

PSYCHE AND SOCIETY

December-2009

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Vol. 7 No. 2 PSYCHE AND SOCIETY December-2009

Editorial

Right to Potable Water

'Canning Yuktibadi Sanskritik Sanstha', a voluntary organisation of Canning, North 24-Parganas, has been serving to the people of Sunderban, West Bengal for the last twenty five years. Here it is the pioneer organisation, who has done a commendable job regarding snake-awareness among the mass. In this respect it is to be noted that Canning Rural Hospital is the only peripheral centre in West Bengal treating the snake-bite patients with utmost sincerity. For this a lot of credit should go to this organisation. Besides, with the help of West Bengal Government Forest department, especially those dealing with the Tiger Project, they organise free medical camps every one and a half months, and try to reach upto the remotest corners. We feel privileged to have participated in some such medical camps; but those were in normal situations. This time I was summoned to serve the *Aila* affected Sunderbans - an awfully different situation. The giant cyclone has caused irreparable damages to the rural areas and has almost changed the landscape of South Bengal. The people here seem to be fated to struggle for existence against the odds of their surrounding - salinity of water, fragile silt embankments, mangrove forests and so on. *Aila* has left them amid a pandemonium.

The only bliss for them was that *Aila* hit the poor villages during day, and so very few casualties have reported. Otherwise hundreds would have been buried under their huts in their sleep. In its few hours visit, *Aila* has devastated the area beyond hope. Will these poor victims be able to overcome the damages, and if so, how and when?

One of the forest department worker's shocking announcement was heard over the wire-less system in the launch - a thirsty tiger returned into the jungle without drinking water. How could it drink? - The high tidal waves have turned the sweet water bodies into saline water reservoirs. Then what about the forty lakh people of the Sunderbans? Almost all Bengali readers have read 'Mahesh', and after seventy years, I feel, once again one can find such heart-rendering story-lines from here. Water, water evrywhere, not a drop to drink - the famous line seems to echo here.

"Please give us some water. Don't go away - water, water" - a pathetic cry fills the atmosphere. People, irrespective of age and sex, thronging the river banks with pots and utensils, is a sorry sight for one to experience, while travelling in a launch. This is the stark reality of the situation, the condition of the people pitted against their ill-fate. The shivering thought about those residing two to three kilometers interior, and beyond any aid, cannot be bayed out from the mind.

People are desperately striving to survive amid the stench of rotten straw with carcasses of cow, goat, dog in the surrounding dirty brine. They are desperately attempting to make temporary shelters with a few bundles of straw, torn terpulains, jute-stick - for the forthcoming monsoon. They are rushing madly towards any aid brought to them, to get a sure share of it to satisfy their basic demands for the time being. Their houses, courtyards, orchards, farms - all are under stagnant saline water, without any outlet. Again in some places, the stinking water is flowing in and out through a broken bank. The high tide (*Bhora Kotal*) is ready with

its tooth and claw, severe threat for another flood. The sand embankment should be completed to fight back the fresh threat. But who will complete the 350 km. embankment?

There is another severe threat awaiting them - the appearance of the enteric diseases, as the carcasses cannot be removed. Sweepers from Kolkata have to go and remove the dead bodies of animals from there, because others will not touch it. It is ironical for the three decades Communist rule, who have failed to spread the consciousness of narrow-minded spectrum amongst the mass and purge them from the sense of untouchability. The winds from the remote islands are bringing in the tides of their barrenness - no homes, no food and no potable water. When a convict dies in a Correctional Home, a lot of hue and cry is raised over it in the name of Human Right. Will we once again see such humanitarian demand for the right to potable water, for the 30 lakh people of Sunderbans, who are more sinned against sinning, from the City of Protests?

Does our government deserve to rule any longer, after proving their ignorance of what a severe cyclone can do to the 30 to 40 lakh people of the Sunderbans?

The geographical conditions of Sunderbans have given a struggling life to its people. But *Aila* has surpassed everything. Epidemics, hightide, monsoon, severe scarcity of water, fuel and food - are some of the serious, but temporary problems, that can be overcome fast. But the dire consequences of the *Aila* will take some couple of years to bring back everything in order. The top soil of the fertile land has been destroyed by the saline water. Hence the farmers will look for some other occupations to sustain themselves - and the handy option is forest. And this will disturb the already affected eco-balance further. The natural habitats of the wild life will be disturbed further.

But there is no other choice. It is impossible to rehabilitate so many landless people elsewhere. Their livelihood reflects the fragility of the riverbanks of the area. Sense will prompt that the Sunderbans is not fit for human settlement. But the basic demands of human life forced them to ignore the prompts of sense, and they seem to have accepted nature's challenge and settle down there - permanently.

It is true, that the spirit of man is undaunted. Through ages man is seen to strive, to seek and never yield to the whims of ruthless nature. So let us hope and unanimously take an oath to help these brave-hearted victims overcome the situation; and we are sure to succeed.

