

FOUR CALCUTTANS IN DEFENCE OF SCIENTIFIC TEMPER*

DEBIPRASAD CHATTOPADHYAY
Guest Scientist, NISTADS, New Delhi.

The main focus of the paper is on the contributions of P.C. Ray, which is adequately understood by taking note of (a) what he inherited from his predecessors like Rammohan Roy, Iswara Chandra Vidyasagar and Akshaya Kumar Datta, and (b) how he inspired some of his notable students of the Presidency College, specially Meghnad Saha and Satyendranath Bose.

I

That science-consciousness, often also called the scientific temper, is inconceivable without science is, of course, obvious. What requires to be noted, however, is that one could as well be a vigorous champion of science without himself being a scientist. Perhaps the most prominent example of this is Francis Bacon, generally accepted as the prophet of modern science. No notable contribution to any branch of positive science was made by him. He even showed the failure to understand the profound significance of a scientific discovery, as is evident from his often mentioned resistance to the discovery of Copernicus. Still he was among the bravest to defend the real importance of science not only for the advancement of learning but also for the progress of humanity.

I have purposely mentioned Francis Bacon at the very beginning. In this paper I am going to discuss mainly four eminent defenders of the scientific temper of which the history of Calcutta is reasonably proud, though out of these four only three were themselves working scientists, viz. Acharya Prafulla Chandra Ray, Meghnad Saha and Satyendranath Bose. But the first two have defended the scientific temper no less vigorously than any one, himself belonged outside the circle of working scientists and was without any notable scientific achievement to his credit. Still, without his vigorous defence of the spirit of science it is not easy to conceive its soil being prepared in India. He was Akshaya Kumar Datta (1820-1886) whose struggle in defence of science was so relentless as to make him reckless of any consideration for career and even the very question of his basic livelihood. Incidentally, our mention of Francis Bacon at the very beginning of this paper is not really irrelevant for understanding this science-intoxicated man of Calcutta. In the preface of one of his books, Datta declared that what India needed was a Francis Bacon.

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As contrasted with Bacon, however, Datta's enthusiasm for natural science ultimately led him to become a stark atheist going to the extent of disproving the efficacy of prayer with an ingenious argument, which, howsoever naive it may appear to us, presumably had an impact on the consciousness of the vast majority of Indian people that was denied the facilities of basic education for generations. The equation runs as follows:

Labour + Prayer = Crops

Labour – Prayer = Crops

Prayer = 0

“This equation”, it is observed, “spread like prairie fire among the youth and was used as an intellectual slogan by rationalists after Dutt.” (A.K. Bhattacharya in *Rationalist Annual*, 1962, p. 27). It is, therefore, interesting to note that Datta began his career as an ardent follower of the Adi Brahma Samaj, the form of reformed Hinduisms initiated by Rammohan Roy. Because of his literary talent, Datta was selected by Devendranath Tagore to edit the journal called *Tattvabodhini Patrika*, in 1843 which was intended to be the organ of the Brahma Samaj. But Devendranath, himself a devout theist, eventually found that the fascination for natural science was drifting Datta to a different line of thought altogether. In 1850, Datta, much in the spirit of Bacon, observed: “This overt and visible world as cosmos is the greatest and best book – it is the scripture written by the supreme being himself”. A.K. Bhattacharya to whom we owe a brief but brilliant study of Akshaya Kumar Datta observes that for Datta, “to study of mind of God, therefore, one has only to turn to physics and natural sciences. All existing scriptures were “imaginary”. (ibid., p. 25). This naturally led to a growing rupture between Datta and Devendranath Tagore. As the latter observed, “where was I and where was he! I was searching for the relationship between God and myself and he was searching for that between external objects and human nature. There was a sea of difference” (*Sahitya Sadhaka-Caritamala*, Vol. 12, p. 20). So, Datta proved himself unfit for the editorial work of the journal and had apparently to face extreme hardship until Iswar Chandra Vidyasagar, the fabulous rationalist of the age, came to his rescue and offered him the headmastership of the newly founded Normal School. On receiving this offer, Datta is reported to have observed, “This at last may save me”.

