

Uses of Scientific Argument

The Case of 'Development' in India, c 1930-1950

This essay seeks to carry out an apparently simple task: to recover some of the ways in which 'science' was used as a category by nationalists in late colonial India in connection with the need for 'development'. In so doing, the essay also looks at ways in which 'science' became part of a legitimating rhetoric in late colonial India.

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This is not a new theme, although the contours and limits of both the rhetoric and practice remain debated. The complications encountered by such a task are not a few. Just as in the heyday of development planning it was customary to appeal successfully to the authority of science and technical expertise, in the post-developmental era it is conventional within the humanities and social sciences to attribute the ills of the world to science and the arrogance of its assumptions and practitioners. As a result the category 'science' has always had a polemical aura about it, a normative category without much descriptive bite. An attempt to restore some of the descriptive content might appear to implicate the historian in a justification of the alleged tyrannies of science, a good case of killing the messenger who bears bad news. A few preliminary clarifications are therefore necessary before spectres of giant, genetically-modified chickens and American multinationals patenting all seeds appear in continuum with this essay.

'Science' was the basis of claims to legitimacy made by many people in late colonial India. Not every claim to 'science' as a legitimator was regarded as 'science' by contemporary practitioners of science. This obviously means that the historian must make a distinction between a professional practice of science and the claims made, for instance, by the Arya Samaj to a 'Vedic' science, and carefully avoiding conflating the two.¹ *This does not mean* that those scientific theories and practices which were regarded as self-evidently scientific in the 1930s or 1940s by practitioners of science should continue to be regarded as scientific – this is often done by the opponents of science in order to construct a better polemic against a generalised conception of 'science'. For what may be forgotten is that the pseudo-

science of earlier generations is often recognised as pseudo-science on the basis of tools of analysis provided by scientific research itself, and not merely on the basis of changing ethical considerations. Such intellectual debts to the enemy are seldom acknowledged.² A generalised attack on 'science' may be thus part of a wider reason-as-post-enlightenment-tyranny-post-modernist-universal-doubt set of positions which indulges in much creative anachronism: that is, mixing up current, retrospective concerns with contemporaries' concerns and projecting the former into the past.³ A careful separation of the contemporary and the retrospective must be made, therefore, without surrendering the right to retrospective commentary on the discursive assumptions of earlier periods and their possible implications. For this reason, for the purposes of this essay, an external or universal definition of 'science' can be avoided and instead an attempt can be made at eavesdropping on the past.

If 'science' is the normative negative in much of today's polemics, academic or otherwise, then any argument made in the past using science as a normative positive may merely be reproduced today in order to discredit it. But the flatness attributed to those past arguments is spurious. The historian's duty to describe is often over-ridden by the duty to impose order. And this disciplining of the sources, post-ex-facto, silences the voices of the past. To identify diversity of argument and to allow the separate strands space should surely be as important in dealing with arguments about science as in dealing with delicate matters of 'cultural' difference. This essay's attempt at disaggregating arguments might assist in a not unimportant task: to identify different ways of appealing to science and how these appeals worked, or did not work, as the case may be.

If this is to be an exercise in disaggregation, in making distinctions, it is necessary to make explicit the principles of selection of the voices presented. This essay deals with questions of science or technology discussed by scientists or technologists and by Indian nationalist politicians in connection with problems of development, broadly construed; it tries to trace the influence of these discussions on the conceptualisation of a future, possible India. In so doing it also attempts to trace the influence of science or scientists on nationalist politics or politicians;⁴ but also the other way round – it examines major nationalist politicians' use of the category/ies 'science'. These influences were mutually reinforcing, contributing to a language of political legitimacy in part at least based on a desire for a scientific, modern and developed Indian nation/state. In tracing such a language of legitimacy, it becomes important to look at appeals to legitimacy framed in a language of 'science', but which were only secondarily about science itself, even when the appeals were made by scientists themselves. Therefore, the essay turns briefly to some debates ostensibly basing themselves on a scientific language of race, which, I argue, borrow a current language for different uses. The essay does not examine the whole spectrum of things called 'science' – that would be a case of confusing the name for the thing itself; for as I remarked earlier, not everything that people claimed was 'science' was accepted as science by practitioners of science at the time.

The phrase 'late colonial', used in connection with this essay, might seem to be a straightforwardly retrospective term, sitting uneasily with the approach outlined above, especially in the light of the inability of anyone to understand when colonialism becomes 'late': what is the criterion of lateness? In order for this category to be

meaningful as a way of understanding contemporary perceptions, it may be possible to suggest a working definition. The 'lateness' of the colonial state begins from the point at which it declares its own impending demise: rhetorically, in the Montagu-Chelmsford Reforms document,⁵ and more generally after the first world war, when the Wilsonian principle of self-determination was on everyone's lips; and the formula of 'trusteeship' was invented to cover the division of parts of the former Turkish empire and the colonies of the Central Powers among the victorious allies. This declaration of its own lateness on the part of the colonial state, *even if* widely recognised to be more rhetorical than real, is nonetheless an important event: it sets in motion certain anticipations of a future situation of impending decolonisation and independence. Anticipations of decolonisation and independence set in motion certain debates of an urgency that was lacking in their earlier versions, because they were less immediate.⁶

Notable among these debates in India were those on 'development'. In reading the writings of people who were concerned with 'development' at the time, it becomes clear that they were not merely interested in 'economic development' or 'economic planning'. The debates reveal a surplus meaning and an emotive significance that is not explicable merely with reference to the state of the discipline of economics at the time, or even to conventional political economy explanations regarding 'interests'. 'Development' now stood forth as a category through which concerns related to a future, possible India could be ordered, and connected with ideas of regeneration and progress. Although catalysed by contemporary worldwide discussions about how to manage economies or how to industrialise quickly – the New Deal, Soviet and Fascist planning, the beginnings of Keynesianism – these debates contained and incorporated far wider concerns.

Four themes stand out in these debates. Nationalists spoke about development in terms of the need for government to express certain social concerns (called 'socialism', but whose criteria varied enormously); in terms of the importance of science and technology, therefore of the directing expertise of technically qualified personnel; and of the need for 'national discipline', often expressed in terms of the moral unity of the 'nation'. These three recurrent themes appeared in various

combinations. A fourth theme, which could attach itself variously to arguments using any or all of the other themes, but which on its own was ineffective as a yardstick of legitimacy, was what might be called the 'indigenist' theme: to be legitimate, 'development' had to take an Indian, not a 'foreign' path. The four themes were contained within a view of development-as-progress – which had to be 'modern' (implying a progress possibly universal in nature), but not 'western'.⁷ Interlocking and intermeshed, these themes provided the basic building materials of development debates in late colonial India, a discursive framework that included both proponents and opponents of the developmental model that many in India came to know and love in the 1950s: heavy industry, state protection, centralisation and planning. This essay highlights for discussion one of these themes: science and technology – without, it is hoped, losing sight of its linkages to the other themes.

Why is this discursive framework worth discussing at all? Ideas that form the basis of the accepted political rhetoric of public arenas are ideas that define the boundaries of publicly acceptable political behaviour. They therefore define public standards to which people are expected to conform: a language of politics that becomes inescapable in that claims to political legitimacy must be made in that language. This creates the basis for public debate and the standards for acceptable action. Deviations from such norms need to be hidden, or justified as only apparent deviations, ultimately assimilable within the bounds of the norms. The point, therefore, is not whether the users of a language of legitimacy always believe in the language themselves, but why they must use it even if they don't. And this involves tracing how a language came into being.

Applied science, Technology, 'Modernity'

There was, of course, a very straightforward reason to claim importance for science in development. Technology was recognised as a necessary means to the desired end of industrialisation, through which Indian economic development would be achieved – this is well-documented in existing writing. But this was more a concern with technology – practical application of engineering or technical skills – than with scientific practice and method for its own sake. In the course of

the insistence on the need to industrialise – a call which went back to the 19th century – a great deal of attention had been paid to the lack of technology and technological skills in India. The main concern with the teaching of science was centred in imperial arguments around its clearly practical applications – the promotion of engineering colleges being one such area. The debate around 'technical education' was also a strong strand in British India, merging with the demand for industrialisation. While for the Indian side of the argument, this was to be combined with constructive government activity, a protective tariff policy, and genuine fiscal autonomy, it was often the limit to what the government was willing to do. Nevertheless, in connection with 'development' it was urged that science should be put to the service of industrial research and technical training of scientists who would thereafter serve industry – a phenomenon, it was claimed by opponents of the government, which was well known in Britain and other industrialised nations. Nationalists were quick to blame government policy for the inadequate promotion of industrial research or technological training.⁸

In the course of these debates, scientists were increasingly being cast as the most potentially influential group in a new India; they were increasingly being included in discussions on developmental matters as 'experts'; and a number of them had already begun to take this role extremely seriously, carrying the message of the importance of science to a wide and constantly increasing readership among the educated middle classes. Journals which catered to a general middle-class readership carried articles on the importance of science, on occasion discussing complicated concepts in various branches of science taking for granted the interest of its readership in these matters;⁹ a scientific journal could cater to a general interested readership beyond the scientific community, carrying articles on the intricate details of electronic engineering, statistics or physics problems alongside news of the latest developments in Sigmund Freud's work in Vienna and the successes of the Soviet industrialisation programme.¹⁰ It might be said, therefore, that the need for technology gave way to a heightened interest in scientific practice, which of course was in congruence with the perceived need to be 'modern' – a normative term usually related to in terms of technological or material conditions,

and more specifically in terms of industrialisation.

For others, the instrumental use of technology was of more interest than the wider intellectual pretensions of science. In 1934, the engineer and former Dewan of Mysore Sir M Visvesvaraya wrote to Gandhi, "I feel that in this machine age, we should not hesitate, except in temporary situations, to utilise mechanical power to the utmost limit that circumstances permit... I am enclosing an extract from a speech by the Russian leader J Stalin..."¹¹ Visvesvaraya was no socialist, believing in the virtues of private capital, and was in fact an admirer of Mussolini's ability to get things done properly by disciplining and thereby modernising the masses;¹² the appeal of Stalin was therefore the Stalinists' apparent ability to solve problems of production and industrialisation by the use of technology. In this he was not alone. A K Shaha, practical scientist and 'scientific socialist', the man who claimed to have persuaded Subhas Bose, Congress president at the time, to set up the Congress' National Planning Committee in 1938, and a member of the NPC himself,¹³ wrote in 1948, "Industry and technique solve all problems", rightly said Comrade Stalin'.¹⁴

The connection of science and technology with industry and ultimately with 'modernity' was a theme stressed in the 1930s, and particularly in the course of arguing against the Gandhian line on not using machinery.¹⁵ This was not the only point of criticism of Gandhi. Others were on the line of his ideas inadvertently serving capitalism by providing legitimation for the capitalists through the idea of the 'trusteeship' role of the wealthy; that his ideas were 'backward' and not conducive to modern life; and that contrary to Gandhi's claims, they were not 'indigenous'. On the question of 'indigenism', unlike the other points, it was his opponents who felt more defensive. Gandhi's claim that his opponents' positions were not in keeping with Indian traditions or conditions; that they were 'western', was the main strength which Gandhian arguments could rely on, as it drew on old anxieties regarding cultural disruption or what constituted legitimate borrowings from the 'west'. On the subject of machinery and industrialisation, therefore, the response of 'modernisers' to accusations of their 'westernisation' or a lack of respect for 'tradition' was based on a strategy which claimed that there was nothing wrong with the principles of

Science and the benefits of technology on which industrialisation was based per se; if it appeared that they were not universally valid, this was due to their misuse, which had distorted the results obtained. In the hands of a nationalist government with due regard for Indian conditions they could be put to the best possible use.

