowledge of this function is fundamental to assessing the significance of a correlation, while Fisher's geometric method of representing a sample in a multidimensional Euclidean space became standard in distribution theory. This paper announced his arrival in the pantheon of mathematical statisticians and gives the lie to the claim that his scientific agenda was driven by eugenic concerns. Correlation

coefficients are of universal applicability throughout statistics, as is distribution theory.

Two other papers have quite properly caught the eye of historians of science, but they were not published until the typescripts were unearthed in 1976. Both were read to undergraduate meetings of the Society. The first, 'Mendelism and biometry', to the Cambridge society on 10 November 1911 is an astonishing harbinger of Fisher's great 1918 paper 'The correlation between relatives on the supposition of Mendelian inheritance', which is the foundation of biometrical genetics, animal and plant breeding methods, the analysis of variance, and much else. The second paper 'Evolution and Society' on 13 March 1912 (in W.B.G.Batten's rooms on S staircase, Tree Court) is a brief but remarkable philosophical discourse on the implications of natural selection for the evolution and structure of human society, with relevant comparisons to insect societies and other biological communities which act cooperatively.

Positive eugenics

In her biography of her father *The Life of a Scientist* Joan Box brilliantly describes his life and extra-mural work while teaching for a year at Rugby School and then at Bradfield College (pp.49-61). The extra work not only included an attempt at subsistence farming that would impress any modern green student politician, but an increasing involvement in the Eugenics Education Society encouraged by its President Leonard Darwin, Charles's fourth surviving son.

Darwin (Leonard) not only provided a personal link with Charles but nourished Fisher's intellectual life by involving him in writing short notices of papers in the genetical literature for the *Eugenics Review*, greatly widening Fisher's own knowledge. He also arranged for him to receive a part-time salary from the Society for this work and other assistance that he gave. Soon he was engaging Fisher in correspondence about the interpretation of genetical correlations which inspired Fisher's famous paper 'The correlation between relatives on the supposition of Mendelian inheritance'.

When this paper was reviewed unfavourably by the Royal Society's referees it was withdrawn. Finished in mid-1916, two year later it was still unpublished. Darwin stepped in and found that the Royal Society of Edinburgh would publish it for a contribution of about £50 to the printing costs, and told Fisher that the Eugenics Education Society wished to sponsor it. Thus was the '1918' paper born. Fisher wrote a less technical summary of it for the *Eugenics Review* which ended:

> In conclusion it is right that I should express my deep sense of gratitude to the Eugenics Education Society, who have most generously assisted me throughout; and in particular to Major Leonard Darwin whose continual kindness and encouragement has enabled me to carry through the work.

Yes, the Eugenics Society ensured the publication of this seminal paper, but it is not true, as has been written, that 'We should see it ... as a stunning contribution to eugenics'. It contains no eugenics at all.

Meanwhile the Great War of 1914-18 had taken place, and the appalling loss of life on the Western Front had intensified the pre-war discussion at home of the demographic consequences of class-variation in fertility. At a time when there was already concern about the possibility of the population declining, the loss of so many young men became part of the discussion, which had already generated the phrase 'Positive eugenics' to refer to the need 'To increase the birth-rate in the professional

classes and among the highly-skilled artisans', as Fisher put it in his paper 'Positive eugenics' in 1917.

Fisher's paper was what one might expect from a young man of twenty-seven obsessed with a mission to halt a long-term decline in the British population in both quantity and quality. He calls upon the professional classes and the trade-unions to help with methods 'by which material advantage may be given to the families of members' by scholarships, facilities for professional training and the free exchange of professional services between members. He ends:

> The present distribution of the birth-rate is draining the nation of its best ability, and if I am right in supposing that the root cause of this dysgenic selection is the difficulty of giving to the children of the professional classes an adequate start in life, a programme of cooperation with the professional classes should constitute the first great step in Positive Eugenics.

