ANTISCIENCE AS EXPRESSED BY A PROFESSIONAL SCIENTIST: A NON-EUROPEAN VIEWPOINT

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I

Two questions are relevant at the outset of this talk. First, should science be regarded as value-free since it is based on the very nature of man who wants to know? And secondly, is it right to defend science by saying that the evil comes only from its "wrong" use?

Question 1:-- As long as the action of knowing is confined to a purely personal and private enterprise, and jealously guarded against the practical application of any sort of the knowledge acquired, science may be regarded as value-free. However, as soon as one wants to see the knowledge applied to a practical purpose (not in order to test the validity of one's knowledge but for some other "good" or "bad" purposes), then knowing can not be value-free any longer. The vast professionalisat: of science as seen to-day is a mere extrapolation of this last trend. And science is now tightly integrated into the value-system of contemporary society.

Question 2:-- Science viewed in its totality as it is practised now is a social venture, and as such has certain limitation which must apply to the use of science in any form whatsoever. Here I wish to present my views about the obvious limitations of science which can be recognised by an analysis of the course along which science has been developed. There is already some conspicuous antiscientific emotion among young people and also in a sizable fraction of the society at large. As compared to these antiscientific feelings, my presentation, I hope, is a more logical one and derived from the very root of what is now called science.

a. As pointed out by May (1971), all the great successes of natural science in understanding the Universe have confined themselvest to systems the elements of which show relatively little or no mutual interaction. These systems were therefore more readily amenable to the mathematical analysis of linear systems or to any other methods of a fundamentally reductionist approach. On the other hand systems in which

elements characteristically interact are not amenable to the reductionist approach, are notoriously intractable to mathematical analysis. The more difficult fields physical science and molecular biology, and the bulk of the biological, human and ial sciences deal with these complicated non-linear systems. The alternative roach of solving non-linear equations numerically by computers suffers from our ertainty about the proper values of parameters to be employed. In reality, no two ts of the Earth are geophysically equivalent; no two ecosystems are the exact licas of each other in their constituent members which in turn must have th ir peculiar genetic backgrounds as populations; and no two human societies are the e. Accordingly, these parameters are never of general or universal applicability the real world but valid only in one particular case. Moreover, all of these tems are evolving, and never the same historically, the impact of man's activities r accelerating their rate of change. Uncertainties in this type of approach are too clearly illustrated by what followed the publication of The Limits to Growth Meadows, Meadows, Randers and Behrens (1972). Much debate actually led to no eral agreement about points ranging from the validity of the method, feasibility the models, plausibility of the data used, down to the final interpretation and ommendation borne out by that study. Here are vast areas of potential studies evant to the actual world, in which natural science has never shown itself to be rwhelmingly reliable or exceedingly successful. Whether science will ever surmount s difficulty simply remains to be seen.

b. The majority of the scientific community will react to point a. by saying t a more vigorous support of research is the only hope one can have to overcome difficulty through a great progress in scientific methodology. However, such a sive development of science must presuppose a vigorous economy. The sheer size human activities supporting that type of economy is far from negligible in inflicting effects on the physical, biological and human realities of the Earth, and will vitably change the actual status of the objects to be brought under scientific utiny. Therefore, the real situation of these properties will never be correctly erved and ultimately understood in rigorous scientific terms, because the inter- ence of the observer with the object is in this case exceedingly significant. s is the thesis of a sociological or scientific uncertainty in a sense similar

to the quantum-physical and biological uncertainties recognized in the past. Hence there lies a limitation to scientific enquiry into the reality of the world, and science can never become the final resort from which to extract one's judgement.

c. Because science has been handling, and even now handles, simpler, linear systems more easily and successfully, it is quite clear that science will better understand the nature of energy, inorganic and organic resources and space, which in this society may be largely interconvertible with money, than the nature of human being and their deeds. However, once scientific knowledge is put to a practical use, the propensity becomes unavoidable that man's dependence on his/her fellow human beings is alleviated by employing more energy, resources and space (or money) for the fulfilment of her/his needs for survival and other activities than at the time when people had to depend mainly on other familiar people for those needs. Thus, it is obvious that what science brings about, quite independently of the initial benign or malicious intent of the scientists involved, tends to be intrinsically dehumanising.