The Gandhian voice, on the other hand, represented to them an unfortunate commitment to 'backwardness' – it was admitted by 'modernisers' that village industries might have a place in an economically rational scheme to provide employment at the local level, and for this purpose might even be worthy of government protection, but, as the journal *Science and Culture* put it, to place a commitment to 'the philosophy of spinning wheel and bullock cart' at the centre of national economic life could only be a denial of the progress of science, of the 'techniques of modern civilisation'.¹⁶ This was an unviable approach "[i]f India is to grow into a powerful world-entity like the US, Soviet Russia, and the countries of western Europe... A nation, however great its moral and spiritual qualities may be, can not hope to win battles with bows and arrows against tanks and artillery. In this world of strife and competition, if a nation wants to survive, it must develop the latest techniques of civilised existence".¹⁷ This, it might be noted, was a view of the state and of state power being conflated with the nation.

This was also a scientist's or a technologist's critique; it assumed a good deal in terms of the transformative capacity of technology. The Congress Socialists' critique was more subtle, and took Gandhian ideas more seriously, while still maintaining a strong polemic against them. The CSP were always careful to preface their criticism of Gandhian ideas with the assertion that they had no doubts as to Gandhi's own good intentions – it was merely the logic of his ideas that they questioned. Asoka Mehta, addressing the Gandhian question of whether machines caused unemployment, accepted that this was indeed the case in many countries of the world at present, but concluded that this was only the case under capitalism – "the logic of capitalism demands an army of unemployed as its reserve force, and it will not eliminate it". Under socialism, "there will be planned economy and work will be so evenly distributed that all will have their share of work and leisure".¹⁸ This rebuttal was conducive to confusions

on an important point: planning under private ownership of technology could also lead to the replacement of workers by machines. Mehta and other Congress socialists had made the point clear elsewhere, when he argued, describing the initiatives of the New Deal, that planning under capitalism merely strengthens capitalism.¹⁹ In the above passage, it was possible to interpret planning and socialism as somehow necessarily connected. This was a conflation of terms often made, with a planned economy and a large state sector being allowed to stand forth as socialism.

The reclaiming of science as a legitimately Indian concern was also central to the arguments in the often polemical debate against Gandhi: science was not to be regarded as outside the Indian cultural framework:

It is probably not so well known that the east has originated all those arts and crafts which are responsible for the greatness of the present European civilisation. It was in the east that copper was first discovered from its ores and used to replace tools made from stones. The east has used bronze which is far superior to copper for offence, defence, and work, upto [sic] 1200 BC. It was again the east which first showed that iron by special treatment could be converted into steel, a product far superior to bronze for fighting and tool making. Even the use of mineral coal originated in the east.²⁰

Thus, European civilisation having borrowed from the east, the east is entitled to reclaim the fruits of its own achievements. Science thereby performs its rightful duty in developing a modern India whose modernity is her own, not plagiarised.

It has, following contemporary critiques, but sometimes with a new, positive twist rather than a negative one, become conventional to see Gandhi and the Gandhians as resistant to 'modernity'.²¹ But it would have been impossible to make a valid argument related to development in India on the basis of a rejection of 'modernity', especially as these arguments were addressed to intellectuals. What had to be achieved was the disassociation, in the Gandhian position, of the categories 'western' and 'modern', not through a straightforward acceptance of the universality of the 'modern', but through the introduction of separate criteria of 'modernity' – criteria which were not 'western', but truly Indian, but which by implication it was desirable

to make universally applicable. The criteria of 'modernity' had themselves to be tested by 'science' as well as 'morality', which were, the argument went, compatible. If this were done, it would be the 'east' which would be seen as 'modern'.

This may have been a question of strategic placement of an argument. The moral could not of course be abandoned for the scientific if Gandhi had to maintain his image as the moral philosopher whose politics was based on that morality. But he did make some concessions to reach an audience who might have been less reachable by his more extreme anti-technology views. It must also be said that his opponents were prone to presenting a somewhat caricatured version of his arguments, for which they were given plenty of opportunity by the mystical and elusive nature of Gandhian rhetoric itself. Phrased differently, and outside that rhetoric, some of it could sound quite conventional.

Gandhi's extreme anti-machinery doctrine seems to have been modified over the years to accommodate the use of some machinery. In 1924, discussing his *Hind Swaraj* position in which he denounced the use of machinery, Gandhi clarified to Mahadev Desai that he was not against all machinery, but was against the 'craze' for labour saving devices while men went about unemployed. He called the Singer sewing machine 'one of the few useful things ever invented' (as good an endorsement as a commercial product ever had); and when it was pointed out to him that these machines had to be made in factories with power-driven machinery, Gandhi replied that this was true, but he was 'socialist enough to say that such factories should be nationalised, state-controlled'.²² In 1933, Gandhi, writing in the *Harijan*, praised the Nazis for reviving village industries and for de-mechanising certain industries to create more employment, arguing that even a technically advanced country such as Germany recognised the need for limiting the use of machinery.²³

The arguments put forward on the Gandhian side with respect to the compatibility of scientific thought with a Gandhian socio-economic order were usually the work of J C Kumarappa, the head of Gandhi's All-India Village Industries Association, who had the benefit of an economics education at Columbia University, a discipline that could at the time claim to be 'scientific'. That this was not simply Kumarappa's gloss on Gandhi's mystical position is evident from the

correspondence of master and disciple, although Kumarappa himself did not dispense with the mystical in his own writing.²⁴ Dissatisfied with one of Kumarappa's efforts, Gandhi wrote sternly to him in 1941,

Your article on industrialisation I consider weak. You have flogged a dead horse. *What we have to combat is socialisation of industrialism.* They instance the Soviet exploits in proof of their proposition. You have to show, if you can, *by working out figures* that handicrafts are better than power driven machinery products. You have almost allowed in the concluding paragraphs the validity of that claim.²⁵

Significantly, Gandhi did not phrase the intended project in terms of the need to combat the use of machinery, as he was conventionally wont to do, but in terms of the need to combat the 'socialisation of industrialism'. Perhaps he was being inconsistent, perhaps more honest in private than in public.

J C Kumarappa sought to establish the practicability of the village-based economy on the basis of the scientific wisdom of the principles of economics on which it rested. This was not a rejection of 'modernity'; Kumarappa challenged the basis of generally accepted yardsticks of 'modernity', claiming to establish a case for a better yardstick in the consideration of a longer time-frame: 'the perspective of eternity'. Far from rejecting conceptions of 'modernity', and consequently of 'science' or 'economics'.

Kumarappa therefore sought to persuade his readers that his standards of 'modernity', 'science' and 'economics' were better than those which had currency. In many of his articles he argued strongly that science and technology should be placed at the disposal of village industries, and denied the charge that the AIVIA was 'against human progress'. The idea that the village should be self-sufficient should not, he argued, be taken to imply that the artisans should be left to themselves: a chamar's expertise in leather-working should not be restricted by the older technologies of tanning to which he was accustomed; rather, the assistance of scientific research should be available to him. Science should, however, be put to such correct uses, to transform the 'crude village economy'. 'We want to yoke science to human progress', Kumarappa wrote. 'Today, science is being prostituted', its use 'denied to the masses'; it needed to be harnessed to village problems.²⁶

It might be noted that one set of players who steered clear of the machinery/antimachinery debate with the Gandhians were Indian capitalists. Their legitimisation through Gandhian ideas of the 'trusteeship' role of the wealthy made this a prudent step; and the legitimisation of machinery was left to scientists, technologists and socialists.

Why 'Science'? Lineages and Crossovers

Science as practical technology and science as legitimiser both had long lineages in India. As far as the first was concerned, the connection between 'development' and science was an obvious one if 'development' was intended to privilege industrialisation and increased production in any form. For this purpose it was perfectly sensible to defend the use of technology. But all arguments had one thing in common: the appeal to science as legitimiser of a position. As a legitimiser 'science' also carried wider connotations of 'rational', and 'progressive' activity.

These connections were self-evident for many of the personnel who came to be closely associated with the planning of industrialisation, men who were often also closely involved in the practice of 'science' or the promotion of technology. A few obvious examples come to mind. Meghnad Saha, physicist, of Presidency College, Calcutta, and Imperial College, London, was author of a scheme to dam the river Damodar, and a member, from 1938, of the Congress' National Planning Committee, and on the Sub-Committee for River Training and Irrigation, and the Sub-Committee for Power and Fuel.²⁷ P C Mahalanobis, Presidency College, Calcutta and King's College, Cambridge, physicist-turned-mathematician-turned-physicist-turned-statistician-turned-developmentalist, a relative late-comer to debates on Indian 'development' (although he had been a close member of Rabindranath Tagore's circle, and peripherally connected with the Sriniketan experiment in rural development), and later to be author of the eponymous 'Mahalanobis Model' of development planning, set up the Indian Statistical Institute at Presidency College, in a corner of the physics department. Both were close associates of Satyendranath Bose, Einstein's sometime collaborator – and had worked together with him on a book on relativity.²⁸ This was a social and professional circle which had begun closely

to associate Science, Development and Modernity: Saha set up the monthly journal of the Indian Science News Association, *Science and Culture* to promote a 'scientific' approach towards problems of development and national progress, and did a great deal of writing for it himself; Mahalanobis and Saha were regular contributors to the annual Indian Science Congresses; both Saha and Mahalanobis had worked on the problem of floods in the Damodar valley in the 1920s and 1930s.²⁹ Sir M Visvesvaraya, ex-Dewan of Mysore, highly successful former civil engineer and government servant, and author of several books on developmental schemes, was one of the vice-presidents of Mahalanobis' Indian Statistical Institute for a while; and Saha, Visvesvaraya and Mahalanobis were all involved in the Congress' National Planning Committee, though Mahalanobis more peripherally: he wrote to Nehru in 1940 suggesting that he examine all the reports of the National Planning Committee from a 'purely statistical point of view'.³⁰

The educational and intellectual antecedents of Jawaharlal Nehru, a BA in natural sciences from Trinity College, Cambridge, with Fabian connections, left-wing links and strong sympathies, for a period, with 'scientific socialism',³¹ Jayaprakash Narayan, whose American education had brought him in touch with the Communist Party of the US;³² or Minoos Masani, LSE student with Labour Party and ILP experience to go with the Fabian connections of LSE life³³ – this was well before his CIA days – contained strong doses of scientific optimism – science as a panacea for most ills, scientific socialism in varying proportions, and a belief in progress, the possibilities of social change.

Most claims to 'science', whether made by scientists themselves or their close supporters, fell short of a well-worked-out philosophy of science, however; the belief in the capacities of applied science to change existing conditions was built on a conception that it was the use of technology which marked out the 'advanced' from the 'backward' societies.