A return to J.A.Cobb's theory

At the end of the 1919 school year Fisher ended his unhappy career as a school-master, presumably a war-time occupation since his extreme short-sightedness had made him unfit for military service. He had three foundational papers in mathematical statistics under his belt. The first, introducing the method of maximum likelihood hardly yet recognized, the second solving the distribution of the correlation coefficient, and the third a *magnum opus* on the correlation between relatives which introduced the analysis of variance.

He applied for a Fellowship at Caius, but was unsuccessful. Nevertheless, he had been noticed. A Cambridge botanist, Horace Brown, introduced him to Dr E.J.Russell, the Director of Rothamsted Experimental Station who was visiting Cambridge looking for staff. 'In August there followed an offer from Rothamsted:' - writes Joan Box - 'would Fisher come for 6 months or a year to find out whether the accumulated records could yield more information by a thorough statistical analysis than had been possible in the absence of a trained statistician?' From his appointment in 1919 until 1933 Fisher the Caius mathematician was to invent all the statistical methods that were needed himself. Russell soon made the post permanent: 'He reported to me weekly at tea at my house. It took me a very short time to realise that he was more than a man of great ability, he was in fact a genius who must be retained' (Fisher Box, p.97). Caius caught up the following year by electing him into a non-resident Fellowship for six years.

Fisher did not mention Cobb's theory in 'Positive eugenics', but we know that he had been continuing to think about it. A year or two before 1968 Joan Box was clearing out the family house Milton Lodge in Harpenden and found a typescript at the back of a cupboard with the first three chapters of a book by Fisher. It is dated 1919 and is a draft that formed the basis of parts of *The Genetical Theory of Natural Selection* of 1930. In particular part of Chapter XI 'The social selection of fertility' deals at length with Cobb's theory and its Galtonian origins. At some later stage, presumably when Fisher was reviewing the material for inclusion in *The Genetical Theory*, he wrote in the margin of the typescript a comment that 'neither its logical cogency nor its importance to sociological theory, seem to have been ever widely grasped, and apart from some ephemeral papers of my own … it might be said to have been totally neglected'. (This appeared in *The Genetical Theory* with the addition at the ellipsis of 'and a brief discussion in Major Darwin's recent book *The Need for Eugenic Reform*'.)

I can find no reference to Cobb's theory in any work of Fisher's published after 1914 until 1924 when he reviewed E.F.Rathbone's *The Disinherited Family* in

the Eugenics Review. In an extensive discussion of her proposals for family allowances he advances his version designed to counter the dysgenic effects to which Cobb had drawn attention.

Then in 1926 came 'Eugenics: can it solve the problem of the decay of civilisations?', originally an address in French given in Paris. It is Fisher's first full account of his proposal for family allowances which he was to promote tenaciously for the next seventeen years. 1926 was also the year of publication of Darwin's book, in which the author refers to Cobb's paper and to the contemporaneous paper by Fisher 'with whom I have frequently discussed these topics' (footnote, p 339). Fisher ended his long review 'Modern eugenics', also 1926, of Darwin's book by recording his 'particular personal gratification' that the author had noted 'these topics'.

In a long essay in 1929 entitled 'The over-production of food' Fisher reviews the problem of population from an economic point of view in the light of western Europe's population no longer replacing itself. He stresses the consequences of a system of flat-rate family allowances but it is 'beyond the scope of the present article' to question its 'intricate' 'effects upon the hereditary constitution of future generations'.

Once started at Rothamsted Fisher devoted his time to the development of the statistical mathematics for which he became famous. In 1925 he published *Statistical Methods for Research Workers*, the most influential statistics book of all time, while the companion volume *The Design of Experiments* based directly on his work at Rothamsted was published in 1935, two years after he had moved to University College London as Galton Professor of Eugenics. For the most part he set aside any thoughts of continuing with the book he had started just before his Rothamsted appointment, but in 1928 he took up the work again, encouraged by Darwin. It was to become *The Genetical Theory of Natural Selection* and to incorporate, in its last five chapters, the mature development in Fisher's mind of the idea planted there in 1913 by Cobb's paper.