d. Science is defended by the massive beneficial effects it has brought to the human being. However, a question may be raised whether it is intrinsically possible to use scientific knowledge only in the "good" or "right" way. Certainly the historical evidence (and this is the only evidence we have) speaks against such an idea. Since its post-renaissance era, European science developed in a world which was quickly expanding towards the unknown beyond, as exemplified by writings of Francis Bacon (see Medawar, 1972, on this point). The social or economical quest of Europe over the rest of the world thus gave ideological support to the scientific quest. From that time down to the period of the Indochina war, major scientific activities have always been supported by a social institution commensurate with colonial or imperialistic exploitation; slave trades, missions, plantations and natural histories went hand in hand; Darwinism as a product of the activities of British Navy, etc. There has always been a polarisation in the distribution of the fruits of scientific exploration among different people. And since science dealt with simpler systems more easily than more complex ones, this issue of polarisation has seldom come close to the attention of scientific communities. Thus, at the one end there has always been a group of benefited recipients of what science could produce, whereas at the other end there have always been people whose lives were upset in various ways from

utside: many cultures and civilisations were decapitated (as indeed more were efore the rise of European civilisation; so I am not blaming European civilisation lone); and the delivery of the "goods" of science to the unfavoured communities as always delayed until their society had almost completely been disintegrated nd the people were uprooted from their traditional value-systems. One used to egard this as a progress, but if one comes to recognise the emergence of diversity s an essential feature of organic evolution, one has to question what that progress ctually meant. One may refer to the tremendously improved health cares or education of the underdeveloped world as the results of good scientific practice, but one vonders whether those were also mainly realised in order to enable or facilitate the scientifically more advanced nations and people to enter the area for whatever opportunities there may be of economic and scientific exploitation and exploration. As for health, there is evidence indicating that some successful "indigenous" people had their own effective means of preventing the devastation of trypanosomiasis or malaria (see for example Ford, 1971), of keeping their infant mortality tolerably low (Neel, 1970), of maintaining general good health and developing a fine physique on their own extremely frugal nutrition which would hardly be acceptable to the contemporary science (see New Scientist, 1973). Of course those people must have had their problems, but so have the scientifically more advanced communities. The crucial point is that the scientific achievement in the latter could not have been realised at the rate it has seen had they not interfered with the integrity of other societies and driven the majority of their members into a situation over which they themsleves have no control. I am afraid it has never been demonstrated that what we now conceive as science can be practised in an alternative way. If one succeeds in this, as perhaps the Chinese are now partly trying to do (Wheelwright and McFarlane, 1971), science may very well be transformed to an extent unpredictable at the moment. Anyway, it is clear that we can no longer hold the naive view that science should be supported because it serves to enhance human welfare.

Incidentally, it is of interest to note that the population of European people increased very much during the period of scientific exploitation of the world (e.g. for three centuries between 1650 and 1950, the human population increased 3.7-fold in Africa, 3.6-fold in Asia, 5.7-fold in Europe and the "Soviet Union",

about 30-fold in the Americas and 6-fold in Oceania--the last two mainly due to European immigration (Nemoto, 1972), whereas for one century and half preceding the Meiji restoration (1868) the Japanese population remained virtually at a stationar level of 30 million, only to expand more than three-fold during the subsequent century, while Japan actively introduced Western civilisation and science.