Aila at a glance

The affected villages - South 24-Parganas 1737, North 24-Parganas 1967, East Midnapore 2964, West Midnapore 6310, Bankura 5100, North Dinajpore 4430, Maldah 3535. 67 lakhs people of this state are affected, 126 people died. 361000 number of houses are totally destroyed and 550000 number partially. 40 lakhs people get shelter into the temporary relief camps. Gosaba block of Sunderban is mostly affected. 9 blocks of Sunderban out of 13 are affected **P A S**

Reflection of Contemporary Conflicts In the Mind of Artist Dhirendranath Ganguly

Art and literature are created in the effort of removing the incompleteness and weakness of the essence of individual - this statement is true though partially. Our ancestors had tried to tame the cruel nature by magic. Though magic was applied by our ancestors like tools and implements, as a much more powerful weapon, to control the cruel nature. Science, art and literature are all originated from magic. Magic was applied for the welfare of the community, art were performed for the interest of the community. Gradually as individualism developed so the purpose of art and literature became much more complex.

Due to alienation from his community the individual psyche became helpless and insecure. Naturally it reflected in the art and literature. The content of the art and literature becomes the will and reluctance, joy and sufferings, optimism and pessimism of the individual. Again the desire to integrate with the community due to the sense of oneness with the community is also reflected and expressed in the literature.

In the class-divided society the form of art and literature became more complex. As long the violent conflict between the general interest of the community and its class interest become overt and severe, this conflict began to be revealed accordingly in the literature. The problem of litterateur becomes much more serious.

On the one side, there is pain of alienation from the external world (nature and society), on the other side there is urge of self-actualisation of the individual essence - conflict of these two opposite ideologies made the contradictions much more regarding various groups, parties and their opinion and the variations of style of expression in the art and literature.

The capitalist society creates a favorable situation for the growth and development of the individual due to rapid industrialisation and development of technology. Side by side creating extensive and deep alienation it has brought much anxiety and tension in the individual psyche. Extensive alienation and development of individualism both the tendencies are specially notable in today's art and literature. Occasionally, the artist lost himself totally in the art of creation and again in some times with intense individual consciousness he separates himself from his art of creation and tries to analyse the social system and individual person.

In all these situations the artist is self-conscious. Though the consciousness is pre-conditioned and depends on previous learning. If he has been lost due to this emotional excitation it is not that he has lost himself due to the influence of some unconscious drive. One modern and famous critic (Ernest Fischer) says, "For make no mistake about it, work for an artist is a highly conscious, rational process at the end of which the work of art emerges as a mastered reality - not at all a state of intoxicated inspiration."

This is not the right place to discuss this paradoxical statement of psychology.

At the first phase of alienation the expression of the individual psyche or ego in the art and literature certainly influenced by the social-consciousness, community-consciousness. 'Subjectivism' is not just always narcissism or self-indulgence. In the poetic-songs of prayer

written for Afroditi we commonly hear, to satisfy the gods, are actually the echo of the ancient magic hymn to influence the reality.

In that poem, limit, prosody, rhyme – all these ingredients to produce the magic-process are present. When the unfortunate and failure-stricken person express his sufferings tuned with pause, measure and prosody, then we can understand that his aim is to be subservient to the community – his purpose is to resolve the alienation creating by assembled harmony.

Individual is alienated from the community for a primary necessity. The magic-rod of the magician gradually metamorphosed into painting-brush of the artist and the writings of litterateur. The lament of alienation has been echoed in his songs, the individualism developed in the art and literature created by him. Harmony of the united community has been broken into pieces and created the various musical tunes of personal feelings. As due to the magic touch of the skilled hand in labour, the power and variations of the tools ramified so the individual becomes alienated from the community; but in spite of all these the person has reflected the community, society in the small circle of his individualism.

Consciousness about society or community have not been abolished completely. Innate self-preservation instinct is beautified exquisitely into immortal love-songs. Is this spark of love preserved inside the individual psyche today in this era of extended phase of alienation? Do the fire and heat would emerge with the contact of appropriate inflammable condition? What is the probability of change of this cold and hard interpersonal relationship?

A special trait is evident in the ultra-modern art and literature. To analyse the alienation and to ascertain its cause, man today enters at his inner-world. The external world is inconsistent and meaningless to him. So he wants to find out the meaning and consistency in the deep inner psyche. There he has also seen hard to understand complexity. So, his poem is hard to understand today. His fiction depicts the free-association without interhuman relationship. His art is abstract, without based on any exact matter. His drama is absurd.

He hasn't any yearning to join with the collective because the feud is meaningless or impossible. It cannot assured security to the individual. There is rare possibility that in any day the solo song would be harmonised into concert. In the form there are various gorgeous adornment in the bodies and in content there are frustration, fear, sense of guilt, anxiety and various psychological disorders. In today's art and literature there is not only evident disinclination but also the tune of opposition to life. Opposition to society has been converted to opposition to life.