II

Such in brief is the story of one of the greatest pioneers defending the scientific temper. During his lifetime, an eminent working scientist was born to continue the tradition, though on a much higher level. He was Prafulla Chandra Ray (1861-1944)*. Indeed many aspect of his activities in introducing modern science to India are rather

* This paper does not discuss several other eminent Calcuttans who bolstered scientific temper before Ray, e.g. Mahendralal Sircar, father Eugene Lafont, Co-founders of the Indian Association for Cultivation of Science, Pramatha Nath Bose etc – Editor, IJHS.

well known. Under the most adverse circumstances and against the resistance of the colonial policy of the British rule, he succeeded in setting up the first full-fledged chemical laboratory in Calcutta in the University College of Science. Realising the importance of science being actually applied to industry, he worked for building up the first chemical workshop, starting with the savings of his personal paltry salary, which, thanks to the support he received from some of his close Indian friends eventually flourished as the Bengal Chemical and Pharmaceutical Works Ltd. The list of students he trained up would be a long one and among them we shall presently mention specially two whose international reputation is well known.

Among the varied activities of this multi-dimensional personality, what we want to focus on however, is, one point: Realising the importance of proving that natural science is not an essentially European phenomenon and hence foreign to our national tradition – he was the first working scientist to dig up from out past the glorious achievements India once had in contributing to the stream of global science. This led him to write the monumental work, *History of Hindu Chemistry*, the first volume of which was published in 1902 and the second in 1908.

Before proceeding to discuss what we are inclined to emphasise as the most important feature of the work, it is necessary to be clear about one point. The word ‘Hindu’ was used by him in the wider sense of ‘the Indian’ as it somehow became the practice of his time.

A brief chapter in his book bears the title ‘Knowledge of Technical Arts and Decline of Scientific Spirit’, a theme which none before him felt in need of discussing notwithstanding the fact that there is much for the historian of science in India to-day to learn from it.

The first point to be noted about his discussion is that he wanted to see the real cause of the decline of scientific spirit in India, not *within* the general framework of science itself, but *outside* it; i.e., mainly in the social conditions that developed in this country. The main cause of the decline of the scientific spirit in India was, he argued, the entrenchment of caste society, with its disastrous degradation of the social status of the technicians, craftsmen and other manual workers. As he puts it.

“The drift of Manu and of the later Puranas is in the direction of glorifying the priestly class, which set up most arrogant and outrageous pretensions. According to Susruta, the dissection of dead bodies is a *sine qua non* to the student of surgery and this high authority lays particular stress on knowledge gained from experiment and observation. But Manu would have none of it. The very touch of a corpse, according to Manu, is enough to bring contamination to the sacred person of Brahmin. Thus, we find that shortly after the time of Vagbhata, the handling of a lancet was discouraged and Anatomy and Surgery fell into disuse and became to all intents and purposes lost sciences to the Hindus. It was considered equally undignified to sweat away at the forge like a Cyclops. Hence, the cultivation of the *kalās* by the more refined classes of the society of which we get such vivid pictures in the ancient Sanskrit literature has survived only in traditions since a very long time past.

“The arts being thus relegated to the low castes and the professions made hereditary, a certain degree of fineness, delicacy and deftness in manipulation was no doubt secured but this was done at a terrible cost. The intellectual portion of the community being thus withdrawn from active participation in the arts, the how and why of phenomena – the coordination of cause and effect – were lost sight of – the spirit of enquiry gradually died out among a nation naturally prone to speculation and metaphysical subtleties and India for once bade adieu to experimental and inductive sciences. Her soil was rendered morally unfit for the birth of a Boyle, a Des Cartes or a Newton and her very name was all but expunged from the map of the scientific world.

“In this land of intellectual torpor and stagnation the artisan classes, left very much to themselves and guided solely by their mother wit and sound commonsense, which is their only heritage in this world, have kept up the old traditions. In their own way they display marvellous skill in damascening, making ornamental designs on metals, carving on ivory, enamelling, weaving, dyeing, lace-making, goldsmith’s and jeweller’s works, etc”.