***The Genetical Theory of Natural Selection* (1930)**

Fisher's 1926 paper mentioned above was a first published look at the problems he was to consider in Chapters VIII to XII of *The Genetical Theory of Natural Selection*. These chapters have tended to be neglected, pilloried or cited as racist or 'classist', in spite of Fisher's protests that they are an integral part of 'the genetical theory of natural selection' as it applies to Man and his social history.

Each chapter starts with a short list of contents and ends with a Summary. Chapter VIII 'Man and society' sets the scene including comparisons with social insects. The Summary for each chapter may usefully be read first to prepare for the main text. Chapter IX 'The inheritance of human fertility' considers 'the great variability of human reproduction', the 'direct evidence for the inheritance of fertility' and 'the evolution of the conscience respecting voluntary reproduction'. Chapter X 'Reproduction in relation to social class' examines the 'economic and biological aspects of class distinctions' and discusses the fact that in Europe and the United States there is an 'inversion of the birthrate' with respect to the prosperity of families, the wealthier having the fewer children. 'Those who can afford most of comforts and luxuries can assuredly afford to have the most children, and upon purely economic grounds … the large households of the rich might be reasonably expected to produce and support more children than the small households of the poor'. 'The total burden of rearing the next generation of citizens would be more easily borne, if distributed more in accordance with the ability to support it'.

Chapter XI ‘The social selection of fertility’ describes the crux of Fisher’s eugenic concerns. It traces the ‘History of the theory’ to remarks by Francis Galton in his *Hereditary Genius* of 1869 but quickly passes to J.A.Cobb’s 1913 paper in the *Eugenics Review* already mentioned. As noted above, Fisher observes that ‘apart from a few ephemeral papers of my own, and a brief discussion in Major Darwin’s recent book *The Need for Eugenic Reform* [1926] it might be said to be totally neglected’.

Before quoting the major part of Cobb’s paper Fisher summarizes the theory as follows:

> Restricting himself to the unconscious causes of relative infertility, Mr. Cobb points out that, just as the fortune of an heiress enables her to make a socially advantageous marriage [Galton’s point that heiresses necessarily come from small families], so among the children of families of any class, members of the smaller families will on the average commence life at a social advantage compared to members of larger families. Alongside the many excellent qualities which enable a family to improve its social position, relative infertility also plays its part. In this way the less fertile stocks, having the social advantage, will gradually permeate the upper classes of society, and there cause the peculiar situation in which the more fortunate and successful of mankind have the smallest birthrate.

Two sections follow: ‘Infertility in all classes, irrespective of its cause, gains social promotion’ and ‘Selection the predominant cause of the inverted birth-rate’. Fisher then continues at length with the implications of the theory for understanding ‘The fact of the decline of past civilizations’, but that is not our present subject. In the long Summary to the Chapter he remarks ‘The various theories which have sought to discover in wealth the cause of infertility, have missed the point that infertility is an important cause of wealth’.

The short final Chapter XII ‘Conditions of permanent civilization’ is a call to arms for the introduction of a system of family allowances to help break the association between infertility and wealth. ‘The total burden of rearing the next generation of citizens would be more easily borne, if distributed more in accordance with the ability to support it’ (Chapter X). Fisher considers the implications of Cobb’s theory in a mature contribution to the discussion then taking place of the introduction of family allowances in Britain. Arguing against the adoption of the French system of equal child allowances paid by the employer he envisages a similar system but with the allowance being proportional to the employee’s wage, and outlines the eugenic and economic advantages of such a plan. In neither case would the cost be borne by general taxation but through redistribution of the employer’s wage-bill. He argues that both benefits would accrue to the long-term advantage of society through a contribution to the equalisation of the birth-rate throughout the different strata of the population.