The attention and concentration of the artist has been drawn now to the ulcers of the psyche in lieu of malignant ulcers developed from the social conflicts. Even a few days ago the yearning to fuse with the collective was hard as the helpless cry of the shattered pieces of individual essence. Today instead of that there is audacious sky-high inflated ego. Instead of behaviour of a healthy body and mind there reveals sign, symptoms of unhealthy megalomaniac¹. This self-conceitedness expressed due to distrust regarding the future of mankind or deep rooted frustration regarding human nature or to cover up the inferiority complex of mind. On the other side there it is seen schizophrenic² incongruities by withdrawing himself from the environment.

Today's intelligentsia do not admit that gradual development of this alienation in the ultra-modern literature is indicative of mental illness or abnormality. Mental illness or abnormality is so extensively pervaded that it falls under the category of normalcy rather healthy or satisfied persons can be said today as abnormal or unhealthy. Social and personal values are ruined. There is no respect for the past and no trust for the future. At present it is our destiny

to whirling around the labyrinth of difficult to understand situation. The fatalism of middle age has taken a new form today. The fate of person is controlled by machine-god.

Today's man has lost faith in the power of labour, intelligence and judgement. Today's literature contains self-reproach, unsympathetic satirical insinuation or psychoanalytical criticism. We find the Stoic³ indifference instead of painful catharsis of great tragedy. In the past those who were called unhealthy or neurotic, today's critics designate them in a new definition. In the art and literature the word 'Outsider' today is much uttered and honoured connotation. From the flag-bearers of ultra-modern absurd, incredible art and literature to the spokesman of 'the stream of consciousness', all are either penetrated or honoured in today's progressive front.

1. Megalomania patient suffers from hyperinflated egoism. The more the alienated ego suffers from helplessness the more he thinks himself as extended to earth, heaven and hell like of King Bali. Hitler can be said as the first class 'megalomaniac' of this era.

2. The schizophrenic patient torments when he realises the opposition of external world reflected in his inner world. Self-contradiction between socialist production system and autocratic profit making selfish appropriating system is manifested in split-personality schizophrenic patients. In modern literature specially in poetry the incongruities between form and content is manifested like schizophrenia. The more this opposition would be acute the more the poet would withdraw himself from reality. Perhaps he would try to express himself composing one or two syllable words in near future.

3. Stoic: Greek philosopher, follower of philosopher Jenos who is indifferent even either in happiness or sufferings.

Today the visa of socialist countries are not rare to them. Today 'conscience' or 'commitment' is not the main problem to the famous litterateurs. Under the guidance of conscience some ideology-inspired, specially committed persons are not the representative character of the literature: "The problem of our age is not a problem of conscience or commitment . . . The problem is rather why people who have no personal conviction of any kind allow themselves to suffer for indefinite or undefined causes, drifting like shoals of fish into invisible nets. The problem is mass-suffering, mute and absurd. ..."

The echo of inquiry of George Orwell and Aldous Huxley is heard before a number of decades in the above speech of Sir Herbert Reed. They are these uncommitted people who desire freedom but do not know what is freedom.⁴

4. It has been opined regarding the modern British dramatists: But it is perhaps sign of the times, and no mere coincidence, that they should all share the same basic theme: the undermining of order by chaos - to put it in one way - or the revolt articulate or inarticulate, intelligent or instinctive, of the individual against any social framework.

As an example these lines of Samuel Becket can be quoted: But what matter whether I was born or not, have lived or not, am dead or merely dying. I shall go on doing as I have always done, not knowing what it is I do, nor who I am, nor where I am, nor if I am.

Today these traits of decades are undoubtedly direct and obvious. After the First World War the sprout seen in literature today has transformed into a big tree. This tree strikes its root also in the mind of Marxist breaking the barrier of socialist realism. Their problems today are considered to be the problems of the present era. The 'Positive Hero' is ridiculed today. Negative speeches are accepted today as universal and full of wit and humour. The greatest

way of self-revelation today is the soliloquy of alienated man in the crowded place. Abstract art has been identified today as the example of absolute perfection of art.

Naturally one can ask: what does these indicate? Whether this tendency is beneficial or evil? Whether there is any sign of negation of the negative condition visible in the society or art and literature? Before searching the answer we should enquire how the problem and opposition of ultramodern era influence the mind of the artist. If we know the causes we can find the solutions.

Firstly: On one side in an age of automation, overall development of technology has alienated the person not only from the society but from his self-identity. On the other side the propaganda system of State and big private industries have suggested him in such a way that he has developed into a 'mass-man'. Today the sensitive mind of the artist is perplexed due to strike of these two opposing forces.

Secondly: On one side national problems, crisis of transition makes the person ultra nationalist and the person gets much more interest and develops a sense of pride about the archaeology and history of his nation. On the other side in the peristalsistical world, mutually dependent state and nation the national pride and boundary-line have broken down. Inspired by a new form of internationalism and scientific humanism man dreaming of developing a new interhuman relationship.

Thirdly: Due to various modern scientific inventions man's imagination is running in two opposite poles. On the one side there is intention of unopposed visit to the stars situated at a distance of million light-years having the power and size of millions of sun. On the other side the accidental introduction with the divisible various new fundamental small particles in the minute atom.