...if we take the motor car industry as an index of civilised existence, the US stands easily first, with over 30 million cars in use; about one man in five possesses a car, i.e., every family possesses a car... in India, there is one car for every 2300 persons. This figure gives an appalling picture of the low index of civilised life in India...³⁴

'Civilisation' here is apparently understood in material terms, opposed to the more abstract connotations of 'culture'; but still carrying with it the idea of being opposed to 'barbarism', or 'backwardness'. This distinction does not seem to have been rigorously maintained, the existence of two terms being useful to distinguish one from the other in the same space.³⁵ Certain aspects of 'culture', according to this view, needed to be jettisoned:

...if this country is ever to enter the path of progress, her younger generations must be cut adrift from many medieval ideas and traditions which are instilled into their minds in the name of religion, philosophy, custom, tradition or history. Only a good dose of scientific education can undo the evil influences to which young minds are subjected.³⁶

Or as Jawaharlal Nehru put it:

...I realised that science was not only a pleasant diversion and abstraction, but was of the very texture of life, without which our modern world would vanish away. Politics led me to economics and this led me inevitably to science and the scientific approach to all our problems and to life itself. It was science alone that could solve these problems of hunger and poverty, of insanitation and illiteracy, of superstition and deadening custom and tradition, of vast resources running to waste, of a rich country inhabited by starving people.³⁷

The 'science alone' part is surprising – possibly meant for his specific audience of scientists, possibly a rather revealing Freudian slip. Those with socialist sympathies were not usually willing to claim that science was an apolitical practice, merely that it could be a search for universally relevant knowledge if it was freed from its bondage to capitalism.³⁸ As an editorial in *Science and Culture* put it in 1938, "It is true that the Industrial Revolution in Europe caused great social dislocation and political unrest, but this was due to the fact that the discoveries of science were first utilised by capitalists, for the sake of private gain...".³⁹ Nehru was not a particularly reliable guide to the consensus among socialists or the scientific community, despite being facilitator of communication and organisation. He wrote in 1939, in reply to a letter by one Ahmed Bashir, Secretary of the Majlis Kabir Pakistan of Lahore, in which the latter had urged him to accept the partition of India:

Perhaps it is true, as you say, that I look at the facts from the westerner point of

view, though I have not divorced myself from facts in India. I move about the country a great deal and see vast numbers of people in the villages and in the towns. Nevertheless it is true that my outlook on life and politics is what might be called scientific.⁴⁰

Here Nehru collapsed the categories 'scientific' and 'western'; the latter term, one most often used as abuse in colonial India, was appropriated by Nehru as a positive trait. This was far from what most Indian scientists perceived themselves as doing; and Nehru himself did not consistently make this equation, usually stressing the universal rather than the 'western' aspects of science. A closer analysis of these slips would require a closer study of Nehru's psychological history, which is not of primary importance to this argument; it must be said, however, that the anxiety recurrent in Indian political discourse of the time, of the need for 'Indianness', is encountered again here, with the distinction between 'eastern' and 'western' ways of thought and action remaining crucial. This theme, which dominated earlier political debates, and survived notably in the Gandhian position, tended to be used by the right wing of the nationalist movement to delegitimise its leftist opponents. Nehru's own tracing of the trajectory of his 'discovery of India' was more honest than most who sought to claim the necessary eastern authenticity: he found the east via the west.⁴¹

'Science' as a universal framework, with a capacity to legitimise the work of the colonised and to create equality between colonised and coloniser – 'progress' in science as being neutral and universal – was a powerful ally to claim in colonial India. This was one ground on which a claim to abolishing the particular claims of 'nateness' and consequent difference which was the basis of colonial constructions of its own superiority. The universal of this dynamic – a downtrodden group's need for legitimating criteria, its escape from negative placings of itself – the scientist as scientist, not as native, Jew or Negro – has been discussed in different contexts.⁴² At the same time the scientist was an Indian scientist – the Indian part of it was relevant, not in Indian science being separate from 'western' science or science as a whole, but in that Indians could contribute as equals in the scientific world.⁴³

If there was an initial anxiety involved in practising a science seen as 'western',⁴⁴

by the 1930s, anxieties arising from being an 'Indian' practising 'western' science hardly arose in a significant manner; if they had once existed, resolutions to the arguments had been found; the confidence in the practice of modern science was widely accepted. Initially, the importance of science teaching had been strongly linked to inculcating modern values in the Indian.⁴⁵ Modernity was seen to be linked, in the colonial project as well as in much of Indian resistance to that project, to an attempt to impose 'western' values on Indian society. Partly as a result, from the middle of the 19th century to the first decades of the 20th century there had been lively debates as to the relevance of science and the need to negotiate an 'Indian' version of science and scientific practice. These acquired immediacy in the period surrounding the Swadeshi movement and the corresponding demand for 'national education'.⁴⁶ The resolution of this debate seems to have been achieved through a conception that the technological achievements of 'western' science needed to be appropriated so that a national programme of industrialisation could be launched; this despite the material nature of 'western', 'natural science'-based civilisation, as opposed to the moral civilisation of India; for without industry Indian sovereignty could not be realised.⁴⁷

A universal science that accommodated Indians as equals required the acknowledgement in its history that Indians had contributed to the making of that science. Crucial links in such a resolution were found in the rediscovery for India of an ancient past of scientific practice. Acharya Prafulla Chandra Ray, of Bengal Chemicals and Swadeshi fame,⁴⁸ a larger-than-life figure who became a major inspiration behind Indian Science, wrote a two-volume *History of Hindu Chemistry* which contributed to an ongoing challenge to the idea that Science was the achievement of 'western' thought alone.⁴⁹ He was himself a major influence on Brajendranath Seal, philosopher and educationist, incidentally the man who introduced a young P C Mahalanobis to practical statistics,⁵⁰ and the future vice-chancellor of Visvesvaraya's creation, Mysore University. Seal's treatise on *The Positive Sciences of the Ancient Hindus*.⁵¹ originated in his contribution to the second volume of Ray's *History of Hindu Chemistry*, which he enlarged and recast for publication.⁵² P C Ray was a major influence on Meghnad Saha and his associates, of whom not a few had been

taught by Ray at Presidency College.

The tentativeness of early debates on the validity of science for India could be overcome not merely through a historical quest for an ancient Indian science, but also because of the recognition on a world stage achieved by Indian scientists, such as P C Ray, Jagadish Chandra Bose, and later Satyen Bose, Meghnad Saha or C V Raman, and the erosion of some of the discrimination in terms of employment suffered by Indian scientists in earlier years.⁵³ It was possible in the 1930s to argue with far greater confidence that Science, if not an universal philosophy, was certainly not to be regarded as outside the Indian cultural framework; for it was in the 'east' that 'all those arts and crafts which are responsible for the greatness of the present European civilisation' had originated.⁵⁴ If, then, 'science' was not 'western', but originally 'eastern' and now universal, it could be successfully and legitimately regarded as indigenised for use.

The sectarian nature of some of this rediscovery of 'Hindu' science has been commented upon;⁵⁵ but its complexity and ambivalence needs to be noted as much as its sectarianism. The tendency itself was not unlike Gandhi's argument on the purity and beauty of village life, reaching backwards to a better, golden age – with the consequent implication that to relive that golden age in the present constitutes liberation. Perhaps more to the point, the reading of 'science' which became central to the developmental imagination was clearly non-sectarian. 'communalism' was backward, and would wither away in the face of the assault on the negative material conditions that sustained it; this assault would be achieved by a scientific developmental programme.⁵⁶ The normative rhetoric of Indian political life was unambiguous on this point: development good, science good, communalism bad, irrationality bad. Whether or not there was as sharp a separation between the good and the bad as the rhetoric suggested, the silencing of undesirable voices by the legitimate rhetoric resulted in an edited version of the debates reaching the public; and sectarian arguments had to appear in various legitimate disguises.

The selection of science's national heroes who would embody the legitimacy of science and the possibilities of progress also indicate this reading. Acharya P C Ray was a complex figure who managed to combine an insistence on the virtues of

practical science, technology and entrepreneurship with his support for Gandhian ideas (he had actively campaigned for khadi in the 1920s in connection with the Non-Cooperation Movement, and was a believer in a moderate version of Gandhi's anti-machinery doctrine) even as many of his students and fellow-scientists rejected Gandhian views sharply and found themselves closer to views on socialism and science that eventually came to be called 'Nehruvian'.⁵⁷ Ray was extremely eclectic in his choice of influences and his views of past and future; in a most un-Gandhian manner he attributed the 'intellectual renaissance in Bengal' to the efforts of Rammohun Roy and Thomas Babington Macaulay, and agreed with James Mill that the 'Hindu' mind was capable of great metaphysical subtlety but deficient in practical skills.⁵⁸ Three years later, he used the same Minute of 1835 as a quote beginning a chapter dealing with the Bengali's imitative tendencies: adopting European dress, customs, manners, and consumption patterns, embodied in tea, tobacco and automobiles: the Macaulay's Minute-led process, he implied, had gone too far and in the wrong directions.⁵⁹ He also maintained respect for Mussolini, quoting him on the inadequacy of university learning and the need for actual experience, alongside Ramsay Macdonald and Lord Haldane – a reminder of the co-existence of often contradictory ideas among Indian thinkers on 'development' problems at the time.⁶⁰ While some of his contemporaries slid into sectarian arguments in (sometimes uncritically) unearthing a glorious 'Hindu' past and lamenting the onset of decline with Muslim invasions,⁶¹ Ray was able to avoid a situation in which his historical quest turned into ancestor-worship and sectarianism.⁶²

P C Ray was a figure appropriated as the embodiment of the legitimacy – and the possibilities – of science. Meghnad Saha, both as a scientist and as a socialist, used his old teacher's legitimacy in many public campaigns. In 1941 Ray wrote an open letter to Sir Richard Gregory, president of the British Association for the Advancement of Science, who had recently condemned Fascism for putting science to anti-human uses. Ray wrote that it was not only fascism, but also imperialism which frustrated the 'human welfare' object of science. "Industrialisation, which is essential for the prosperity and strength of a nation in the modern age, has been persistently opposed, and even recently

the government of India has refused to support the growth of an automobile industry in India...".⁶³ And yet the authority of 'science', through the person of P C Ray, was also claimed by Gandhians – logically enough, for P C Ray had been a Gandhian and the mainstay of the non-cooperation Khadi campaigners in Bengal in the 1920s. In the Foreword to a book on cow-keeping written in 1945,⁶⁴ Gandhi commended the author, Satish Chandra Dasgupta, as "one of the first and best pupils of the late lamented P C Ray", and the book 'to the lover of the cow as also to every one who would learn that the slaughter of cattle for food is a pure economic waste'; he called the cow the 'Mother of Prosperity'.⁶⁵ The work was clearly positioned primarily as a 'scientific' book both by Gandhi and by Dasgupta; Acharya P C Ray was widely recognised as a figure who had stood for both science and swadeshi, and was a heroic public figure to whom both a lay public and a scientific community could relate.⁶⁶ Dasgupta engaged in a long debate against some of the findings of the Royal Commission on Agriculture in India, which had misled 'the scientific men and the economists'; consequently he had 'had to quote expert opinion' for the 'findings' he had arrived at.⁶⁷ A long section on pharmacology in the second volume, essentially a veterinary tract, betrayed the author's background in chemistry; the drugs he prescribes include 'indigenous' herbs, but far from giving them primacy, he treated them as supplementary – hardly in keeping with Gandhi's *Hind Swaraj* position that 'to study European medicine is to deepen our slavery'.⁶⁸ Yet such argument was not to be considered merely scientific: 'The book is no mere collection of formulae for feeding a cow, or directions for obtaining the utmost milk from a cow. Cow-keeping is a yajna, and I have tried to show why and how it is so'.⁶⁹ The cow, if 'lifted from its downtrodden condition' by the 'constructive workers in the village', would prove a 'most responsive animal'; and more importantly, the uplift of the cow would 'amount to lifting the nation'.⁷⁰ The potential meaning of yajna as 'sacrifice' seems to have been missed by Dasgupta.

Cow-protection books masquerading as economic or scientific tracts were common enough in India: a necessary masquerade if cow-protection was not to appear as a Hindu sectarian argument against cruel Muslims. But the invocation of P C Ray in this regard was ironic. In his own

memoirs, Ray had noted that in Vedic times Brahmins used to eat cows;⁷¹ and he himself seems not to have been particularly concerned with cow-protection; but he was now dead, and could be used more freely as a legitimating figure than when he was alive.