Reactions to *The Genetical Theory of Natural Selection* Chapters VIII to XII.

Three of Fisher’s contemporary colleagues best-qualified to comment on his book and in particular on the chapters on ‘Man’ were J.B.S.Haldane, Julian Huxley and Lancelot Hogben. All were on the political left, Haldane being a member of the Communist Party. Hogben was the most antagonistic to Fisher’s position in both genetics and statistics, while Haldane could be relied on for vigorous and often public comment on the human condition from a genetical point of view. Haldane and Fisher, from their different political view-points, did however maintain a sort of barbed friendship with mutual scientific respect. Huxley was not quite up to the intellectual powers of the other two H’s but was the most friendly with Fisher. He, like Fisher, was an active member of the Eugenics Society; Haldane had been a member of the Oxford branch, while Hogben was strongly opposed.

First out of the starting-block was Haldane who in March 1931 wrote to Fisher 'I think it would be an excellent thing to present your results about eugenics in a more popular form', which indeed Fisher was to do the following year (see below). Haldane contributed a review 'Mathematical Darwinism' of the whole book to the *Eugenics Review* (**23**, 115-17, 1931) in which he remarked (with a nice socialist dig at the end):

> [Fisher's] suggested remedy for the dysgenic character of civilized societies is a very thorough-going system of family allowances on such a scale that infertility would no longer be a cause of social promotion. The reviewer considers that he has made out an extremely strong case. Indeed, if his biological facts are correct it is probable that a socialistic state in which no wealth was inherited would be more eugenic than our present society, and it is a little difficult to see why Dr. Fisher's economic views are not even more radical.

Haldane, characteristically, then gives arguments against the efficacy of Fisher's proposal, but concludes: 'Nevertheless, if Dr. Fisher is on the whole correct, civilization can only be saved by a very radical change of opinion and practice'.

Then in 1932 in his book *The Causes of Evolution* based on lectures at the University of Wales Aberystwyth in January 1931 Haldane wrote 'And the usual course taken by an evolving line has been one of degeneration. It seems to me altogether probable that man will take this course unless he takes conscious control of his evolution within the next few thousand years'. As late as 1955 Haldane said, in his Woodhall Lecture at the Royal Institution, 'I fully agree with Fisher that family allowances are a eugenic measure, but I see no possibility of a fully eugenic policy with the limits of our present economic system' (The prospects of eugenics, *Penguin New Biology* **22**, 7-23, 1957). In fact, independently of Cobb's argument, Haldane never departed from the view, usually unspoken, '[the Nation] would have improved more if, say a million children who were born to unskilled labourers had been born to skilled workers, teachers and the like' (from his eulogy for Karl Pearson, *Penguin New Biology* **25**, 7-26, 1958).

Huxley congratulated Fisher on *The Genetical Theory* by letter on 4 May 1930: 'It does seem to me the most important book on Evolution which has come out this century'. He later referred to the final chapters in his Galton Lecture of 1936:

> Then R. A. Fisher has brilliantly and devastatingly shown the relentless way in which such a system as ours promotes both infertility and certain types of talent, and in so doing ties together the genetic factors responsible. In the course of the generations - genes making for small families become increasingly bound up with those making for social and economic success; and conversely those making for social and economic failure become bound up with those making for high reproduction rates. Eugenically speaking our system is characterized by the social promotion of infertility and the excess fertility of social failures.

In *Genetic Principles in Medicine and Social Science* (1931) Hogben wrote: (like Haldane, with a socialist dig at the end):

> R.A.Fisher has pointed out that low fertility assists materially in social advancement in societies in which mercantile or industrial interests predominate and thrift is the supreme social merit. This might tend to concentrate individuals who are incapable of having large families in the governing classes. As a long view of the situation, Fisher's argument is worthy of attention. For the collective endowment of parenthood he makes a case which compels the serious consideration of those who are disposed to regard private enterprise as an institution sanctified by natural law.