Fourthly: To the opposite side of the total destruction of this species by atomic radiation there is the devotee of the infinite strength and conductor having the possibility of venture of winning the dementia and death of this species-being.

Fifthly: On the one side, there is vaunt of a few fortunates possessing abundance of wealth, on the other side it is seen the mute appeal of innumerable famished, unhealthy, thin, afflicted persons.

The conflicts and oppositions of external reality certainly influences the man to some extent. But the so-called much publicised distress of existence of the artists and litterateurs have agitated and influenced much more. In today's Western Culture the old value premises of religion and morality are vanquished. So the existence of the intermediary time of his between birth and death is in danger. In the view of bourgeoisie intelligentsia man is alienated from nature as he is deviated from his organic self. He is identical with the animals in his organic drive, again on the other side due to his superior psyche, intelligence and judgement he intends to surpass his animality.

Here lies the cause of acute conflict. The more he has increased his power of intelligence, aesthetic sense and judgement the more he feels unhappy as he is being alienated from the nature. With the increase of self-knowledge his helplessness is also increased. The fear of self-destruction has tormented him in the process of death. "Reason, man's blessing is also his curse, it forces him to cope everlastingly with the task of solving an unsolvable dichotomy." The problem of existence is the biggest problem to today's man. He has to solve this problem if he wants to survive. Again he has no way out to solve this problem. Where is the solution of alienation of body and mind? It is not possible to overcome and to identify with the organic nature at the same time.

This neo-Freudian *weltanschauung* is the source of origin of this hostility towards life and incredibility of modern art and literature. The modern litterateur is specially influenced by the philosophy of existentialism and Freudian psychopathology.

Why this Freudian *weltanschauung* has engrossed so much to the artist and litterateur? Why we do not find the person at the point of his staying in the exact time and place? Why the reality does not become obvious today by the painting-brush of the artist? Why there is effort to establish Camus-Kafka in the country of socialist-realism? Why there is so much influence of Becket, Eunesco and Betnick? Why today in our country the reknowned Marxist magazines published articles regarding artist's mind referring Freudian unconsciousness and also quote Paul Klee, the apostle of reactionary ideology? What is the reason of eulogium in the thoughtful (?) magazines of the theoretician of flag-bearer of idealist social-psychology?

To answer these so many 'whys' and arguments perhaps can be placed easily. The argument though old but is malleable: The development of social consciousness can not be matched to the speed of development of scientific inventions and industrialisation. As a result the depth and extension of alienation is ever increasing. The reality today cannot be captured within the boundary of individual perception as it is not confined to that. The world of Galileo, Copernicus and Newton is qualitatively different from today's world of quantum, relativity and atom. Common man is alienated from the world of science. That world is only the world of high order of abstraction of mathematical symbols.

Slightest difference between social consciousness and acquired power of technological-knowhow may be the reason of catastrophe. Momentary error or lack of proper social consciousness and good sense of the person who is sitting by the side of the Radar and the person who is holding the key switch of atom bomb, may create destruction of this planet. As if the future of man depends on some divine power that is not within our control.

Nevertheless from time to time discovery of minute particles of opposite character in the world of quantum physics also influence the mind of the artist. He is trying to impose today everything 'Anti' or opposite character in the art and literature. In the process of creating anti-novel and anti-drama, there is an effort to create anti-man. "I know that some bourgeoisie writers in the West are trying hard to create an antipode to man – an antiman. Inhumanity and cynicism are counterposed to humanism. I am horrified by the thought of a shrunken, contradictory, passive, anti-hero, a destroyed split-personality that has no strength left to fight its 'minus'".

The direct perception of the individual cannot cope with the speed of scientific discoveries, accumulation of facts and knowledge. Innumerable new facts have been accumulated in the data-bank of the scientist but its similar construct cannot be created by the mind of the artist. Comprehension of new data-knowledge is a time consuming process. Again creating a construct depends on the exact conception of the phenomena. Today science and scientists steer the world. Somedays ago the supreme suzerians were the dwellers of the abstract world.

In the post-war period scientist like Juliet Curie, Bernal and others have taken the place of Romain Rolland, Burbus and Gorky. The litterateur are not firm in their self-confidence like scientists. It can be said that there is not a single member of litterateur who is universally respected. Is this failure of abdication not related to some extent to revelation of frenzy outburst of litterateur? It has to be admitted that the influence of art and literature are on the wane. Today the domination of second signalling system of brain is well established. The feelings of wonder of human being arises in the setting off to the space-travel and computer.

There is no need to recite poem to realize what is life. On the other hand to search the meaning of life or its explanation specially the problems of existence to the philosophy of

science is the chief motto of the serious readers. For entertainment there are cinema, radio, TV or other identical light things. Science cannot provide the clue to the universally admitted truth. The art and literature are making failed effort to become universal by penetrating deep inside our mind, breaking the boundary of caste-class-creed. The artists and litterateurs cannot understand properly the mind of today's readers.