There was nothing new of course about censoring the evils of the caste system which many a social reformer did both before and after P.C. Ray. What is most striking about Ray, however, is that he saw in the caste structure of society something that condemned science as a prey to creeping paralysis. This caste-society, with its ruinous separation of manual work from mental work and the consequent condemnation of the former, made the emergence of significant scientists virtually impossible, for the manual workers alone possessed the tools and apparatus of interrogating nature without which the “how” and “why” of phenomena cannot be known. Ray emphasised this point decades before E. Zilsel’s famous paper on the Genesis of the Concept of Physical Laws (1942), Farrington’s *Greek Science* (1944) and Bernal’s *Science in History* (1954) — works that gave a new turn to the historiography of science basically in the same lines. Incidentally, it must have been remarkable of Ray that long before these scientists — particularly Farrington — drew our attention to the development of slavery as having the most adverse consequence for Greek Science, Ray highlighted the point in his own way.

If Ray was the first working scientist in India to have rejected the “internalist hypothesis” by looking at the cause of the decline of the scientific spirit of India not *within* science but *outside* it, he was also aware of the ideological and philosophical factors that worked as co-respondents to the decay of scientific temper in Indian history. Thus, he could see that the philosophy of atomism associated in the popular mind with the name of Kaṇāda had significant science potential which was sought to be demolished by the world-denying metaphysics of *māyāvāda*, generally known as Samkara’s Vedanta. It is indeed amazing for us to note how Ray, who was physically so frail and weak, had the stupendous guts for looking back at Samkara as standing condemned for destroying the spirit of science in our country.

“The Vedanta philosophy, as modified and expanded by Sakara, which teaches the unreality of the material world, is also to a large extent responsible for bringing the study of physical science into disrepute. Samkara is unsparing in his strictures on Kaṇāda and his system. One or two extracts from Samkara’s commentary on the

Vedanta Sutras, will make the point clear: (Observed Samkara) ‘It thus appears that the atomic doctrine is supported by very weak arguments only, is opposed to those scriptural passages which declare the Lord to be the general cause, and is not accepted by any of the authorities taking their stand on scripture, such as Manu and others. Hence it is to be altogether disregarded by highminded men who have a regard for their own spiritual welfare’. (Again) ‘The reasons on account of which the doctrine of the Vaisesikas cannot be accepted have been stated above. That doctrine may be called semi-destructive (or semi-nihilistic)’.

Here is Ray sums up his main points:

“Among a people ridden by caste and hide-bound by the authorities and injunctions of the Vedas, Puranas, and Smritis and having their intellect thus cramped and paralysed, no Boyle could arise to lay down sound principles for guidance”.

III

In Calcutta, the uncompromising defence of the scientific temper was taken up by Meghnad Saha and Satyendranath Bose whom P.C. Ray refers to as his “talented students of the Presidency College”, though among them the former had to enter for the purpose into a long-drawn polemics with the champions of Hindu orthodoxy. It seems to be a misfortune for readers outside Bengal that the robust defence of the scientific temper by these two giants in the scientific world still remains untranslated from Bengali in which they originally expressed themselves. We have the scope here to put their points in brief summary form.

M.N. Saha carried forward not only Ray’s defence of science as a value in itself but also the superb insight of Ray into the relation is science and society. For this, Saha had to confront literally a barrage of attack from the champions of Vedic orthodoxy. He was accused of showing only a slavish mentality in defending modern science flourishing in Europe, overlooking the fact that everything worthwhile in modern science is already to be found in the Veda-centric culture of ancient India, which in many ways was alleged to have been far ahead of modern “European” science, for example, in developing the caste system which was supposed to impart a kind of stability to society, and hence enabled the Indians to evade the social turmoil of capitalist Europe. Saha had to waste much of his valuable time to clean up such rubbish. We do not unfortunately have the scope here to quote the whole of it. We shall mention only a few of his points.

A point of exceeding importance raised and briefly discussed by Saha is that the champions of Veda-centric or Aryan culture somehow feel obliged to suppress or bypass the recent archaeological work, which proves that the Vedic people – apart from their literary work that often proves highly obscure for us today – left practically nothing worth mentioning as material achievements, there developed already at least a millennium before their coming to India an imposing civilization in the Indus Valley

which — at least according to a section of serious archaeologists was finally destroyed by the invading Aryans. There are controversies, of course, about the decline and final destruction of the Indus Valley Civilization. Without entering into these, Saha raises a simple but significant question: Why do his opponents — the champions of the Āryāvarta culture — prefer to remain silent about this glorious past of Indian civilization? Is it simply because of the fact that the makers of the Indus Valley Civilization were pre-Aryan and pre-Vedic? It is understandable that P.C. Ray in his *History of Hindu Chemistry* did not raise this question, because the Indus Valley Civilization was discovered after its publication. But it is worth mentioning that outside the archaeologists, M.N. Saha is about the only notable scientist who, already in 1939, found it worthwhile to write a longish article in *Science and Culture* on “The Indus Valley 5000 years Ago”.