For Caians, all we lack is an opinion from Joseph Needham, who of course knew Fisher well in College for nearly twenty years. I myself during many discussions with him had opportunities to ask about eugenics and Fisher's contributions, but the subjects simply never came up. Stories about Fisher, most of them amusing, circulated freely in my time (I arrived six years after his death) but no Fellow had a really deep knowledge of his scientific work.

I am not aware of any contemporary writer who understood Fisher's argument and criticized it. Much later Stephen Jay Gould (1996) did, in an essay I consider below.

Fisher's papers from 1932 and 1935

In 1932 Fisher returned to the subject of the social selection of human fertility and family allowances, first in an address to the Eugenics Society on 12 April 'Family allowances in the contemporary economic situation'. In this lecture he places his proposals from *The Genetical Theory* in the wider political and economic context, reminds the Society that they were incorporated in its *Outline of a Practical Eugenic Policy* of 'some years ago', and defends them against criticism both articulated and foreseen. He mentions the proposals of Sir William Beveridge, later incorporated in the Beveridge Report of 1943, for a flat-rate allowance of (say) 5s. per child per week supported by a national insurance scheme, and explains the economic reasons for preferring proportional allowances paid by the employer. (He adds that it is only fair to say … that Sir William has established among the professors and lecturers at the London School of Economics the first English system of family allowances for university teachers.)

Next, Fisher is invited to deliver the Herbert Spencer Lecture for 1932 in Oxford, which he does on 8 June: 'The Social Selection of Human Fertility'. This is appropriately enough a more academic discourse, with a long introduction about the phenomenon of natural causation arising from the probable behaviour of large assemblages of entities such as molecules and genes, but with the same plea as before eloquently argued.

In 1933 Fisher left his post of Chief Statistician at Rothamsted Experimental Station to take up the Galton Professorship of Eugenics at University College London. In a lecture 'Eugenics academic and practical' to the Annual General Meeting of the Eugenics Society in 1935 (a title to which he was invited to speak) he laid out his academic plans for a Department in what we now call human genetics. It was the moment at which the subject of human genetics was detached from 'practical eugenics', which he described as 'practical action in the legislative sphere'. Under Fisher and his successors the 'Galton Laboratory' established itself as one of the world's premier departments of human genetics.

In this lecture Fisher did not mention family allowances, but in the same year the Eugenics Society issued a notice of its *Aims and objects*. 'Eugenics aims at improving the inborn qualities of future generations'. Under 'Positive Eugenics' a paragraph states:

> FAMILY ALLOWANCES: The Society favours the provision of family allowances by the establishment of graded equalization pools and other systems calculated to have a eugenic effect. It regards as wholly dysgenic the provision of allowances through flat rate payments by the State.

It is clear that Fisher had carried his proposal in the Society.

Haldane's *Heredity and Politics* 1938 and The Geneticists' Manifesto 1939

In 1938 Haldane published his Muirhead Lectures 'Heredity and Politics given at the University of Birmingham the previous year, and in Chapter 4 'Differential Fertility and Positive Eugenics' he describes Fisher's view in *The Genetical Theory* and understands his evolutionary argument. But he does not describe Fisher's solution. He writes: 'My own view is that some form of family allowances would be a measure of social justice, but would be extraordinarily difficult to carry out. It would be most difficult to arrange a system of family allowances for the professional groups such as

lawyers and doctors, who are a valuable class of men from the eugenic point of view'. Fisher had argued that the child allowances in such self-employed professional classes should be via their professional associations, which would add a sum to their members' annual subscription that would allow a standard allowance per child to be paid. Difficult, certainly, but Fisher was promoting a progressive idea at no cost to the state that first of all needed to be seriously discussed. Haldane continued 'Although I am in considerable sympathy with Fisher's views, I cannot regard them as resting on very complete evidence', implying criticism of Fisher's careful arguments in *The Genetical Theory*.