To follow the rate of change of mind the litterateurs and artists give up the depth of the matter or deny the change entering into the deep of the mind. According to Illia Erenburg, "The literature and art of today have not yet embraced these tremendous changes which have already occurred in the spiritual world of the reader and the spectator." Loosing connection from the reader, today's litterateur is bewildered.

Do we get the complete answer from this statement? What we are introspecting concentrating our mind to the inner self from the incomprehensible uncontrolled outer world? Our sense-perception and consciousness are influenced and guided by individual and collective unconsciousness. We have no power to take any independent decision and self-regulation. The outer world is in control of machine and the inner world is enveloped with unconsciousness. Freedom of behaviour and will is controlled by bureaucracy and freedom of thought is controlled by organic-instinct. We are helpless, incapable and worthless.

We are confined to the world created by ourselves. This analysis of the individual psyche stands as a cause of self-torture in the name of self-aggrandizement. Today person uprooted by centripetal force, is narcissistic and totally detached from any social-relations, leaving causal relationship of historical sequences he is eager to take refuge of free association.

Now different question will arise. What is the reason behind to consider man only 'psychological being', not also the 'social being'? Why there is a tendency to treat the problem with the Freudian unconsciousness, not with the Marxian theory of reflection? Is it not the case that as a result of considering man, is just regularly active as a mechanical robot, we are serving the purpose of the reactionaries? Do we not nursing the pessimism and resisting development of progressive ideas with this neo-Freudian propaganda that the cause of alienation is not historical, it is natural.

What do I think in the first phase of the post-socialist revolution the Marxist could not given special care to the individual psychology. They have tried earnestly to establish man as an out an out social being. As a result there was a tendency to apply theory of reflection mechanically and instantly. As a consequence due to superficial practice of socialist realism the art and literature became equivalent to propaganda-literature.⁵ Considering human essence as social-machine the socialist man became a diminutive person in the society. To explain and analysis Individual psyche and social psyche only the economic reasons were given preference. Neglecting the dialectical relationship and mutual dependency of all the factors, the theory of reflection and Pavlovian higher nervous system had not developed comprehensively.

Influenced by these bourgeois ideologies that, driven by esoteric organic-instinct man is naturally self-seekers or narcissistics, human nature unchangeable or in this era man is just automatic machine - the litterateur are bound to fail to mitigate the incompleteness or weakness of human essence. In this period of automation the philosophy of life of split man is incapable of integrating the wholeness. Today's split philosophy of life has been reflected in body-mind parallelism and theory of individual and collective unconsciousness: "The individual can not help his age; he can only express that it is doomed."

The strong optimism that had been echoed at the art and literature at the first stage of alienation, is dissolving today at the universe at this last stage of alienation due this age of monopoly capitalism. Apparently it seems that the natural science is continuously discovering the external world each and everyday. But psychology entering into deep world of psyche lost the way into hazy darkness of mystery. So the artist who is dealing with the inner world of man, is incapable to ascertain the way of outer world, specially connecting the collective and the society. It is futile to resist this alienation of reality by any old methodology. The way to find new methodology is not seen.

Rapid change of the social background is not been constructed accordingly in the mind of the artist. The scientist today is capable of having the opportunity to discover the new horizon of reality and perceiving the reality with the help of many devices of enhancing the strength of brain and substitute-brain. The artist has no such opportunity. So he has chosen the deviated way from reality of churning the sea of unconsciousness like psychoanalyst, or the very simple theory of stimulus-response of Behaviourist.

The litterateur sometimes directly deny or neglect the reality and in another time mechanically thinks that man is the slave of environment. In this present form of crisis, in this age of greed, cruelty and state of confusion due to the pressure of monopoly capitalism, in this age of absolute alienation, artist cannot capture the future introduction of new form of welfare in his artistic consciousness.

The fusion of the process of alienation, course of social reality is going on according to its own law. We have to find out by scientific analysis and comprehension the speed of this course on this linear mark as on a conch of history. People have high expectation in this age of automation and nuclear era. Though there is qualitative difference regarding this expectation yet there is similarity with it to the primitive faith on jugglery and magical power. In very recent era there is evident though trace the influence of modern science in literature. The two flanks of primitive magic, science and art are vibrating for reunion in the future. Today in the new historical condition, there is seen the possibility of fusion of alienation of intelligence and emotion, the inking of joining of two severed parts of the essence.

In the age of science the process of reconciliation of intelligence and emotion is going on. To fulfill the demand of this metamorphosed consciousness of readers and viewers, there comes the flood of revolutionary changes in the form and content of art and literature. In the sharp consciousness of the artist, the whole life would be reflected again - this hope is not at all a remote dream, it is conjectured on the basis of science.