No less important is Saha’s observation on the causes that inhibited the development of modern science in India — an observation in which he carries forward the view already expressed by P.C. Ray. We quote him, though inevitably missing much of the force of his argument in our rough English rendering. Refuting the alleged benefits of the caste system, Saha observes:

“But I have looked at the matter from a different angle. In my view the caste system has completely snapped the connecting link between the hand and the brain, and this is why the material culture of India is lagging far behind that of Europe and America. One who belongs to the intelligentsia is perpetually busy with bookish knowledge, commentaries, glosses and grammatical debates; the ideal for the medieval Indian scholars was to create awe among the people with the extent of their learning. They had little connection with real life. They never cared for the development of industry and commerce, which perhaps carried the risk of being degraded in caste hierarchy”. By contrast, adds Saha, Hargreaves was an illiterate labourer, Arkwright a pennybarber, Cartwright a village clergy, James Watt was a smith running a repairing shop — it was because he came in contact with Professor Black of Glasgow University that he was able to invent steam engine.

As against all this, his orthodox critic — hitting as it were below the belt — argued that neither Meghnad Saha nor Rabindranath Tagore is a craftsman; will then the social status of a skilled shoemaker or weaver be higher than them? Saha’s answer to this is a bitter one. What he is arguing is a different point altogether. “Why”, he asks, “should be the social prestige of an illiterate priest — who, without really knowing the meaning of the Sanskrit verses, makes other mutter these during the marriage or Śrāddha ritual — be higher than a weaver or shoemaker? After all, the weaver or the shoe-maker serves the society with his labour; but what else can you possibly say about the illiterate priest than a social cheat?”

Saha’s passionate defence of manual work and his emphasis on the need of the unity of head and hand as an essential precondition for scientific development cannot but be reminiscent of the teachings of P.C. Ray — so also in a sense, his way of looking

back at the Indian philosophical tradition and its impact on science. Thus, for example, when Ray argued that the overwhelming influence of Samkara's Vedanta, with its attempted suppression of the atomic hypothesis, had only an inhibitory influence on the scientific activities in India, Saha wants us not to forget the fact that this Vedic philosophy had not been the only one in the general fund of Indian philosophical thought, evidently implying that the genuine national sentiment may as well look to other directions in philosophy that could better cater to the requirements of our national development, the focal point of which in Saha's view is of course the development of modern science and technology. Addressing his orthodox critic who insists on the exclusive glory of the Vedas, Saha asks: "Is he not aware of the fact that both Buddhism and Jainism, which ushered in the most glorious periods of Indian civilization have completely rejected the Vedas as but a bundle of errors? Is he not aware of the fact that, according to the Lokayata view, 'These makers of the Vedas are but cunning cheats and thieves?' All this means that sometimes before Christ, there was a group of rationalists who could realise that it was extremely difficult to comprehend the actual meaning of the Vedas; only a few hypocrites propagate erroneous views with the alleged sanction of the Vedas. So to seek the roots of Hindu religion and philosophy only in the Vedas is about ninety per cent erroneous and it is this error that makes the essay of the critic full of mistakes".

IV

A famous speech delivered by Satyendranath Bose in 1961 in the Science College later published with the title "A Scientist's Apologia", is not widely known. The occasion on which the speech was delivered was the centenary celebration of Rabindranath Tagore. The guest-in-chief of the meeting, the then Vice-Chancellor of the Calcutta University, tried to show that in Tagore's thought natural science had at best a secondary significance, the main emphasis having been on the so-called spiritual wisdom of our ancient sages. The Vice-chancellor went to the extent of suggesting that the lopsided emphasis on modern natural science was perhaps carrying the country to a perverse direction. As the president of the meeting and as representing the scientific community, said Satyendranath Bose, he felt obliged to say something in defence of modern natural science, particularly because, as he added, the scepticism about science was infecting the minds of many a leader of the country. We have the scope here to give only an outline of his arguments and that too in rough English rendering.