The following year at the Seventh International Congress of Genetics at Edinburgh 'The Geneticists' Manifesto' *Social Biology and Population Improvement* was drawn up and circulated by seven participants, F.A.E.Crew, J.S.Huxley, J.B.S.Haldane, H.J.Muller, S.C.Harland, J.Needham and L.T.Hogben. It attracted fourteen further signatures, including those of G.Dahlberg, Th.Dobzhansky, R.A.Emerson, A.G.Steinberg and C.H.Waddington. As we have noted above, Huxley, Haldane and Hogben had all understood and applauded Fisher's argument. It was not explicitly mentioned, but the following extract indicates support for the practice of eugenic selection:

> The intrinsic (genetic) characteristics of any generation can be better than those of the preceding generation only as a result of some kind of selection, i.e., by those persons of the preceding generation who had a better genetic equipment having produced more offspring, on the whole, than the rest, either through conscious choice, or as an automatic result of the way in which they lived. Under modern civilised conditions such selection is far less likely to be automatic than under primitive conditions, hence some kind of conscious guidance of selection is called for. To make this possible, however, the population must first appreciate the force of the above principles, and the social value which a wisely guided selection would have.
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> [Sixthly,] conscious selection requires, in addition, an agreed direction or directions for selection to take, and these directions cannot be social ones, that is, for the good of mankind at large, unless social motives predominate in society. This in turn implies its socialised organisation. The most important genetic objectives, from a social point of view, are the improvement of those genetic characteristics which make (a) for health, (b) for the complex called intelligence and (c) for those temperamental qualities which favour fellow-feeling and social behaviour rather than those (to-day most esteemed by many) which make for personal "success", as success is usually understood at present.

Not surprisingly given the socialist methods proposed, Fisher, who was present at the Congress, did not sign. Indeed, he had given his contrary opinion privately in a letter to his friend C.S.Stock in 1932: '… anything so big as eugenic aims must be controlled by the personal choice of individuals acquainted with their own individual needs and circumstances'. His proposal for family allowances did not seek 'the improvement of genetic characteristics'. It was more modest and more urgent, intended to halt the dynamic action of the processes currently acting in the British population in the opposite direction. Many years later Guiseppe Tomasi di Lampedusa captured the same logic in his famous Sicilian novel *Il Gattopardo*: 'Se volgiamo che tutto rimanga come è, bisogna che tutto cambi. Mi sono spiegato?' – 'If we want everything to stay the same, everything will have to change. Do I make myself clear?'

An experiment involving 'conscious selection' and 'socialised organisation' was about to start. The Second World War began a few days after the Congress broke up.

1943 Beveridge and Fisher

In 1943 Sir William Beveridge gave the Galton Lecture on 16 February. As we have seen, Fisher was aware of Beveridge's proposals for flat-rate family allowances supported by the government, and Beveridge, himself a member of the Eugenics Society, was familiar with Fisher's arguments, for Fisher had sent him his 1932 address to the Society. Beveridge's lecture 'Eugenic aspects of children's allowances' is an attempt to assess the merits of the two approaches.

'Do people tend to have relatively fewer children because they are rich, or is it the other way round, that infertility is the cause of economic success?' asks Beveridge. He has already missed Fisher's point (and Cobb's). Both effects acting concurrently are involved in social advancement in consequence of which the associated genotypes will rise together in the social strata, taking with them the attributes which favour both increased economic success and reduced fertility. Both are part of the same phenomenon and result in the same effect, namely the stratification of society so that economic success and reduced fertility are correlated. The answer to Beveridge's question is that both alternatives are true, and, that being the case, they provide the answer to Fisher's question, which is 'Why are the successful strata *innately* less fertile?'