On the scientifically minded artist's mind it would be felt for the first time that - "Man is capable of creating situations he wants and needs." Then not only the panic of atomic destruction would be depicted at the literature but the litterateur also would not agree to this axiomatic contradictory statement that 'Infinitely powerful man is weak and powerless.' When in modern mind he would be familiar with the laws of science, then only he would know that gradual change of the condition of paradoxical state would create the ultra-paradoxical state, then negative stimulation develops to opposite positive stimulation, high panic-stricken inactivity transforms into active fearless resistance. This scientific realisation would inspire him for new creation. Then he would not think that this gradual alienation is irresistible.

Naturally the nervous system of majority of us are inhibitory type. There partial inhibition instigate excitation at the neighbouring areas. As a result to some extent a state of balance-equality is maintained. But any sort of qualitative change is delayed. But when it is in a state of complete inhibition that is due to the totalitarian alienation, that can be compared with the

5. One can remember 'Proletcult' movement.

sleep of 'Kumbhokarna'. Immediately after waking from sleep it would show restlessness due to excitation. Then it has yearning for joining and associated activities. So as a result there is possibility to end this alienation finally.

Excitation and inhibition are mutually complementary principles of brain connected with dialectical laws. The excitatory waves are latent in the phenomenal world of inhibitory waves. There is high possibility of unification, hidden in the state of extended alienation. Artists and litterateurs would make the possibility fruitful by active participation and direct endeavour in the struggle of life.

July, 1966 **P A S**

Psychiatrist Dhirendranath

(Continued article - Concluding part)

Basudev Mukherjee

[Due to some serious editorial error this important last part of this article has not been published. The error is regretted.]

We consider Dhirendranath as one of the leading pioneers of psychiatry in India. In the previous issues of this magazine we had included the intellectual formation and socio-psychological development of Dhirendranath as a psychiatrist. He had many introductions but over all other introductions, being a psychiatrist can claim of the fundamental ones. We will continue to examine the matter further in this issue regarding his achievement as a psychiatrist in practice due to wholistic participation in the subject. Ed. *PAS*.]

Humane virtues and abilities

Dhirendranath used to love to have a chit-chat with his friends when he didn't have any definite work to do and the context from football and drama to commonplace household used to get appear. Once we planned to build a football team with eleven best personalities of the world (football was his favourite game). Among these eleven players nine e.g Aristotle, Buddha, Marx, Lenin, Shakespeare, Newton, Darwin, Einstein, Rabindranath and so on came to our mind very easily. Difficulties arised with Mao-Tse-Tung. Dhirendranath would never take him in his team; but we would also never give up. Eventually he gave in under our pressure, because he was alone and we were as heavy as the population of China.

But we all got into trouble on the question of who could be the eleventh player, because strating from Jesus to Tolstoy to Beethoven, a lot of people appeared to be claiming that place. As a result we could not solve the matter; but we could initiate a wonderful discussion concerning this issue. The issue is, to what extent the astonishing manifestation of humane virtues and abilities that we see in some cases, is an individual's latent ability, innate endowment and how much of it is actualisation due to internalisation of the social resources.

I have told you earlier that, Dhirendranath was a Marxist and he used to believe in Marxist social sciences. He used to believe that, it is possible to create heaven for the human beings in this planet itself by changing this world completely. Therefore the materialisation of the innate endowment of every child is not possible if that social set up can not be built. In this case he had a clear-cut idea about how a human being gets built up. He also used to love to talk in this matter. As for example he used to say that, the man has a universal power to a certain extent and the help from his parents and family is essential for the method in which he would use it in his own life. That is, it becomes difficult for him to even master all of those

universal capacities if his parents fail to attend upon him during the years of his upbringing.

Parents try to the best of their abilities to fulfil this demand of their children. Among these demands there is the adequate and proper supply of nutrition, safety, care, security etc.. But in case poverty is intense in the family, the parents fail to properly bear that familial or social responsibility. Consequently the actualization of the children gets interrupted. If the children get opportunity they participate with their parents in their emotional activities from a tender age and in this process they gradually become social by internalizing the familial merits and demerits. Here the parents are the first and the most reliable representatives of the society to their children.

Gradually the demand of the children due to growth increases, so it then becomes impossible for the parents to supply according to that demand any more. So the child-adolescents go out of the home, in order to learn more and more special kinds of socialization practices and lifestyle education. At that point of time, in majority of the cases the teachings for socialization, sense of ethics, values etc. formulated by their parents remain with them. In this case who are lagging behind socio-economically, remain so busy to sustain their own family or with the problem of filling their stomach that they find it impossible to fulfil the growing demands of their children.

In comparison to that parents in the middle-class families such as ours try to be prompt to fulfil all the demands of their children. If the parents remain too busy with their own problems and can not give that much attention to the problems of their children, the child may turn out to be a rebel or a lot of negative teachings could get left inside him.