I was astounded to find out that more than two millennia ago, the situation as outlined above in a.-d. has already been envisaged in Chuang Tzu; see his antiscientif stand:

'Hwang-Ti had been on the throne for nineteen years, and his ordinances were in operation all through the kingdom, when he heard the Kwan Khang-Tze (a Taoist sage) was living on the summit of Khung-Thung, and went to see him. "I have heard," he said, "That you, Sir, are well acquainted with the perfect Tao. I venture to ask you what is the essential thing in it. I wish to take the subtlest influence of heaven and earth, and assist with them the (growth of the) five cereals for the (better) nourishment of the people. I also wish to direct the (operation of the) Yin and Yang, so as to secure the comfort of all living beings. How shall I proceed to accomplish those objects?" Kwan Khang-Tze replied, "What you wish to ask about is the original substanc of all things; what you wish to have the direction of is that substance as it was shattered and divided. According to your government of the world, the vapour of the clouds before they were collected, would descend in rain; the herbs and trees would shed their leaves before they become yellow; and the light of the sun and moon would hasten to extinction. Your mind is that of a flatterer with his plausible words; --it is not fit that I should tell you the perfect Tao." '

The really amazing part of the fact is that Chuang Tzu had not analysed the various aspects of Nature into their elements to understand each piece of them, but yet he managed to secure a penetrating grasp of the profound dynamic processes involving Nature, human beings and society. This type of wisdom, which reaches some sort of understanding of objects as a whole without decomposing them into their elements and still is capable of correctly predicting the outcome of certain practices, is diametrically opposite to the reductionism on which the entire edifice of Western science has been built. In the second part of my talk I will discuss that aspect of human knowledge.

II

There certainly are forms of human knowledge which one acquires without a ductionist approach. Pattern recognition, learning of native language(s), intuitive cognition of various natural and artificial taxa, such as butterfly species or nera (even in flight!), music of Debussy (or to that effect even that of as ntemporary composer as Yasusi Akutagawa), work of Hirosige, make of motor vehicles d aeroplanes, or diagnosis of ailments by well-experienced physicians, almost mediately at first glance or encounter. One of the most impressive examples for was the case of a Japanese butterfly collector, quite knowledgeable in the laearctic montane fauna but completely unfamiliar with the Australian fauna: when ked to guess which species was the one occurring at the highest altitudes in a series many Australian species belonging to a group totally endemic to the Australian gion, he could quickly pick up the correct species in a cabinet full of specimens the group! Also, according to Mellamby (1971), well-experienced field workers may able to detect even the subtlest sign of the beginning of ecological deterioration. this type of knowledge or knowing has a certain predictive power without deeply lysing objects.

The people who possess this kind of knowledge are usually aware of it somehow thout using words, so much so that they can not describe it by words intelligible ough to their fellow people, even if they try to do so. This type of knowledge, one can easily see, is shared by craftsmen, farmers, fishermen, and many other nual workers in various trades, and probably by all the native tribesmen. As lanyi (1962) pointed out, the same applies to some physical exercises such as cycle riding or swimming, and he called it the tacit knowing. Of course one can into the details of one's knowledge, analysing it in scientific terms by taking s elements apart into minor details, but the more one does this, the less relevant comes this knowledge to one's awareness or understanding of the whole object or ocess in question, so that its total image is lost somewhere. This is just like e loss of life of an animal which we dissect trying to understand how that life rks, or like the loss of the beauty of flowers when we want to look into each ement of that beauty.

In the case of sporting exercises, and especially in learning some martial art there seems to be one salient feature. One can not perform it properly at the begi. ning; only through repeated practice can one learn how to do it. But one can not tell exactly how one has learnt it. Usually, while one is practising it over and over again, with such a concentration that one does not think or both/or with anything else, especially one's desire of eventual success --- then, one suddenly happens to succeed in doing it almost unconsciously. Usually the instructor can not transmit this secret verbally either. The whole process just depends upon the practice and concentration of the learner. The tacit knowing unexpectedly falls on you out of the blue when you have attained a complete elimination of the awareness of oneself in the midst of concentrated practice ---in other words when the last trace of ambition for good performance or success has been evaporated off.

Thus, the tacit knowing may be acquired by a concentration and hard work not marred by any intelligent reductionist analysis or any expectation of rewards in any form. This type of concentration or absorption may also be found in scientific investigations or artistic creations. For example, Monod (1970) wrote:

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'I am sure every scientist must have noticed how his mental reflection, at the deeper level, is not verbal: it is an imagined experience, simulated with the aid of forms, of forces, or interactions which together barely compose an "image" in the visual sense of the term. I have even found myself, after lengthy concentration on the imagined experience to the exclusion of everything else, identifying with a molecule of protein.'