Science of Times: Towards a Scientific Conception of 'Nation'

Straightforward appeals to 'science' as legitimator in a generalised sense apart, there were also elements of scientific discussion that were drawn from contemporary worldwide scientific trends, apparently state-of-the-art scientific concerns which were also closely associated with the period's general concerns with human improvement. There was, for instance, a trend towards conceiving the national state as a body, a physical entity composed of morally and physically healthy citizens. The General Education Sub-Committee of the Congress's National Planning Committee proposed a compulsory social or labour service to make all young men and woman [sic] between the ages of 18 and 22 contribute a year of 'national disciplined service in such form and place, and under such conditions as the state may prescribe in that behalf [sic]'. It moreover proposed to fix general norms of physical fitness to be adhered to.⁷² The sub-committee on Population, while stressing the need for birth control as well as 'self-control', spoke of the need for removing the barriers to inter-marriage "for eugenic and other social reasons".⁷³ In 1938, the National Planning Committee's Sub-Committee on 'Woman's Role in Planned Economy' came up with the following resolution:

The health programme of the state shall aim at the eradication of serious diseases, more especially such as are communicable or transmissible by marriage. The state should follow a eugenic programme to make the race physically and mentally healthy. This would discourage marriages of unfit persons and provide for the sterilisation of persons suffering from transmissible diseases of a serious nature, such as insanity or epilepsy.⁷⁴

Once again, there are lineages of these ideas which need to be taken into account. Nationalist debates in India had long been concerned with questions of how to overcome the stigma of being a backward nation – to this end various forms of education and discipline had been advocated. These

debates were incorporated into later discussions on development. Socialists were perhaps more stringent about their selection of methods and examples through which to achieve this dispossession, and would certainly have taken much trouble consciously to maintain a distance from what they saw as Fascist ideas; but the project is nonetheless recognisable. However, it was also possible to be influenced by contemporarily available metaphors of national purification and health, discipline and control, many of which were authoritarian in nature, and were not necessarily seen as Fascist; such influences cut across political lines. Moreover, as is evident from several instances provided above, Fascism was not necessarily discredited in Indian eyes in the 1930s, linking up with Indian concerns with creating an efficient and disciplined nation in the process of nation-building: 'merely an aggressive form of nationalism'.⁷⁵ And there was less than an intellectually rigorous and consistent engagement with the origins of the ideas borrowed for Indian use.

The language of race efficiency and eugenics was also much used in connection with national discipline. Once again, this had not clearly been discredited until carried to its logical conclusions by the Nazis during the second world war; in the 1920s, Fabians discussed 'socialist man'; and socialists as well as liberals spoke of improving the human stock;⁷⁶ John Maynard Keynes had toyed with eugenics in his writings on mathematics and economics.⁷⁷ In India too, there was a strong confusion among terms like 'race', 'nation', and 'civilisation', often used interchangeably, for instance in the tendency to speak of a 'Hindu nation' or a 'Hindu race'.⁷⁸

In part this can be seen as a problem of translation, both linguistic and cultural: linguistically to discover equivalent terms in Indian languages for those in English, and vice versa; and culturally to map Indian concerns onto debates current in British and European contexts. This cultural translation had important political motives, in a public sphere dominated by the British colonial state: political arguments in colonial India were necessarily interventions into arenas structured by the British colonial power; an intervention which was to be effective had to appeal to principles which the colonial power recognised as valid, and therefore was forced to rebut. This meant that an idea which had already secured political and/or academic respectability in Britain was particularly useful

in arguments put forward in India: the credibility of the idea on which the argument was to be based had already been established. The confusion of 'race' and 'nation' can similarly be observed in contemporary perceptions regarding language, culture and race: The distinction was never quite clear to the Theosophists, who played a crucial role in the rediscovery of Hinduism in India as well as provided echoes of recognition for predecessors of the Nazis with their theories of Aryan supremacy.⁷⁹ Moreover, the temptation in India to claim a similar racial origin to rulers who claimed racial superiority was particularly strong; although one consequence of this manoeuvre was to deny such resources to those among Indians who could not claim an 'Aryan' origin.

Not all these strands found their way into the conceptualisation of 'development': crucially, 'race efficiency' was a relevant category, but not as a sectarian category; rather, 'race' in development debates appears as an approximate synonym for 'Indian national', having shed its 'Aryan' or 'Hindu' connotations.

An example might be provided here. At the Third International Conference on Eugenics in 1932, the Indian contribution was from Henry E Roseboom and Cedric Dover, 'The Eurasian Community as a Eugenic Problem'. It cited P C Mahalanobis' 1922 work with Annandale on the Anglo-Indians, and his analyses of race mixture in Bengal. Dover was an Eurasian and a member of the Congress Socialist Party, and one of Jawaharlal Nehru's self-appointed educators. He insisted (along with his co-author) on the one hand that 'the problem of the Eurasian community, as the Simon Commission (1930) points out, is essentially economic', but on the other hand insisted that 'anthropometric study will demonstrate the physical equality of its members with those of any other community in the east, even if it does not suggest the possibility of the physical superiority under improved conditions'. He argued for the influence of environment in addition to 'miscegenation' as influencing the 'characteristics of the community', appealed to a notion of 'hybrid vigour': 'a carefully nurtured hybrid is superior to either parent'. He advocated miscegenation – the 'development of mixed breeds' would also remove racial friction – and envisioned a future world of 'one composite race'.⁸⁰ Thus, in being used to conceptualise a 'national'

entity, a potentially divisive category such as 'race' was turned to an use implying solidarity and collective effort.

The routes to such semantic shifts were not always straightforward. One strange trajectory was that of the statistician P C Mahalanobis.⁸¹ Although closely associated with Presidency College, and the circles which discussed the role of science in the development of national life, he was a relative latecomer to the concerns which his colleagues articulated.⁸² Much of his first published work, in the 1920s and 1930s, related to anthropometrics, eugenics and race; he kept extensive notes on race and anthropometry, and also took extensive head-length measurements of Bengalis by caste, from which data he published his articles.⁸³ Mahalanobis' interest in statistics was channelled in these directions as a consequence of his working with N Annandale, then director of the Zoological and Anthropological Survey of India, on some of the latter's anthropometric data.⁸⁴ This was the sort of problem to which the young discipline of statistics was being applied, especially through the work of Karl Pearson, socialist and Galton professor of Eugenics at University College, London, with which these early writings engage.⁸⁵

At first Mahalanobis maintained his distance from the project in which he was involved, absolving himself of responsibility for the conclusions. 'I frankly confess', he wrote, "that I know very little of anatomy. My work on the data supplied has been purely statistical".⁸⁶ Annandale clarified that he was 'doubtful about the value of bodily measurements taken on the live person', and 'suspicious that there was some fallacy in the whole method'.⁸⁷ Although the general conclusions bore out Annandale's doubts, the relevance of the category of race itself was not questioned,⁸⁸ and Mahalanobis stated in his definition of terms, following Karl Pearson's 'Coefficient of Racial Likeness': 'By 'race efficiency', I would denote stability, combined with capacity to play a part in the history of civilisation'.⁸⁹ In later writing, Mahalanobis overcame his diffidence and entered the debates in earnest. In particular, he attempted, through statistical analyses of anthropometric material, to modify the work of H H Risley on the *Castes and Tribes of Bengal*.⁹⁰ By the time he became involved with national planning, possibly through the influence of his colleagues,⁹¹ this strand was no longer particularly important to him.

The term 'race' can be read, as used in debates on development, as a red herring; it was a term which did not properly denote the idea which it conventionally implied in European contexts at the time. More relevant was the need for national discipline, a factor agreed upon by intellectuals across political barriers. The 1920s, in the aftermath of the great war and the Montagu-Chelmsford reforms, saw a focus on a rhetoric and practice of 'nation-building'; this process of 'nation-building' was seen as necessary in advancing towards self-government. Imperialist arguments stressed the need for a period of 'nation-building' before India could qualify for self-government. Although nationalists denied the need for a period of qualification, they nonetheless believed that a greater sense of national solidarity and discipline had to be created. A number of initiatives for creating this sense of solidarity were already in existence: social service organisations, 'constructive Swadeshi' measures, religious reform movements; Indian appropriations of that specifically imperialist organisation; the Boy Scouts; paramilitary 'Hindu' outfits like the Rashtriya Swayamsevak Sangh; and the Congress' own volunteer corps. Some of these groups were explicitly Hindu, sectarian and violent;⁹² others less so, or not at all. Explicitly sectarian arguments were, however, not acceptable in a programme for national development, which was expected to carry the whole nation with it; if a sectarian argument had to be made to appear legitimate, it had to be framed within the rhetoric of economic need (as in the case of arguments for cow protection as preservation of national wealth), or national solidarity, in which a sectarian argument operated by blaming an opposing sect of itself being sectarian, and of breaking the rules of national solidarity.

Many of these movements stressed discipline, physical fitness and martial arts, the ability to use weapons, and obedience to a leader, in different combinations. This was not necessarily seen a commitment to militarism: it was a question of discipline and of mass mobilisation rather than of violence. Such mobilisation, it was felt, could bring less mainstream groups into the nationalist movement – into which category, for instance, women might be placed. In 1938, Subhas Bose wrote to a woman who told him of her desire to serve the country through a women's welfare organisation that she had set up, advising her to 'give physical training to younger

women. They have to learn lathi and dagger play, etc.' in order to defend themselves.⁹³ It was in this context – of both mobilisation and control of mass participation in politics – that Mussolini's success in Italy was interpreted – as a version of what Indian nationalists hoped to achieve with the Indian masses, and as a particularly effective form of nationalism.⁹⁴ If these trends appealed to a language of eugenics or race efficiency, it was often without a consistent or well-thought-out position. The exceptions, from Hindu fundamentalists' close engagement with Fascist and Nazi forms of mobilisation, were less concerned with the alleged 'science' of their position, and were quite distant from the debates on 'development' which could bring scientists and politically active nationalists together.

Connections, Separations

The coupling of conceptions of order, progress, reason, science, discipline, held together by a general concern with the need to escape from backwardness, is evident in debates on 'development' in India. The common assumption was a faith in directing expertise, shared among all advocates of 'development' towards 'modern' goals. 'Expertise' was strongly linked to the claims of technology, properly utilised in the service of national progress; whatever the wider parameters of 'development' might require, it was generally agreed that a necessary component of 'development' would be the technology to overcome backwardness. This is unobjectionable, even commonplace: technology for development, therefore directing expertise – an approach which the Gandhians shared, despite disagreement regarding the goals envisaged for a 'developed' society. The implicit – or sometimes more explicit – corollary was that it was the 'experts' who could judge what 'modernity' might involve. Those who won the argument, it might be added, had the trends of history on their side: industrialisation, as Visvesvaraya put it, 'connotes production, wealth, power and modernity'.⁹⁵ This was a fact: speculation about alternatives was not, then, particularly interesting. 'Modernity' itself was perhaps more abstract: but it was 'science' that had to endorse what 'modernity' was.

For many, science was interpreted as technology, and those who believed that there was more to science than technology also placed a high premium on the impor-

ance of technology in the progress of the nation.⁹⁶ It might be said, therefore, that the need for technology gave way to a heightened interest in scientific practice, which of course was in congruence with the perceived need to be 'modern' – a normative term usually related to in terms of technological or material conditions, and more specifically in terms of industrialisation; but also in terms of the need to be 'indigenous'.

But there was also a great deal of writing that picked up the language of the times rather than maintained a coherent engagement with it. The necessity of being current, up to date in a colony was especially acute so as to link up with metropolitan arguments and borrow their legitimacy. The currency of the language could for a time hide the fact that those who used it – because it could claim legitimacy as 'science' – were not necessarily highly regarded as practitioners of that 'science'. Some of this using of a current language was therefore strategic; public arguments could be more effective if they employed an already legitimate idiom, and could cite metropolitan scholarship in their support. This was especially important in a society in which arguments that were ostensibly internal arguments among Indian nationalists were to a certain extent staged before the imagined audience of the colonial ruler and before metropolitan public opinion.

