MAHATMA GANDHI AND THE WORKING SCIENTIST: A RECONCILIATION*

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IMAGINE a scientist who is a follower of Mahatma Gandhi. What kind of science can he practice? Would it be different from the kind of science that is being practised? I believe it would be and will illustrate this by constructing Mahatma Gandhi's view on science and scientific research based on his writings on related subjects. To me this implies that science is affected by the scientist's subjective values. I will then trace some of the values behind science as practised today and examine their implications for the relationship between the scientist and the society. I will also present a case for abandoning the belief that science must be universal and show the relevance of Gandhian concepts to scientists.

Obviously the kind of scientific work that a 'Gandhian' can do is that which is consistent with Gandhian principles. Gandhiji has written very little directly on science and hence 'we' have to put together 'his' view of science from his writings on Khadi, machinery, modern civilization, etc. Let us take a few samples of such writings. "Scientific knowledge requires constant probing into the why and wherefore of every little process that you perform. A scientific mind will not be satisfied with having things scientific just on faith..... He will insist on finding a basis in reason. Faith becomes lame when it ventures into matters pertaining to reason. Its field begins where reason's ends. Conclusions based on faith are unshakeable whereas those based on reason are liable to be unstable and vulnerable to superior logic. To state the limitation of science is not to belittle it. We cannot do without either — each has its own place. Finally, a scientific mind must have detachment or else it will land itself in the lunatic asylum", and "A science to be science must afford the fullest scope for satisfying the hunger of body, mind and soul[1]". In a discussion involving Prof. C. V. Raman, one gets the impression that Gandhiji approves, especially the last statement, when the former remarks that "Science is nothing but a search of truth. ..... salvation lies in the instinct to sacrifice ..... for the sake of the species[2]".

The above view of science is similar in some respects to that usually held by scientists, but is also different from it in a crucial way. Gandhiji writes that the word Truth is derived from 'Sat' or that which exists. It is from this meaning that he derives that Truth is God[2]. Such a Truth is Absolute Truth. Search for the Absolute Truth is the sole aim of life. Certain minimal material conditions must be met by the 'body' before the 'soul' can engage in its search for the Truth. Gandhiji would consider work aimed at creation of such conditions for all as the content of natural sciences. Thus for Gandhiji, natural scientific knowledge would be practical knowledge and would be concerned with such things as agriculture, medical aid and health. Therefore Gandhiji would make little distinction between science and technology and view that motivation for scientific activity should come from one purpose: human welfare. This view is reflected very clearly when he states: "I would prize every invention of Science made for the benefit of all[3]" or "Take the case of Singer's Sewing Machine. It is one of the few useful things ever invented, and there is romance about the device itself[4]".

I will now attempt to substantiate the Gandhian view of science I present. In the article entitled "Scientific Mind and Khadi" he writes "Why should the spindle be made of iron, not brass? Should it be thick or thin?[1]". He sets out the tasks of "Khadi Science" as follows: "A

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number of processes relating to the production of khadi are in vogue... And yet a complete and detailed knowledge of all these different processes is necessary before the science can be developed.... A scientific study of carding would of course include a knowledge of the construction of the carding bow..." etc[1]. These indicate clearly his view that science and technology are indistinguishable. The same spirit shows up when he expects a Khadi worker with a scientific mind to ask himself "Why charkha, why not the spinning mill?" His concept of human welfare being the aim of science makes him expect the scientific khadi worker to arrive at the following answer to the above question: "every body cannot own a spinning mill. If people depend on spinning mills for their clothing, whoever controls the spinning mill will control them and there will be an end to individual liberty[1]". Consider another example from his writings on machinery. "An improved plough is a good thing. But if by some chance one man could plough up, by some mechanical invention of his, the whole of the land of India and control all the agricultural produce, and if the millions have no other occupation, they would become dunces, as many have already become..... I would welcome every improvement in the cottage machine, but I know that it is criminal to displace the hand labour by the introduction of power-driven spindles unless one is at the same time ready to give millions of farmers some other occupation in their homes[1]". It is relevant to add here that Gandhiji is not against machinery *per se*, but is only against that kind of machinery that violates human sustenance and his concepts of human welfare. Thus it is possible that he would oppose a kind of machinery in one place and not in another. There are no 'universal' judgements involved.

To sharpen the above view of scientific activity, and that of human welfare, we have to focus on other relevant Gandhian principles. Thus human welfare consists of developing an attitude of Ahimsa. Human welfare lies in believing that "we must work for our bread", that we must "eat our bread by the sweat of our brow[3]", and, that true civilization consists of setting "a limit to our indulgence", dissuading ourselves from "luxuries and pleasures" and realising that "real happiness and health consisted in a proper use of our hands and feet[4]". The last but a very important aspect would be "Swadeshi" which he defined as follows. "A votary of swadeshi will as a first duty dedicate himself to the service of his immediate neighbours" and "a man who allows himself to be lured by the distant scene and runs to the ends of earth for service, is not only foiled in his ambition but fails in his duty towards his neighbours[1]".

Based on the above, the following might be Gandhiji's view of good scientific work. A scientist shall be motivated in his work by its usefulness, especially to the needy and to his immediate surroundings. He shall be the sole judge of his work. In assessing his work he will be "truthful in speech, in thought and in action" and not "reduce the standard of truth even by a hair's breadth".