In our country, observed Bose, are advanced quite a lot of philosophical theories. He wondered about the exact philosophical theory to which the Vice-Chancellor himself subscribed. But he could not resist very politely asking whether the Vice-chancellor simply believed in God or there was also Satan peeping behind his image of God.

And Bose continued, "We are told no doubt of the life of many a great sage of our country. We are told further of the great renunciation – sarcastically described as renunciation – going to the extent of sacrificing their own minds. But could it be that such an existence is willed by the Lord god? To reach the question to Him, however,

we have to seek the aid of the philosophers, for we, the scientists are absolutely blind on this point, without the possibility of ever directly meeting God.

What the scientists are aware of is the simple fact of man making his progress as an expression of the evolutionary process. The scientists are convinced that civilization is accordingly making progress. Therefore the human chariot will not move forward impelled by sheer imagination. Human progress can be registered only by establishing it on the knowledge gained from the power extracted from nature. As a result he cannot cling to philosophical speculation alone.

By contrast, if we think on the strength of sheer philosophical speculation that as human beings we are capable of some kind of unified existence devoid of envy and hatred throughout our lives, all this will amount to empty talk. For thousands of years this is being testified by history. There is nothing new in all that is said by our Chief Guest about archaeology. We feel proud to talk about our own heritage. The poet D.L. Ray once said to the colonial rulers: 'Beat us a lot with your stick, but, for God's sake, however, read our *Gita* at least once'. At the same time one feels like saying that even in the country where such a philosophy fully flourished, there had been no period without violence, hatred and clashes. It is true that the purer of our philosophers know how effectively to wriggle out of such an argument. One is tempted to recapitulate a story here. The sage Vasistha always preached that *brahman* alone was true and the world false. The king arranged to chase him with an elephant. Vasistha started running away even without having time to have the holy knot of his hair tied. The king then asked him, 'What is this, O great sage? Where are you running to? All this is fancy after all!? The sage answered, 'The fact of my running too is equally fanciful.' In the present meeting we can go on indulging in such debates over the nature of truth and falsehood, but it is impossible to explain away as mere *māyā* the colossal poverty and ignorance so palpable in our country. Such a differentiation between sheer imagination and crass facts will persist at least as long as human beings exist on earth. As long as man exists, he will have to try to stamp out all these things from real life. He will have to strive for the making of a society that can be completely free from all these. What is necessary for the purpose is knowledge as well as power of imagination. The scientist today can assert that had the world been ruled by mere philosophers (as it is sometimes alleged that such was the state in India), even then the world would not perhaps be free from hatred and violence. There would have been no cultivation of science and hence no invention of the atom bomb. Yet the point is that the ordinary weapons would have remained current and these could have been as cruel and destructive. What is lamentable, however, is that those who are at the helm of things are not scientists. They are sometimes religious leaders, sometimes national chauvinists. They often believe that their own nation is created for a specific purpose and their duty is to make the roller move on the face of the earth, smashing everybody else and thus drive the car of civilization. 'I am personally aware of the fact (though I do not know whether all of you are aware of it or not) that the dictator Hitler was an intently religious person though we all accuse him of being responsible for the Second World War and would have hanged him for his crime (though prevented from it because he

committed suicide). A survey of his life shows that he never touched any non-vegetarian food and many other things like that. From the books on which we depend for our (ordinary) judgement, we may have the illusion that a religious man works for human welfare. So many things have since happened affecting the fate of Germany. What I feel like asserting to-day is only this that if ever this ruined nation can re-assert itself it will be only on the strength of science.... It is the firm conviction of the scientist that the cultivation of religion alone can yield no result... Admitting the possibility of explaining away everything as non-existent on the strength of sheer imagination, even then hundreds of people – thousands and millions of them – will be left there with faces darkened by sorrow, constantly threatened by all sorts of danger and those who are not aware how to make four handfals of rice grow on the soil that normally yields two handfals, knowledge in a “limited” sense will come to their rescue. Such knowledge may not give him a full picture of the creator of the Universe but it is on the strength of such *limited* knowledge that human being is emancipated from horrors so varied.”

From Akshaya Kumar Datta to Satyendranath Bose we see a courageous defence of the true message of science.