This disaggregation of levels of argument regarding science and development might be considered slightly academic if the consequences for a politics of development are not touched upon, even if in a rather allusory manner. As has been pointed out, the appeal to purely 'technical' criteria was a favourite mode of argument in politics which sought not to foreground divergent political perspectives, and to insulate a particular process from close political scrutiny or interference. For instance, in the 1950s, the claim made that the Planning Commission was a body representing technical expertise and was consequently beyond politics, was indeed 'used as an instrument of politics'.⁹⁷ But it must not be forgotten that claims to technical expertise could only operate as legitimate within a consensus: the British colonial government's claims to superior technical expertise had never been accepted as valid, for instance, because the goals of colonial government were not seen as within a consensus. This is where the other three themes referred to in the introduction must be restored in order to understand the uses

of scientific argument in context. In the context of the declared goal of socialism, it could, for instance, be claimed that 'socialism' was scientific, or could be achieved given the right technical skills; or could not be achieved without the required disciplined behaviour of the Indian citizenry. Or it might be claimed that extreme or excessive forms of socialism were incompatible with disciplined national life – this latter claim was often accompanied by the claim that extreme socialism was not properly 'Indian'.

The privileging in this discourse of a professional directing elite which was to make decisions for the 'nation' as a whole is clear. But it is not enough to attribute this only to a technocratic or scientific approach. The claimed expertise went beyond merely technical matters, and sought to encompass both the moral and the material: even the Gandhians, who claimed to empower the masses, still maintained the right to decide who had reached the correct level of moral development in order to be allowed to represent themselves. One consequence of this was that the 'masses' all too often entered the picture only as the somewhat abstract ultimate beneficiary, whose interests were claimed to be represented by various socialist parties or even capitalists, in an obligatory populist rhetoric, but whose active participation was hardly envisaged, except in the limited sense of producing the required effort and sacrifices for the success of 'development'. The failure of the masses to conform to the norms of 'modernity' as defined by its leadership, either placed them beyond the pale or prompted ardent efforts to impose on them the correct modes of behaviour, efforts often not far different from the colonial-paternalist civilising mission.

How much praise or blame can 'science' take for this? Science was a prevalent language of legitimacy which nationalists could not but confront and appropriate in one way or another; and the legitimacy that scientists themselves gave to this nationalism was crucial to that appropriation. But if this was all it was, then this is not very interesting. We could use as a point of departure the fact that 'science' became increasingly important from the late 19th century in all bourgeois ideologies of domination. And that the discourse of 'progress' seems to have split in the late 19th century into two – growing pessimism regarding social progress of the 'masses' even as the 'masses' began to

grow more assertive; and on the other hand, a certain optimism regarding scientific and technological progress.⁹⁸ We could argue, then, that 'eugenics' was in large measure an attempt to impose scientific solutions, imported from the optimistic side of the split to the pessimistic, to problems of the 'masses' and their lack of capacity for 'progress'. Socialist participation in the eugenics project was substantial and committed, and much of it was not specifically 'racist', in the sense of discriminating against and attempting to breed out certain ethnic groups. The concern seems to have been more about 'bad stock' – the underclasses of the metropolitan countries themselves – perpetuating backwardness and preventing progress. Furthermore, it might be pointed out that the class origins of most socialists were bourgeois, and that most who considered themselves socialists were committed to the bourgeois order with a few adjustments.⁹⁹ If this picture might be said to apply to the metropolitan bourgeoisies, then perhaps it should not be surprising that it applies to the Indian bourgeoisie.

The Indian 'bourgeoisie' is of course a problematic construct – where exactly might one place the lines of class solidarity? The Gramscian concept of 'passive revolution' has been invoked as an explanation of the bourgeois leadership of Indian nationalism;¹⁰⁰ but it is doubtful, if we are to use Gramscian terminology, whether the Indian professional bourgeoisie – politicians, scientists, engineers or academics – who largely conducted the debates on 'development' – and on 'science' – among themselves, were the 'organic intellectuals' of the industrial bourgeoisie. If anything, many of the former were suspicious of or downright hostile to the latter, taking sides with state control or socialism. They were not 'organic intellectuals' of the working class, either, conforming more closely to what Gramsci called 'traditional intellectuals', though it is possible further to complicate matters and raise the question of where intellectuals created by colonial education to fill professions 'traditional' in the metropole might have stood in this scheme.¹⁰¹ These intellectuals, an articulate, multilingual elite, often highly educated and self-consciously cosmopolitan in outlook, dominated a good deal of the space of organised political activity, and especially the political philosophy behind it. This applied to politics of all kinds, from the 'right' to the 'left'.

And if such intellectuals ended up by legitimating what looked suspiciously like a capitalist order, it is not always to their intentions that we must look – how, indeed, might we find our way to someone else's actual intentions – but perhaps to the logic of the situations they found themselves in. A brief reprise of an example might be a good way to end: there were of course adherents of scientific or technological solutions who thought of themselves as socialists as well as scientists. Meghnad Saha counted himself as one of them. He was a firm believer in the principle that the true emancipation of Science and its use for the betterment of society was possible only under Socialism. Yet in practice he was confined to recommending solutions to limited problems arising within the framework of colonial or indigenous capitalism. At the same time, the linkages between business and science – or technology – were facilitated by intermediaries such as the former Dewan of Mysore, Sir M Visvesvaraya, who was convinced of the necessity to industrialise and less committed to questions of social organisation in terms of capitalism or socialism. These linkages worked in curious ways: in Visvesvaraya's campaign for the setting up of an automobile industry in India, one of his main allies was Meghnad Saha's journal *Science and Culture*. Visvesvaraya was also operating through the industrialist Walchand Hirachand, whose reputation as a defender of the rights of Indian shipping had won him his nationalist credentials,¹⁰² and negotiating with the government of Mysore for land and a collaborative venture on the project. Saha, whose dislike for businessmen was well known, defended the project on the grounds of the need to lift India to a higher plane of technological existence. Visvesvaraya, who had less qualms about businessmen, provided the principled assault on the government for its obstructive tactics, through his organisation, the All-India Manufacturers' Organisation, arguing that it was short-sighted and malicious of the government to refuse to grant permission to set up an industry which would, in addition to building up Indian industry, – and here he was not averse to using a loyalist argument – be so useful to the War Effort.¹⁰³ This strand was used strongly by Hirachand to justify the importance of his venture (it was somewhat ironic that through all this he never succeeded in learning to spell Visvesvaraya's name).¹⁰⁴ In practice,

under colonialism, an Indian capitalist's demand was a nationalist one; and Saha's support reflected this without explicitly using arguments that justified capitalism; via Visvesvaraya, he found himself connected to a very different project. **[P]**

Notes

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- 1 This conflation is particularly evident in Gyan Prakash, 'Science Between the Lines' in Shahid Amin and Dipesh Chakrabarty (eds), *Subaltern Studies IX* (Delhi 1996); and Gyan Prakash, *Another Reason: Science and the Imagination of Modern India* (Princeton, 1999).
- 2 See for instance Claude Alvares, *Science, Development and Violence: The Revolt Against Modernity* (Delhi 1992), in particular his analysis of the green revolution in Chapter Two, or more generally in environmentalist positions on the limitations and dangers of unfettered technology, much of which criticism is based on science itself.
- 3 Not all of past science, moreover, needs to be discussed by practitioners of science today as if it were an embarrassing grandmother – modern embryology, neuroscience or physics might be said to stand on the basis of 1930s science – there have been no major paradigm shifts here – and the generalised attack cannot claim to be based on a careful understanding of all of these fields.
- 4 Historians of science in India will probably find unexceptional the space given to scientists and spokesmen for science from Calcutta, given the importance of that city in the practice of science in India. Calcutta was strategically located in the debates on the validity of science in and for India; the debates that began in the 19th century had their successor debates in the 20th as they were incorporated into concerns with national development and eventual independence and sovereignty for India. Both the dramatis personae and the stage were often provided by Presidency College or Calcutta University's science teaching departments. See Benjamin Zachariah, Subhas Ranjan Chakraborti and Rajat Kanta Ray, 'Presidency College, Calcutta: an Unfinished History' in Mushirul Hasan (ed), *Knowledge, Power and Politics: Educational Institutions in India* (New Delhi, 1998).
- 5 *Report on Indian Constitutional Reforms* (Calcutta, 1918).
- 6 For an elaboration of this argument, see Benjamin Zachariah, 'British and Indian Ideas of 'Development': Decoding Political Conventions in the Late Colonial State', *Itinerario* 1999, 3-4.
- 7 For a more detailed mapping of these themes, see Benjamin Zachariah, 'Beyond