Now consider a few consequences of the above view. I believe that a follower of Gandhiji cannot work on something simply because it is interesting or to explore the 'secrets of nature'. Scientific work must provide employment especially to the poor since they also must live by the sweat of their brow. Science that eliminates employment without guaranteeing substitute work is bad. Technical work that alleviates drudgery, like inventing the sewing machine, would be first rate. Work that goes toward fulfilling the basic needs of all would be valued highly while that which goes towards fuelling and satisfying luxuries would be considered third rate. By the same consideration ecological work, especially if it is aimed at understanding what is meant by the phrase "harmony with nature", will be prized*. War research is prohibited. Vivisection would violate the principle of 'Ahimsa' and a medical scientist cannot use this method in carrying out his work[4] and genetic engineering would be

*An amusing anecdote. Prof. C. V. Raman introduced Prof. Rahm to Gandhiji with the words that Rahm's work concerned an insect that lived without food and water for twelve years. Gandhiji promptly requested the scientist to pass on the secret of the insect when he discovers it[2]!

considered on par with vivisection. Working on a cure for leprosy so prevalent in India would gain priority over finding remedies for other dreadful diseases prevalent elsewhere. The basis of an appreciative relationship between Gandhiji and Prof. P. C. Ray, I think, lies in the implicit presence of such guidelines in the latter's work[5,6]. The work of Satish Chandra Das Gupta[7], a chemist and a chemical engineer who joined the Constructive Programme launched by Gandhiji, illustrates the validity of such guidelines to a Gandhian scientist.

Contrast this with today's opinions. A working scientist today would probably feel that the motivation for his work comes from curiosity and interest, and, his duty is to search for new knowledge uninhibitedly. Despite the close links between science and technology, most scientists would feel, with some justification, that a large concern with 'usefulness' would not have allowed investigators to arrive at such sweeping generalizations as the Newton's laws. Thus he is also likely to feel that science and technology are two different activities. Therefore, one can see that the whole structure and concerns of science and technology and its relation to society will be very different from what it is today if Gandhian Science was practised.

I do not claim the above analysis of Gandhian science and technology to be thorough. There are opinions contradictory to what I have said, especially regarding scientific activity as being a search for truth[8], and it would be interesting to examine this question in greater depth. However for the purposes of this article it is sufficient to show that a scientist's world view does affect his work.

Now it is more interesting to ask the converse question regarding the currently practised science and technology: What is the world view behind the scientific activity? What is it that allows a scientist to investigate any subject that is of interest to him without any restrictions? What is it that sanctions his unconcern for the usefulness or even disastrous nature of his work?

Without going into details, I will offer the following answer. Around the time of Galileo, Science became a force of change, challenging dogmas and questioning what was considered as sacred. In those and even more recent days the natural philosopher often was also an applied scientist. Pasteur, Lord Kelvin, and Faraday are more recent examples of such scientific personalities. Thus the questioning nature and the benefits accruing from the applied nature of science got identified together and established the 'validity' of science and technology as a way of looking at life. The former aspect seems to give the present day scientist a theoretical justification to examine any subject without restraint. Moreover, experiment has been viewed as a test of the truth of theories and scientists consider their work to be search for THE truth. This view also leads to the conclusion that science is universal. Thus a scientist working in India or elsewhere should investigate the same problems and their work should be judged for its significance internationally. Historically, as science and technology became diversified, the inevitable specilization came. Moreover, 'useful' discoveries were very often made in the process of investigating phenomena unconnected with them. Thus scientists started feeling that a subject of study is best chosen because of one's ability to be intensely involved with it (or 'interest' should be the motive force) and that specialization or expertise is to be sought after for its own sake. Such a concept of expertise has two interesting consequences. It absolves a scientist from being concerned about the 'usefulness' of his work. More importantly, since the decision to use or misuse a scientific result is taken by some other expert (e.g. politician), the scientist no longer has to feel socially responsible for the effects of his work.

What do these attitudes mean to the scientist-society relationship?

It should be observed that the benefits accruing from science are really the factors responsible for bringing 'respectability' to scientists and acceptance for science in the society. Scientists aid and abet, if not propogate, the theory that it is science and technology that have brought material prosperity to

the 'developed' countries. Thus "Contracts, even research grants, could not be refused because of the tempting prospects held out and the absence of certain proof that complex nature is not so easily bent to conform to human whim[9]". The third world countries also have accepted this theory under the influence of the local scientific community. It is fair to say that scientists have been more than willing to accept accolades from society, despite their ambivalence regarding their 'social' responsibility.

Two serious problems have now arisen that will not let such idyllic circumstances to continue. The economic condition of the poor in general, and of the poor in the third world countries in particular, has become worse and continues to worsen. Just as the material prosperity was identified with science, it is fair to expect the poor to feel that Science has not been helpful to them and perhaps even to hold science responsible for their sorry state. And it appears to have some justification since science and technology, with their 'bigness' and centralizing nature, seem to favour the rich, and, the 'appropriate technologies' have really had little impact in generating income for the poor, and more importantly, in enlisting active involvement of the 'conventional' scientific community. Added to this, issues connected with warfare and ecological damage are being viewed everywhere as being the result of science and technology. There is a growing feeling that scientists are proposing increasingly complex technological 'fixes' as solutions to these problems and that these fixes have a way of generating their own complications. While scientists may view themselves as experts only in science and therefore not responsible for these problems, public at large will view scientists as a community, and thus responsible as a whole. This too with justification perhaps since, in discussing the effects of scientific work, scientists have been tardy in sounding warning bells while being very forth coming in holding out tantalizing prospects. Thus one should not be surprised if S&T is seen not as an agent of change and liberation, but more as a prop of a structure burdensome on the less fortunate.

All this spells bad for science of course. Perhaps time has come to abandon the idea that science is universal and to put into the choice of scientific investigations some concern for the useful or harmful nature of the work to the immediate surroundings. Surely time has come to 'truthfully' warn public of the possible dangers of increasingly potent, but double edged, choices offered by science and technology. May be it is here that Gandhian science has relevance today.

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