But then Beveridge seems to weaken: 'Not only is infertility the cause of social promotion, but social promotion in turn causes infertility'. However, 'it is not easy to believe that there has been enough time for selection, working by itself, to produce those enormous differences between the relative fertility of different classes. After all, natural selection is a relatively slow process'. (Fisher once confided to my student contemporary J.S.Gale that he had written *The Genetical Theory* with the main aim of demonstrating the remarkable power of natural selection.)

We may forgive Beveridge for some lack of clarity in his long address because, he tells us, he had no script and had just come from the House of Commons listening to the opening debate on the Beveridge Report. Towards the end he remarks that if Professor Fisher is wrong, and 'the lower fertility of the wealthy class is due, to some extent, not to selection but to the fact that they are wealthy or are educated, that still more strengthens the argument for … allowances above the subsistence level in these higher grades so as to remove as completely as possible the premium on infertility'. It is an interesting remark from a social reformer, but then he caps it in his peroration by saying:

> One of the things which we in this country like to do is to look back with pride upon our ancestors. As a nation we look back with pride on our ancestors of 200 or 300 years ago, and some can look back individually to ancestors of distinction. If we look back, I do not see why as a community we should not look forward 200 or 300 years and see that we ensure the best possible posterity. That depends on breeding not from the worse stocks, but from the better. That is worth doing and ought not to be regarded as anything fantastic or unreasonable. We ought to take thought not of to-day, nor perhaps of to-morrow, but of 100 or 200 years ahead. We have need to look forward as well as to look back.

Fisher sums up the whole problem in 'The birthrate and family allowances' also in 1943 in what reads as a reply to Beveridge's Galton Lecture. It is his most eloquent, and as it turned out the final, advocacy of his proposal for family allowances to allay the consequences of the 'Cobb principle'. His only mention of the principle itself is that 'It was, in fact, primarily with a view to the eugenic problem that I first came to study the possibilities and probable effects of family allowances'.

Though there is no indication that the paper was given as a lecture, it gives no references and does not mention Beveridge. The well-known American geneticist J.F.Crow ('Jim'), who knew Fisher well, once told me that he thought Fisher had

simply tired of arguing, in which case we might regard the 1943 paper as a kind of *apologia*, not an apology but a final defence of a rational scheme which Beveridge should have appreciated. He was not without hope:

> It is most earnestly to be hoped that renewed study of the subject in the light of the experience of other nations and the requirements of post-war reconstruction will enable the problem to be met, not by a patchwork of ineffectual compromises, but by a co-ordinated system based on principles fit to bring about the reforms required.

A Parthian shot 1958

It has often been suggested by way of criticism that Fisher was a prominent proponent of eugenics throughout his career, but 1943 was in fact the date of his last public statement, by which time he had also detached himself completely from the Eugenics Society. Yet when in 1958 Dover Books issued a 'second revised edition' of *The Genetical Theory of Natural Selection* Fisher inserted a final paragraph to Chapter VIII 'Man and Society':

> In the following chapters we shall examine, first, the objective evidence as to the magnitude and heritability of variation in human fertility; next, we shall consider the widespread evidence of its association with social class; and, finally, we shall put forward a theory of the selective process by which this association appears to have been established. On this theory it may be seen that its destructive consequences are not incapable of rational control.

It is a wistful reminder to us not to neglect an argument that had impressed him in his youth forty-four years previously and which had drawn no scientific criticism other than by denial of the existence of the effects of natural selection on fertility and behaviour.

Stephen Jay Gould's criticism, 1996

The scientist and essayist S.J.Gould had a tilt at Fisher in 'The smoking gun of eugenics' in his collection of essays *Dinosaur in a Haystack* (1996) thirty-four years after Fisher's death. To his credit he understood the Cobb principle, and he was fair in stating '… I do not single out Fisher for any opprobrium on this score [eugenics]. The great majority of geneticists advocated some form of eugenics, at least until Hitler'. Fisher had ceased to be active in the Eugenics Society before Hitler's war, and, as we have seen, from 1943 and the Beveridge Report he showed no further interest in population questions of any kind.