- Economics: Ideas of Developing India, c 1930-1950', PhD dissertation, University of Cambridge, 1999.
- 8 See Bipan Chandra, *The Rise and Growth of Economic Nationalism in India: Economic Policies of Indian National Leadership, 1880-1905* (5th edn, New Delhi, 1991; first published New Delhi, 1966), pp 76-81.
 - 9 For instance the *Modern Review* and the *Prabashi* in Bengal.
 - 10 One of the stronger advocates of 'modern' solutions to problems of Indian development was the journal *Science and Culture*, which called itself 'a monthly journal of natural and cultural sciences', published from Calcutta, and founded and edited by the physicist and socialist Meghnad Saha. Scientists subscribed to it, (see Bhatnagar to Saha, December 12, 1935, Meghnad Saha papers, Nehru Memorial Museum and Library [hereafter NML], correspondence with SS Bhatnagar); but among its supporters could be ranked other middle class intellectuals; Shyama Prasad Mookerjee wrote to Saha in 1936, "It will be a great pity if Science and Culture has to be discontinued for want of funds and Bengali enterprise. We must devise a way out of this possibility". S P Mookerjee to Saha, October 28, 1936, Meghnad Saha papers, NML, correspondence with S P Mookerjee.
 - 11 Visvesvaraya to Gandhi, November 20, 1934. This was in response to Gandhi's request to him to be one of the advisers to Gandhi's All-India Village Industries Association in matters in which he possessed 'special knowledge': Gandhi to Visvesvaraya, November 15, 1934. Visvesvaraya said that he was willing to advise the AIVIA without being officially involved with it. He objected to Gandhi's views on machinery, and said that he would send him a copy of his book *Planned Economy for India*. Gandhi's reply acknowledged that the two held 'perhaps diametrically opposite views' and that the excerpt from Stalin had no appeal for him. He nonetheless acknowledged Visvesvaraya's 'love of the country'. Gandhi to Visvesvaraya November 23, 1934. These letters are reprinted in Shakuntala Krishnamurthy, *Dr Mokshagundam Visvesvaraya*, Bangalore, 1980, pp 61-63.
 - 12 M Visvesvaraya, *Planned Economy for India*, Bangalore City, 1934, pp 260-63.
 - 13 A K Shaha, author of *Flameless Combustion Process in Industry* (in Russian) (Leningrad and Moscow, 1934); and *Lectures on Fuels and Furnaces* (in English) (Calcutta, 1944); BSc (Dacca) Aspirant (Moscow) equiv PhD. Candidate of Sciences (USSR) equiv DSc. Ex-foreign specialist invited by the Soviet government during the First and Second Five-Year Plans. Title page, A K Shaha, *India on Planning: Planning for Liquidation of Unemployment and Illiteracy*, Calcutta, 1948.
 - 14 A K Shaha, *India on Planning*, p 108.
 - 15 The main outlines of what has come to be known as 'Gandhian economic thought' are well known and easily available – a decentralised, village-based economic order which was as self-sufficient as possible, of rural small-scale agriculture, and industries which employed low technology. See the chapter on 'Gandhian Economics' in Bhabatosh Datta, *Indian Economic Thought: Twentieth Century Perspectives*, New Delhi, 1978, pp 150-58.
 - 16 *Science and Culture* IV, 10 (April 1939), editorial, pp 534-35.
 - 17 *Science and Culture* IV, 10 (April 1939), editorial, p 533.
 - 18 Asoka Mehta, 'The Victory of Socialism over Romanticism', *Congress Socialist*, February 3, 1935.
 - 19 Asoka Mehta, *Planned Economy for India?* (Bombay, 1935), a CSP pamphlet which contains the substance of his articles in the *Congress Socialist*; Mir Alam, 'India's New Deal', *Congress Socialist*, February 3, 1935, p 15, which includes a review of M Visvesvaraya's *Planned Economy for India*.
 - 20 *Science and Culture* IV, 10 (April 1939), editorial, p 535.
 - 21 The most influential of these accounts has been Partha Chatterjee, 'The Moment of Manoeuvre', *Nationalist Thought and the Colonial World: A Derivative Discourse?*, London 1986.
 - 22 Mahadev Desai, preface to MK Gandhi, *Hind Swaraj*, (revised new edition, Ahmedabad, 1939), pp ix-x.
 - 23 *Harijan*, October 27, 1933, reprinted in *The Collected Works of Mahatma Gandhi* Vol LVI, New Delhi, 1973, pp 146-48.
 - 24 See J C Kumarappa, *Why the Village Movement?* (Wardha, 1936), which ran to several editions. For an analysis of Kumarappa's arguments, see Benjamin Zachariah, 'Interpreting Gandhi: J C Kumarappa, Modernity and the East' in Tapati Guha Thakurta (ed), 'Culture' and 'Democracy': *Papers from the Cultural Studies Workshops, Vol 1*, Calcutta, 1999.
 - 25 'Bapu' to 'Ku', August 12, 1941, J C Kumarappa Papers, Nehru Memorial Library, New Delhi (hereafter JCK, NML), Subject File No 5, f 75. Emphasis mine.
 - 26 'Place of Science in the Industrial Development of India', inaugural lecture to the Science Association of Nagpur University at the Convocation Hall, by J C Kumarappa, secretary, All-India Village Industries Association', nd, pp 299-305, speeches and writings in bound volumes, Vol X, JCK, NML.
 - 27 See KT Shah (ed), *Report: National Planning Committee* (Bombay, 1949) (hereafter *NPC Report*), for members; Ravindra Chandra Ray, *Colonial Economy: Nationalists' Response* (Varanasi, 1996), p 74. See also *National Planning Committee: Power and Fuel* (Bombay, 1947); *National Planning Committee: River Training and Irrigation* (Bombay, 1947).
 - 28 Mahalanobis' official biographer describes the three as co-authors of a book on relativity: see Ashok Rudra, *Prasanta Chandra Mahalanobis: A Biography*, Delhi, 1996, p 199. This is not quite accurate: it was a book of translations of papers from the original German, the translations having been done by Saha and Bose, with Mahalanobis providing a 'historical introduction'. M N Saha and S N Bose (transl), *The Principle of Relativity: Original Papers by A. Einstein and H Minkovski. with a historical introduction by P C Mahalanobis* (Calcutta, 1920). (This is also the place to acknowledge the inadvertent factual error – reflecting the hazards of secondary sources – in my review article: Benjamin Zachariah, 'The Development of Professor Mahalanobis', *Economy and Society*, Vol 26, No 3 (August 1997), p 438, in which I cite Rudra's error. I owe the correction to former students of P C Mahalanobis in his 'avatar' as a physics teacher, who cast doubts on Mahalanobis' capacity to understand Einstein's work on relativity.)
 - 29 A C Mukhopadhyay, 'A Brief Account of PCM's Work on Meteorology and Flood Control and Irrigation', in Ashok Rudra, *Prasanta Chandra Mahalanobis: A Biography*, p 160.
 - 30 Quoted in Raghendra Chattopadhyay, 'The Idea of Planning in India, 1930-1951', unpublished PhD dissertation, Australian National University, Canberra, 1985, p 118.
 - 31 S Gopal, *Jawaharlal Nehru: A Biography*, Vol 1 (London, 1975).
 - 32 G D Overstreet and M Windmiller, *Communism in India*, Berkeley, 1959, p 156.
 - 33 Masani, *Bliss Was It in That Dawn...* (New Delhi, 1977), pp 19-36.
 - 34 *Science and Culture* IV, 5 (November 1938), editorial, p 256. Figures based on Sir M Visvesvaraya's statistics – this editorial examines Visvesvaraya's two pamphlets, *Proposals for an Automobile Factory in Bombay*, Note I and Note II (Confidential), (Bangalore, 1938); the quote above is a paraphrase of Visvesvaraya. The editorial continues, "We learn further from these pamphlets that 'Cheap Cars for All' is the latest watch-word in Nazi Germany, which is contemplating the introduction of a people's car, for the use of people with a monthly income of Rs 175/ pm...".
 - 35 The distinction between 'culture' and 'civilisation' is often unclear or blurred in non-specialised modern usage. See Raymond Williams, *Keywords: A Vocabulary of Culture and Society* (revised edition, 3rd Impression, Glasgow, 1989), pp 59-60, 90-93.
 - 36 *Science and Culture* IV, 1 (July 1938), editorial, 'The Next Twentyfive [sic] Years of Science in India', p 2
 - 37 *Science and Culture* III, 7 (January 1938), Jawaharlal Nehru's message to the Indian Science Congress', Silver Jubilee Session, p 350.
 - 38 Such views were also commonly expressed in the *Congress Socialist*. For some in the CSP, 'scientific socialist' politics implied that political practice as well as political understanding was a 'science' (although such rigid interpretations of 'socialism' were not universal).
 - 39 *Science and Culture* IV, 4, October 1938, editorial on the Wardha primary education scheme, p 200.
 - 40 Nehru to Ahmed Bashir, December 26, 1939, Jawaharlal Nehru Papers, NML, Vol 1, f 87.
 - 41 Jawaharlal Nehru, *The Discovery of India*, Calcutta, 1946, passim.
 - 42 Frantz Fanon made this argument about the tension between a (universal) metropolitan education and the inescapable particularities of 'negritude' – see Frantz Fanon, *Black Skin, White Masks*, London, 1980. The argument about tension between the Jew as a practitioner of science, claiming inclusion within the Christian/Aryan environment, and the Jew as Jew despite this claim, both excluded, and excluding himself, has also been made: see for instance Sander L Gilman, *Freud, Race and Gender*, Princeton 1993. These questions are resolved in different ways by different commentators thereon; but this is not the place for me to enter into a discussion on the relative merits of these resolutions.
 - 43 On the claims of imperialism to science, the use of apparently scientific arguments in the justification of imperialism, or the tendency