Good ideas, or good pieces of work may dawn on one when one forgets all about one's personal motive, excludes one's ego, and feels to be one with one's object. The same may also apply to some regligious experiences.

This brings us to the point where both performances and objects are not tangible and hence totally unapproachable from outside; and only by mental (meditative) or physical exercises can one hope to approach the state of mind which may be described as enlightened with truth and which can not be described in words. This seems to exactly correspond to what is talked about as the satori in Zen. One can see that somebody has learned how to swim but one is utterly helpless in seeing whether and

.ctly how somebody has got satori. However, from the preceding analysis one can
tifiably imagine that the consciousness of one's person or ego in its broadest
se must be completely eliminated in order to reach the satori. Seen in this context,
whole aspect does not provoke any sense of mysticism or irrationalism, at least
me.

Once one reaches that state of mind, all the paraphernalia of everyday life,
asant or unpleasant, joyful or sad, stimulating or boring, cumbersome or hard, seem
become immaterial; and one is in a state of being freely available for service
others without reward or for struggles to help suffering and underprivileged
ple without primarily considering one's security, because the absence of self-
sciousness does not seem to deprive one of the feeling of love and pity which however
ould be conceived in a detached, or impersonal, manner.

As Orihara (1972) has put it, "all the human beings are originally nothing, but
spite of this, or rather, exactly because of this, they are open to everything;"
he self, which is nothing, can, while proceeding to be open to everything, hope for
flecting something." Apparently, the issue of one's identity is completely cast away
re; one is conceived as a guest, and definitely not a host, wherever one may go
whatever one may do. Surely then, there is no room for striving to achieve some-
ing. And as Orihara himself has observed, the grasp of this knowledge can not
mply be obtained verbally but only by continuous practice.

Indeed, such a complete retreat from longing for achievement is beautifully
scribed in Chuang Tzu:

'The wise man, when he must govern, knows how to do nothing. Letting things alone,
e rests in his original nature. If he loves his own person enough to let it rest
its origianl truth, he will govern others without hurting them. Let him keep the
ep drives in his guts from going into action. Let him keep still, not looking, not
aring. Let him sit like a corpse, with the dragon power alive all around him. In
mplete silence, his voice will be like thunder. His movements will be invisible,
ke those of a spirit, but the power of nature will go with them. Unconcerned, doing
thing, he will see all things grow ripe around him. Where will he find time to
vern?'

What tacit knowing implies can thus form a basis for an alternative value-system. It organises human society in a different way, certainly counteracting elitism and meritocracy. It may develop a kind of expertise endowed with certain predicting capacities, but such an expertise will never be expanded like industriali science as defined by Ravetz (1971). But above all, the central concern of this value-system is training and practice for a complete elimination of the consciousnes of oneself, from which a tremendous practical capacity is expected to emerge for the enhancement of humane situations in society. Certainly a Utopia is not the goal human beings should seek; rather it will be a kind of hard work by one's own ini ative to get and maintain the state of complete self-elimination. It should start with a subjective concentration about oneself, which is still ultimately to be empti completely. The study of oneself, only approachable by extended practice, deals wit a very complicated subject that is one's self. But one's self is really the only thing which one can hope to control but also it is the thing one will eventually com to realise as very unreliable (see Natume Sooseki, 1906). Obviously the study of oneself can never be done by a reductionist approach, and since it starts with such a complicated whole, it will never lead one, in one's quest of non-human subject to lose sight of human values and social realities. Then the understanding, even in reductionist terms, of other subjects (Universe, Earth, organisms, biosphere, society) may be really useful. Or perhaps, under that value-system, such an under-standing may become of minor importance and interest, because oneself as a human being is so complex and difficult to control that the struggle with oneself may become the major part of one's concern.

This paper is a partial excerpt and an extension of my book on "antiscience" to be published shortly in Japanese.

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