Gould's attack took the well-worn path followed by many of simply denying the existence of heritable components in behavioural characteristics, at least in man. What came to be known as 'sociobiology' was not for them. Familial behavioural characteristics, recognised as such for millennia long before the modern understanding of inheritance, could not have a genetical component. The contrary opinions of Darwin and his mendelian followers counted for nothing. Animal analogies, indeed animal experiments, counted for nothing either. In The *Descent of Man* (1871) Darwin was quite clear as far as 'the intellectual and moral faculties of man' were concerned (it is striking how *The Genetical Theory* employs Darwinian language such as this, even using 'civilised' and 'barbarian' as opposites): 'These faculties are variable; and we have every reason to believe that the variations tend to be inherited'.

Five years later Darwin was to reply to a correspondent who had reported a case of odd inherited behaviour in his family – and another in his dog's family – writing 'The longer I live the more I come to believe in inheritance [of behaviour]'. Today the academic left continues to hide behind the rejection of inherited

behavioural patterns (especially bearing on anything associated with intelligence and ability) and Gould was no exception.

After four pages of exaggerated consideration of 'the numerous false assumptions that detail Fisher's complex argument' Gould delivers his verdict. 'Why should we assume that people who rise socially do so, in large part, by genetic endowment?' This is 'quite unproven; but the second conjecture (a genetic basis for fewer children in the upper classes) seems wildly improbable, even bordering on the absurd'. Fisher, of course, did not say 'in large part' nor did he conjecture only 'a genetic basis' for fertility. Gould concluded:

> We may take a kindly view of Fisher's eugenics and say that his genetic conjectures did no harm, for, try as he might in press and before parliament, Fisher's recommendations made no practical headway. But false genetic hypotheses of human behaviors and statuses are politically potent.

We can but agree with the last sentence also in the case where genetic influence is denied, as in Gould's Lysenkoism.

Conclusion

Fisher's youthful encounter (at the age of twenty-three) with J.A.Cobb's theory of the increasing association between social advancement and infertility as a consequence of natural selection acting on the British population led him to propose a system of child allowances to help share the costs of child-bearing and education more equally in each level of society, to be met by the employer or professional association. He argued that this would help to counter the reduced fertility in the upper reaches of society (which at the time was below replacement level) and thus help to mitigate the undesirable effect outlined by Cobb.

Fisher elaborated his proposal as the years went by, expounding it in papers in *The Eugenics Review* and ultimately in detail in the second part of his great 1930 book *The Genetical Theory of Natural Selection*. It there attracted the qualified approval of his colleagues the geneticists J.B.S.Haldane, Lancelot Hogben and Julian Huxley, and by 1935 had become one of the 'Aims and Objects of the Eugenics Society'. In 1943 Fisher spoke against the system of flat-rate family allowances proposed by Sir William Beveridge in his Report, while Beveridge argued against Fisher's scheme. Flat-rate child allowances won when Beveridge's proposals passed through Parliament.

Fisher ultimately tired of arguing but his 1958 addition to *The Genetical Theory* quoted above shows that he held to his conclusion. It is instructive to note the quotations with which he headed each chapter of *The Genetical Theory*, of which we may repeat the one from Chapter VIII 'Man and Society' from Francis Bacon's (1561-1626) *Of the Wisdom of the Ancients*, here given *in extenso* but with Fisher's extract in italics (his wording is slightly different).

> SPHINX, says the story, was a monster combining many shapes in one. She had the face and voice of a virgin, the wings of a bird, the claws of a griffin. She dwelt on the ridge of a mountain near Thebes and infested the roads, lying in ambush for travellers, whom she would suddenly attack and lay hold of; and when she had mastered them, she propounded to them certain dark and perplexed riddles, which she was thought to have obtained from the Muses. *And if the wretched captives could not at once solve and interpret the same, as they stood hesitating and confused she cruelly tore them to pieces.*