- of science to act as, and be seen as, an agent of imperialism, much has been written. For the Indian case, and on the debates surrounding the relevance and possibilities of an indigenised science, see for instance Deepak Kumar (ed), *Science and Empire: Essays in the Indian Context (1700-1947)* (Delhi, 1991); Deepak Kumar, *Science and the Raj*; Dhruv Raina and S Irfan Habib, 'Bhadralok Perceptions of Science, Technology and Cultural Nationalism', *Indian Economic and Social History Review* 32, 1 (1995); Dhruv Raina and S Irfan Habib, 'The Unfolding of an Engagement: The Dawn on Science, Technical Education and Industrialisation', *Studies in History* 9 (1), January-June 1993, p 15. See in particular Deepak Kumar's discussion of the contours of 'colonial science', *Science and the Raj*, pp 1-15.
- 44 Ashis Nandy puts it strongly: "...modern science which, though overtly universal, had come to acquire an essentially western culture over the previous three hundred years"; in a colonial society such associations 'were bound to make science a symbol of western intrusion': Ashis Nandy, *Alternative Sciences: Creativity and Authenticity in Two Indian Scientists* (Delhi, 1980; 2nd edn, Delhi, 1995), p 19. This is of course too strong a formulation, reflecting Nandy's own agreement with strongly 'culturalist' positions. (An interesting shift in meaning of the term 'culturalist' has come about over the last fifteen or so years; from being derogatorily applied to deviant Marxists to being happily accepted by defenders of essentialised 'traditions'.)
- 45 In this connection see the debates surrounding the establishment of the Hindu College in Calcutta, and subsequently of the Presidency College of Bengal, and the strong emphasis on the teaching of science therein; for the highlighting of this argument, see Zachariah, Chakraborti and Ray, 'Presidency College, Calcutta: an Unfinished History'; see especially my sections on the Hindu College and on the relevance of the teaching of science.
- 46 See Ashis Nandy, *Alternative Sciences*; Sumit Sarkar, *The Swadeshi Movement in Bengal, 1903-1908* (Calcutta, 1973); Raina and Habib, 'Bhadralok Perceptions...'; Raina and Habib, 'The Unfolding of an Engagement'.
- 47 Raina and Habib, 'Bhadralok Perceptions...', pp 106, 114.
- 48 P C Ray was an alumnus of Presidency College, Calcutta, and joined the staff of its chemistry department after returning from Edinburgh with a DSc in 1889. He established a strong tradition of research in chemistry at the college (during the period 1889-1916, 77 original research papers were published by him and his co-workers). He founded the Bengal Chemicals Swadeshi Works, which became celebrated in the period of the Swadeshi movement as an exemplar of the possibilities of Indian entrepreneurship. Prafulla Chandra Ray, *Life and Experiences of a Bengali Chemist* (Calcutta, 1932); Sumit Sarkar, *The Swadeshi Movement in Bengal 1903-1905*, pp 95, 125, 498-99; Zachariah, Chakraborti and Ray, 'Presidency College, Calcutta: an Unfinished History', p 332.
- 49 Prafulla Chandra Ray, *The History of Hindu Chemistry* (2 Vols, 1902 and 1908). The influence of P C Ray was acknowledged by S S Bhatnagar in a letter to Meghnad Saha: 'the guiding spirit invisibly working within me has been P C Ray.' He asks Saha to convey this to Ray – "I think it will please him to know that at least one amongst his chemical grand children confesses where the source of inspiration lies hidden". Bhatnagar to Saha, October 13, 1934, from university chemical laboratories, Lahore, Meghnad Saha papers, NML, correspondence with S S Bhatnagar, f 1.
- 50 Mahalanobis' own acknowledgement of this debt is cited by his biographer: Ashok Rudra, *Prasanta Chandra Mahalanobis: A Biography*, pp 127-28.
- 51 Brajendranath Seal, *The Positive Sciences of the Ancient Hindus*, London, 1915.
- 52 P C Ray, *Life and Experiences of a Bengali Chemist*, p 163.
- 53 On the subject of such discrimination see P C Ray, *Life and Experiences of a Bengali Chemist*, pp 79-82.
- 54 Cited above: *Science and Culture* IV, 10 (April 1939), p 535.
- 55 For instance, on 'romanticism' in science and its connections with 'Hinduness', David Arnold, 'A Time for Science: Past and Present in the Reconstruction of Hindu Science, 1860-1920', in Daud Ali (ed), *Invoking the Past: The Uses of History in South Asia* (Delhi, 1999); and David Arnold, *Science, Technology and Medicine in Colonial India* (Cambridge, 2000), pp 169-76.
- 56 This is, for instance, reiterated several times in Jawaharlal Nehru, *The Discovery of India*.
- 57 P C Ray, *Life and Experiences of a Bengali Chemist*, pp 361, 387-88, 392.
- 58 P C Ray, *Life and Experiences of a Bengali Chemist*, pp 140-42, 147. "Macaulay's famous minute (1835) was in no small measure responsible for the intellectual renaissance of India, however much neo-Hindu revivalists may take offense at some of the passages in it" (p 142). And (p 147) where science should have flourished as a result of the 'ferment all around', "[u]nfortunately, the Hindu intellect, lying dormant and fallow for ages, was overgrown with rank weeds and brambles".
- 59 P C Ray, *Life and Experiences of a Bengali Chemist*, vol II (Calcutta, 1935), pp 333-43.
- 60 See P C Ray, *Life and Experiences of a Bengali Chemist*, p 259.
- 61 On the 'Hinduness' of science and civilisation in India, and their decline from the time of the 'Muslim conquest', see P N Bose, *A History of Hindu Civilisation during British Rule*, Vol 2 (Calcutta, 1894), and vol 3 (Calcutta, 1896); Benoy Sarkar, *Hindu Achievements in Exact Science* (New York, 1918). Such arguments are often dismissed as 'Hindu revivalist'; although they often were, the dismissiveness is unwarranted and retards a closer understanding of why they were so – they would merit closer attention on the grounds that they were often not directly or instrumentally sectarian or anti-Muslim; and they drew strongly on conventions of metropolitan academic writing in their references to and mixing of the categories of 'Hindu' and 'Aryan' – see for instance PN Bose, *A History of Hindu Civilisation During British Rule*, Vol 1 (Calcutta, 1894), p 20; Vol 2, pp 1-5. See also below, on race and national discipline.
- 62 It is impossible to do justice to P C Ray's work in a short summary; but see for instance his critical remarks on the close links of Hindu chemistry with medicine on the one hand, and with magic on the other: P C Ray, *History of Hindu Chemistry*, Vol 1, p (v). Ray's avoidance of this formula is particularly significant in that he was close to both Benoy Sarkar and PN Bose: Bose had been his colleague at Presidency College (he was in the geology department) and Benoy Sarkar was prominent in the Swadeshi movement, of which Ray's company, Bengal Chemicals, was an inspirational institution.
- 63 P C Ray, open letter to Sir Richard Gregory, President of the British Association for the Advancement of Science, *Hindustan Standard*, November 16, 1941. The influence of Saha, who had been a major campaigner for automobiles produced in India, is apparent here. See his editorials in *Science and Culture*, particularly IV, 5 (November 1938), and throughout the war years.
- 64 Satish Chandra Dasgupta, *The Cow in India, Vol I – Breeding – Dairy Industries* (Calcutta, 1945); *The Cow in India, Vol II – The Body of the Cow – its Diseases and Treatment* (Calcutta, 1945). Both volumes were published by the Khadi Pratisthan, in May and September, 1945 respectively.
- 65 M K Gandhi, Foreword, to Satish Chandra Dasgupta, *The Cow in India*, Vol I, p (i), dated Mahabaleshwar, May 20, 1945. Gandhi added, "It will interest the reader to know that the author wrote the whole work during his recent imprisonment" in Alipur central jail, from 1942. The author added, in his own preface, that much of the book was based on his own experiences in running the jail dairy in this and in previous spells of imprisonment: Dasgupta, *The Cow in India*, Vol I, p (iii).
- 66 See P C Ray, *Life and Experiences of a Bengali Chemist* (Calcutta and London, 1932), esp pp 129-51; for the context of PC Ray's stature as a public figure, see the essays in the somewhat ironically-titled *Acharyya Ray Commemoration Volume* (Calcutta, 1932), edited by Satya Churn Law, a *festschrift* for the Acharya on the occasion of his 70th birthday, published half a year late, but certainly during his lifetime.
- 67 Dasgupta, *The Cow in India*, Vol I, p (vii). Much of Dasgupta's opposition to the Royal Commission was due to the latter's recommendation that the buffalo was a more useful agricultural animal than the cow; Dasgupta argued strenuously against that position: Chapter IV, pp 87-203. This caused Gandhi to emphasise, in his Foreword, that this argument was not intended to imply that the buffalo "should be killed or starved out", merely that it should "not be favoured at the expense of the cow". Gandhi, 'Foreword', p (i).
- 68 Dasgupta, *The Cow in India*, Vol II, part VI, pp 291-316; Gandhi, *Hind Swaraj*, in A J Parel (ed), *Gandhi: Hind Swaraj and Other Writings* (Cambridge, 1997), p 64.
- 69 Dasgupta, *The Cow in India*, Vol I, p (vii).
- 70 Dasgupta, *The Cow in India*, Vol I, p (viii).
- 71 P C Ray, *Life and Experiences of a Bengali Chemist*, p 28.
- 72 *NPC Report*, pp 207-08.
- 73 *NPC Report*, pp 148-49.
- 74 *NPC Report*, p 114. At this time, Nehru was in Europe, establishing his solidarity with anti-Fascist and socialist forces. See his regular contributions to the *National Herald* in that year.
- 75 This was the phrase used by Subhas Chandra

Bose in an interview with Rajani Palme Dutt of the CPGB in 1938. Palme Dutt asked him to comment on his view of Fascism in the light of his remarks on Fascism in his book *The Indian Struggle*. Bose replied:

My political ideas have developed further since I wrote my book three years ago. What I really meant was that we in India wanted our national freedom, and having won it, we wanted to move in the direction of Socialism. This is what I meant when I referred to "a synthesis between Communism and Fascism". Perhaps the expression was not a happy one. But I should like to point out that when I was writing the book, Fascism had not started on its imperialist expedition, and it appeared to me merely an aggressive form of nationalism.

Subhas Bose, quoted from 'Report of an interview with R Palme Dutt', published in the *Daily Worker*, London, January 24, 1938, reprinted in Sisir Kumar Bose and Sugata Bose (eds), *Netaji Collected Works, Volume 9: Congress President: Speeches, Articles and Letters, January 1938-May 1939* (Delhi, 1995), p 2. The 'imperialism' of Fascists did not prevent Bose from seeking an alliance with the Axis powers during the second world war.

- 76 On the history of eugenics and its uses in political argument from the turn of the century onwards, see GR Searle, *Eugenics and Politics in Britain 1900-1914* (Leyden, 1976); Daniel J Kevles, *In the Name of Eugenics: Genetics and the Uses of Human Heredity* (New York, 1985); Donald K Pickens, *Eugenics and the Progressives* (Nashville, Tennessee, 1968), pp 3-36, and especially pp 23-36 on Francis Galton, the man who coined the term and was regarded as the founder of eugenics; on liberal and socialist interpretations of eugenics, see Marouf Arif Hasian Jr, *The Rhetoric of Eugenics in Anglo-American Thought* (Athens, Georgia, 1996), pp 112-138. For an account of the German case, not limited to the Nazi period, see Paul Weindling, *Health, Race and German Politics between National Unification and Nazism* (Cambridge, 1989); on eugenics outside Europe and North America, see Nancy Leys Stepan, *The Hour of Eugenics: Race, Gender and Nation in Latin America* (Ithaca, 1991). On the continued respectability of eugenics in the 1930s, see Third International Conference on Eugenics, 1932, *A Decade of Progress in Eugenics* (Baltimore, 1934; reprint, New York, 1984). Progressives were well represented: one participant argued that "fundamental economic forces" were at work which were 'quite beyond the control of us as eugenicists'; that unfortunately "Galton lived too early to appreciate the principle brought out by Marx" (H J Muller, of the University of Texas, 'The Dominance of Economics over Eugenics', p 139); but nonetheless saw a role for eugenics, in 'scientific birth control' and 'the actual increase of those having the more valuable genes', to which ends economic obstacles had to be removed (p 140). He called for a 'revolutionary attitude towards women' and asked, "Do male eugenicists suffer from the illusion that most intelligent women love to be pregnant...?" (pp 140-41). The economic system, he argued, "acts to foil the true purposes of eugenics by masking the genetic constitution of individuals and of vast groups through the gross inequalities of

material and social environment which it imposes on them" (p 141). But he agreed, "That imbeciles should be sterilised is of course unquestionable" (p 138).

- 77 On Keynes' encounters with the Galton Laboratory, see the public exchanges between Keynes and Karl Pearson (1857-1936, professor of applied maths and mechanics at University College, London; in 1911, upon Galton's death, he became Galton Professor of Eugenics, which he remained until 1933: see *Dictionary of National Biography 1931-1940* (Oxford, 1949, pp 681-84) in 1910 over a study of 'the influence of parental alcoholism on the physique and ability of the offspring', reprinted in *The Collected Writings of John Maynard Keynes*, Vol XI (London, 1983), pp 186-216 – categories such as 'feeble-mindedness' and 'racial difference' in samples from Manchester and Edinburgh were hotly debated in terms of the representativeness of the sample – a debate which was given much of its heat because of its importance in connection with the claims of temperance reformers, but which was conducted in terms of the discipline of statistics. Keynes argued that the Edinburgh population in particular was of low quality, therefore biasing the study: "...the authors are comparing drunken stock with *bad* sub-normal sober stock, and find, naturally enough, that there is not much to choose between them" (p 195, emphasis in original) – or in Pearson's paraphrase of his argument, that the Edinburgh sample was from "an exceptionally "low grade" population in which "physical and moral squalor are rampant" (p 205) – therefore the differences in degeneracy between the alcoholics and non-alcoholics would not be significant. Pearson argued that the sample was quite representative. In this debate on the interpretation of figures, Keynes' absolute contempt for people from 'low districts' comes across clearly; neither Keynes nor Pearson questioned the validity of figures derived from measurements of Manchester and Edinburgh schoolchildren by an Anthropometric Committee. Keynes continued to take the categories of anthropometrics as valid, and discussed them in his *Treatise on Probability* (1921); his bibliography cites a good deal of Pearson's work: *The Collected Writings of John Maynard Keynes*, Vol VIII (London, 1973), pp 498-99.
- 78 In this connection, see Christophe Jaffrelot, 'The Idea of the Hindu Race in the Writings of Hindu Nationalist Ideologues in the 1920s and 1930s: A Concept between Two Cultures', in Peter Robb (ed), *The Concept of Race in South Asia* (Delhi, 1995); for the tendency to see caste in terms of race, and the importance of the category 'Aryan' in 19th and early 20th century British colonial ethnography – and the tendency of Indian writers to absorb these then state-of-the-art academic concerns, see Susan Bayly, 'Caste and "Race" in the Colonial Ethnography of India'; on anthropometry and its colonial uses, see Crispin Bates, 'Race, Caste and Tribe in Central India: The Early Origins of Indian Anthropometry', both in Robb (ed), *The Concept of Race in South Asia*. See also Carey Watt, 'Education for National Efficiency: Constructive Nationalism in North India, 1909-1916', *Modern Asian*

Studies 31, 2 (1997), though Watt's concern is not with the significance of this confusion in terminology. That a concern with 'Hindu' nationhood tended to exclude or alienate minorities who could not be discussed in such terms has often been pointed out before, to the extent of having replaced the old nationalist tales of triumphant mass mobilisation interrupted by 'communalism' caused by British divide-and-rule strategies in many textbooks. However, there is now a tendency to carry the argument too far in an opposite direction: namely, that all mainstream Indian nationalist ideologues leaned towards an exclusionary and consciously 'Hindu' movement, provoking necessarily separate minority, and especially Muslim, nationalisms: see Peter van der Veer, *Religious Nationalism: Hindus and Muslims in India* (Berkeley, 1994); and against this, Benjamin Zachariah's review, *Modern Asian Studies* 32, 1 (1998). Once again, those who used such arguments included some who built their solidarity around anti-Muslim sentiment, and others who sought to include Muslims and other minorities in their nationalism through various devices – the Swadeshi movement had appealed to the Muslims as brothers, using the *rakhi*-tying ceremony, usually performed by sisters on brothers, to indicate this tie. Rabindranath Tagore, who had been prominent in the Swadeshi movement, was later to realise the limitations of such strategies of creating cross-community solidarities; others were less aware of this. Gandhi was later to use a strategy of coalition of specifically religious feelings in the Non-Cooperation/Khilafat movement. See Sumit Sarkar, *The Swadeshi Movement in Bengal, 1903-1908*, pp 287, 426; *Modern India 1885-1947* (Madras, 1983), pp 196-97, 233-34.