Inside the family the child keeps on gradually progressing through universal qualities and education to possess more special ability based on qualities and education. If the child possesses special innate potentialities and the ability of the parents turns out to be special, there remains a possibility for the child to acquire special power. But wherever we go, no matter which specialists teaches us, on the final verdict we would get to notice that, all of our knowledge, wisdom, experience, efficiency etc. everything is a social element. That is we internalize all the qualities and abilities scattered in the society like air and water and unfold ourselves. Dhirendranath used to say that, an individual can be immensely talented, but any kind of expression of his talent is not possible if he keeps on living in the forest. Certainly the individual has a role in history; but on the final verdict the process of growing up for all human beings depends on the society. That's why we want that the society may become appropriate for the ideal expression of every child.

In this context we have to remember that, we have not yet got to know and perhaps we will be able to know some day in the future what special quality or ability they own for their talent who are famous in the society as talented. That is, there is no way we can deny that, a few men were born or will be born in this world who possess unparalleled power due to innumerable contingent factors. But they are human beings and all the vices (the six enemies) of the human beings are present in them. On considering the cases of these people too, we will be able to notice that, the contemporary social elements had helped the quite a lot in their growth. That is, they perhaps could not have expressed their talent if they hadn't got those social ingredients.

Dhirendranath's teacher Pavlov had admitted this several times in various ways. But why such dearth of talent has taken place all over the world in the last fifty years? Why don't we get to see individuals of that greatness any more these days? Dhirendranath used to think a lot in this matter. He wanted to say that, the accumulation of knowledge related to science

and technology has reached such a proportion that it can be termed to be almost an impossible task for any single individual to grow up assimilating that. Yet we and our child-adolescents are advancing in the aspect of growth and development.

We can draw an end to this discussion citing a recent example in this matter. We had been gradually observing that, the young boys and girls belonging to the generation a few decades next to that of ours, are becoming matured more quickly in body and mind. They are perhaps a bit excessively taller and sturdier physically and as if contain more intelligence than us in doing works. In this way we can notice that their childhood and adolescence have as if become shorter to a certain extent.

On calculating it can be six months to a year. Among the reasons which we could sort out through discussions there are the following ones: appropriate and timely nutrition alongwith parental care and attention is one of the reasons for the fast development of their body and mind. Because now-a-days the number of children in the family is small, so they are getting the larger share of all the ingredients. Consequently they are growing up quickly. So it can be said that, we are as if realizing directly what could be the direct result of the change of the socio-economical situation.

Finally, we would certainly wish to know how Dhirendranath used to accept the failure of his treatment. It should be mentioned that he faced numerous problems in the matter of treatment. It definitely troubled him to accept all of that. He used to deny a portion of it for ideological reasons and the rest of it to give indulgence to his huge clinical experiences. Yet it can be said undoubtedly that he was an extremely intelligent human being and used to quickly rectify himself on realizing his own flaws. I have heard a quotation by Lenin in this matter from his mouth for a number of times, "To err is human and only that person is intelligent who can quickly correct his mistakes." But as a psychiatrist he was extremely successful from an overall viewpoint.

Why do I come and sink in tears

He was quite capable of turning any particular environment gloomy within a moment. So he used to admit, "Perhaps there is a core of Depression in me." Then we used to mock and say, "Sometimes your stock gets exhausted as you everyday supply so much of hope and faith to so many people." On several occasions he used to say different things regarding the meaningfulness of this life. Perhaps he suddenly used to say, "The animal kingdom puts up a great struggle to survive, is living life that much joyful! Everyday I notice how long people take pains to survive! Why do either human beings bear so much trouble to live? I get to notice certain individuals who get indescribable pain, physically or mentally, yet he or she has a tremendous will power to live. What happens after we live life so painfully! It doesn't matter at all to anybody if life don't exist!"

Perhaps then he started to recite a few known lines from 'The Tempest',

". . . And, like the baseless fabric of this vision,
The cloud-capp'd towers, the gorgeous palaces,
The solemn temples, the great globe itself,
Yea, all which it inherit, shall dissolve
And, like this insubstantial pageant faded,
Leave not a rack behind. . . ."

Perhaps one day he used to say, "Why did life appear in this planet, what difference it would be made if life had not existed here?" Perhaps while saying such things he used to return to

the periphery of his work. Then as if pausing for a while he again started to say that, people owe a lot to religion for finding the meaningfulness of this life. If religion had not existed, we doubt whether we would have got any sort of consolation of any query regarding these issues such as what is the meaning of the life without religion, why do I exist, what is the absolute purpose of my living etc.. That's why, religion becoming so powerful for eons, has created a ring around each and every educated and uneducated person. He used to also comment about his teacher Pavlov that, in spite of being an out and out laboratory scientist he was a sort of 'agnostic' from the philosophical point of view.

He used to say that, in most of the cases the religion of the common man appears to be quite superficial to the educated and intellectual people. That's why they expand their horizon in two directions in order to find a profound meaning of life. Either they find out some mystery of religion by studying the religion itself even better, as for example the Brahmoism or an equivalent way of life was originated here in our country from this necessity, or they develop different kinds of philosophical scriptures. The endeavour towards finding out the 'meaning' of this universe and the life is the main reason behind whatever religion or philosophy given birth to in this world. It's not that it always brings success.