- 79 See Norman Cohn, *Warrant for Genocide* (London, 1967), pp 110-11; see also Gandhi's remarks on the sources he read on Hinduism, MK Gandhi, *An Autobiography, or The Story of My Experiments with Truth* (2 Vols, Ahmedabad, 1927 and 1929; this edn Harmondsworth, 1982), pp 76-77. See also the Theosophical Society's journal, *The Aryan Path*.
- 80 Henry E Roseboom and Cedric Dover, 'The Eurasian Community as a Eugenic Problem', in Third International Conference on Eugenics, 1932, *A Decade of Progress in Eugenics*.
- 81 Mahalanobis, as mentioned before, was at the time only peripherally connected with the debates on Indian development planning – he offered to examine all the NPC's reports from a 'purely statistical point of view': see above.
- 82 Mahalanobis was at Presidency College from 1915 to 1948, teaching physics, with spells as acting principal, head of the department of physics, and Principal. Employed as a physics teacher, he was far more interested in conducting his statistical research, the college playing host, in a corner of the physics department, to his statistical laboratory, which was later to grow into the Indian Statistical Institute. Indian Statistical Institute, *History and Activities, 1931-1963* (Calcutta, nd), pp 1-11. His first encounter with the discipline of statistics was apparently through the journal *Biometrika* at Cambridge; on his return to India, Sir Brajendranath Seal, professor of

- philosophy at Calcutta University, asked him to work with some figures relating to Calcutta University examination results. Seal was himself acquainted with the statistical methods in use at the time, and gave Mahalanobis detailed guidelines on what to do, the latter's first encounter with actual statistical analysis. Rudra, *Prasanta Chandra Mahalanobis: A Biography*, pp 127-28.
- 83 Trunk T-2, P C Mahalanobis Archive, Indian Statistical Institute, Calcutta.
- 84 Indian Statistical Institute, *History and Activities, 1931-1963*, p 1.
- 85 Karl Pearson (1857-1936), sometime professor of applied maths and mechanics at University College, London, founded in 1901, along with Francis Galton, the journal *Biometrika*. In 1911, upon Galton's death, he became Galton Professor of Eugenics, which he remained until 1933. Pearson was a barrister, and in his early years lectured on maths and physics, philosophy and medieval languages, and talked on Lassalle and Marx at revolutionary clubs in Soho on Sundays. See *DNB 1931-1940*, pp 681-84, which, however, makes no references to Pearson's politics – for which, and for Mahalanobis' contributions to the field of population genetics, see R L Kirk, 'P C Mahalanobis and Population Genetics in India', *Samvadham: House Journal of the Indian Statistical Institute*, Vol 10, Nos 1-4 (P C Mahalanobis Memorial Volume), December 1974.
- 86 P C Mahalanobis, 'Anthropological Observations on the Anglo-Indians of Calcutta, Part I: Analysis of Male Stature', *Records of the Indian Museum*, Vol XXIII, April 1922, p 7.
- 87 Annandale clarified that he meant Eurasians, as the new terminology agreed upon by the government of India went, to avoid the derogatory connotations of the term 'Eurasian'. Annandale, Introductory Note, to Mahalanobis, 'Anthropological Observations on the Anglo-Indians of Calcutta, Part I', p 1.
- 88 Annandale's note contains an involved debate on racial categories, relative purity of blood, 'civilised and uncivilised tribes, 'recent Negro blood', 'persons of mixed blood', and so on. Annandale, Introductory Note, to Mahalanobis, 'Anthropological Observations on the Anglo-Indians of Calcutta, Part I', p 1.
- 89 Mahalanobis, 'Anthropological Observations on the Anglo-Indians of Calcutta, Part I', Appendix I: Note on Statistical Terms, p 94.
- 90 P C Mahalanobis, 'Analysis of Race Mixture in Bengal', *Journal of the Asiatic Society of Bengal* XXIII (1927), pp 301-33; P C Mahalanobis, 'Revision of Risley's Anthropometric Data relating to the Tribes and Castes of Bengal', (Abstract), *Proceedings of the Indian Science Congress (Nagpur)* 18, (1931), p 411 (a version of this paper was published in the first issue of Mahalanobis' own journal, *Sankhya*, the journal of the Indian Statistical Institute, founded in 1933; *Sankhya* 1, 1933, pp 76-105); P C Mahalanobis, 'Revision of Risley's Anthropometric Data relating to the Chittagong Hill Tribes' (Abstract), *Proceedings of the Indian Science Congress (Bangalore)*, *Anthropology Section* 19, (1932), p 424; *Sankhya* 1, 1934, pp 267-76; P C Mahalanobis, 'Analysis of Racial Likeness in Bengal Castes' (Abstract), *Proceedings of the Indian Science Congress (Calcutta)*, *Anthropology Section* 22, (1935), p 335. Risley wrote in the 1890s, and greatly annoyed many Bengalis by concluding that they were not Aryan but 'Mongolo-Dravidian'. See H H Risley, *The Tribes and Castes of Bengal: Ethnographic Glossary* (2 Vols, Calcutta, 1891); H H Risley, *The Tribes and Castes of Bengal: Anthropometric Data* (2 Vols, Calcutta, 1891). Mahalanobis himself took a moderate line, arguing that 'social barriers and caste restrictions' had not succeeded in suppressing intermingling of the 'indigenous stock in Bengal with the north-east tribes and the aboriginal tribes from Chota Nagpur; as a consequence 'a larger Hindu Samaj has evolved which is not only not identical with the traditional society of Vedic or classic times but is in many respects even antagonistic. Sectarian obstacles have not proved insurmountable...'. Mahalanobis, 'Analysis of Race Mixture in Bengal', pp 322-23. He nonetheless seems to have accepted the idea of a racially pure 'traditional' Vedic society, which raises uncomfortable questions about his own views on caste.
- 91 The only article on industry he wrote before the Planning Commission papers was one for Meghnad Saha's new journal, *Science and Culture*: P C Mahalanobis, 'Application of Statistical Methods in Industry', *Science and Culture* 1 (1935), pp 73-78.
- 92 For instance the RSS: see WK Andersen and SD Damle, *The Brotherhood in Saffron: the Rashtriya Swayamsevak Sangh and Hindu Revivalism* (Boulder, Colorado, 1987).
- 93 Subhas Bose to Amita Purkayastha, September 3, 1938, reprinted in Sisir Kumar Bose and Sugata Bose (eds), *Netaji Collected Works, Volume 9*, p 271. Translated from Bengali.
- 94 Several articles in the *Modern Review* in the 1920s, for instance by Benoy Sarkar, express this fascination. Acharya P C Ray, a professed Gandhian, quoted Mussolini, P C Ray, *The Life and Experiences of a Bengali Chemist*, p 259. Rabindranath Tagore accepted an invitation from Mussolini to visit Italy in 1926, with P C Mahalanobis and his wife joining him as travel companions. (Mahalanobis moved on to London and from January 1927 spent some months at Karl Pearson's laboratory). Rudra, *Prasanta Chandra Mahalanobis: A Biography*, p 106.
- 95 Visvesvaraya, *Planned Economy for India*, p 220.
- 96 Although the importance of technology was strongly argued by *Science and Culture* – as well as by Visvesvaraya in all his speeches and writings (see also Visvesvaraya Papers, NML, Microfilm) – there was also a sense that the connection between science and technology or industrial research could be pushed to extreme lengths. In 1940 Meghnad Saha wrote to his fellow scientist S S Bhatnagar, in connection with the proposed scientific and industrial research board to be set up by the government, that though such a board was necessary and in fact long overdue, it was necessary to make a distinction between scientific research and industrial research to avoid disappointing the public or inviting government accusations of making money. He cited the experience of the Indian Institute of Science, Bangalore, as an example, stated that many industries that needed setting up, needed protection, not research, and added, "I, as a scientific man [sic], do not wish to take upon myself the responsibility for which I am not fitted. Let it be thrown on the political and industrial leaders". Saha to Bhatnagar, March 29, 1940, Meghnad Saha papers, NML, correspondence with S S Bhatnagar, ff 7. Saha made the same point in writing to the government: Saha to Ramaswami Mudaliar, March 20, 1940, Meghnad Saha papers, NML, correspondence with Ramaswami Mudaliar, ff 7-11.
- 97 Partha Chatterjee, *The Nation and its Fragments: Colonial and Postcolonial Histories* (Princeton, 1993), p 205.
- 98 See for instance Eric Hobsbawm, *The Age of Capital* (London, 1975); *The Age of Empire* (London, 1987).
- 99 See for instance the exchange between Keynes and Pearson, cited above.
- 100 Partha Chatterjee, *Nationalist Thought and the Colonial World: A Derivative Discourse?* (London, 1986); Raghavendra Chattopadhyay, 'The Idea of Planning in India'; Partha Chatterjee, *The Nation and its Fragments: Colonial and Postcolonial Histories* (Princeton, 1994); and others, after Antonio Gramsci, 'Notes on Italian History', *Selections from the Prison Notebooks* (London, 1971).
- 101 For a discussion of intellectuals and their social role, see Antonio Gramsci, *Selections from the Prison Notebooks*, pp 5-18. The Gramscian debate is concerned with who leads the revolution, passive or otherwise, or movement of emancipation otherwise defined; the leadership question itself, as far as India is concerned, has been somewhat diverted by the debate over whether businessmen benefitted from the post-independence order of things, despite the claims to socialism of nationalist politicians, or not. But leadership of the nationalist movement was provided by the 'traditional intellectuals' – who have been influentially described in the Indian context as a separate class by Pranab Bardhan, *The Political Economy of Development in India* (Oxford, 1984).
- 102 Amiya Kumar Bagchi, *Private Investment in India, 1900-1939* (Cambridge, 1972), pp 210-11, 350-51. In this campaign, he had also used the historian Radha Kumud Mookerji as an intellectual ally – Mookerji's *History of Indian Shipping* justified Hirachand's position by referring to India's glorious past of shipping and maritime commerce – in which the technological achievements of Indian shipbuilders were highlighted. See Radha Kumud Mookerji, *A History of Indian Shipping and Maritime Activity from the Earliest Times* (London, 1912).
- 103 M Visvesvaraya Papers, NML, Microfilm; Visvesvaraya, *Reconstruction in Post-War India*, pp 10-15; M Visvesvaraya, *Indian Automobile Factory Scheme: Government of India's Obstructive Attitude* (Bombay, 1942), All-India Manufacturers' Organisation pamphlet, copy in Walchand Hirachand Archive, NML, File 563, ff 10-60; M Visvesvaraya's address to the AIMO, reported in the *Hindustan Standard*, January 15, 1942; news item, 'Visvesvaraya Exposes India Govt's Tactics', *Bombay Chronicle*, July 17, 1942.
- 104 He referred to the scheme as 'Sir Vishveshva Aiyas' Motor Mfg Scheme'. Letter to Lalchand Hirachand, July 9, 1939, Walchand Hirachand Archives, File No 552 Part I, Vol II, f 265, NML.