We can perfectly explain and analyze this universe with science; but can we bring out any 'meaning'? These days many people talk about science-culture and at a point of time we had said vocally that 'scientific humanity' is our religion. Perhaps people in the future would become more powerful in this matter in order to say something definitely; but can we underestimate these distress calls of the 'self' of the human beings by any means in spite of accepting everything!

He used to admit that, there is injustice, inequality, cruelty, inhumanity and selfishness in this society. But who has created these things, we - a few people of this society. We have put up and adapted with it. When it would gradually become intolerable to us, we would definitely change it, either today or tomorrow. Men can do everything if they wish so. A small example of it would be the preparation of the atom bomb. With respect to the destructive weapons, it is the most abominable deed in the history of human civilization to make such a weapon; but with respect to science and technology such a combined effort of such a science is an unforeseen work.

And it is more gloryfying for the Soviet Union as compared to America, because they had to do this work in the midst of endless impediments and adversities. If some day the history of preparation of the atom bomb by the Soviet Union gets discovered, we would definitely get to know how infinitely powerful the human beings are! As if he can solve almost all problems in the midst of hundreds of hindrances and adversities! But this human being himself is very small in front of the 'meaning' of the life! He still has to pray with his knees down.

There was a quotation of T. H. Huxley at the study-table of Dhirendranath. Perhaps he used to hold those words close to his bosom as they matched identically with the philosophy of Pavlov's career. I have learnt the perspective of this quotation from him. Scientist Huxley was called as the 'bulldog' of Darwin. Noel, the three year old and extremely adored first child of Huxley died of a three day long septic fever. At that hour his soulmate (not an ideological one) priest and naturalist Charles Kingsley wrote him a letter to console him in his mournful condition. The reply to that letter (23.09.1860) is considered almost to be the 'Manifesto' in the history of science still now.

The letter is lengthy, so I am paraphrasing this portion of that quotation here: ". . . My business is to teach my aspirations to conform themselves to fact, not to try and make facts

harmonize with my aspirations. Science seems to me to teach in the highest and strongest manner the great truth which is embodied in the Christian conception of entire surrender to the will of God. Sit down before fact as a child, be prepared to give up every preconceived notion, follow humbly wherever and to whatever abysses nature leads, or you shall learn nothing. I have only begun to learn content and peace of mind since I have resolved at all risks to do this."

There is another thing which Dhirendranath often used to say and perhaps had learnt from the life of his teacher Pavlov. We are moving ahead accepting those words as the mystic syllable. The words are, "One, who does not regard any hindrances to be real in front of his or her determination, is the actual human being."

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Jagadish Chandra Bose : Caught Between Two Cultures?

Ashish Lahiri

Jagadish Chandra Bose (1858-1937), the first great modern scientist produced by India, was quite conversant with the problems of philosophy of science. A sequential analysis of the phases of his scientific career vis-a-vis his philosophical ideas throws up some highly instructive points, particularly concerning the role of ideology in science.

J. D. Bernal's argument about the choice of problems is noteworthy: 'The essential feature of a strategy of discovery lies in determining the sequence of choice of problems to solve. Now it is much more difficult to see a problem than to find a solution for it. ... Faraday, for instance, early in his career set himself the general problem of finding the connexions between the separate forces of physical Nature — light, heat, electricity, and magnetism — and taking them pair by pair, nearly completed the programme.'¹ Do we find any such grand plan in Bose's choice of problems?

Father Lafont: The Real Guru

The story must begin with the Belgian Jesuit Father Eugene Lafont (1837-1908), the physics teacher of Bose. Son of an army officer, Father Lafont was born at Mons, Belgium, on March 26, 1837. After receiving the necessary training of the Holy Order, Eugene Lafont studied Philosophy and Natural Sciences at the Namur College. Father Depelchin, who would later establish the St. Xavier's College at Calcutta in 1860, was a minister there. At his request, Lafont joined St. Xavier's College, Calcutta on December 7, 1865 as physics teacher. When in 1867, the BA class was opened at St. Xavier's College, Lafont took charge of the Natural Philosophy division. He also taught Mental and Moral Philosophy. In 1871 Father Lafont became Rector of the St. Xavier's.

Eugene Lafont was trained in the 'romantic' school of 'Natural Philosophy' in the fag end of what Eric Hobsbawm calls 'the age of revolution' in Europe. Hobsbawm's assessment of the contribution of the 'romantic' school of natural philosophy is illuminating. No doubt it 'was speculative and intuitive. It sought for expressions of the world spirit, or life, of the mysterious organic union of all things with each other...' But the point is that it 'produced not merely scientific effort ... but fruitful results. The cell theory in biology, a good deal of morphology, embryology, philology and much of the historical and evolutionary element in all the sciences, were primarily of "romantic" inspiration.' Most importantly in our present context, 'even in the physico-chemical sciences ... the speculations of the natural philosophers about such mysterious subjects as electricity and magnetism brought advances.'² No wonder that despite his religious background, Lafont was an uncompromising Baconian. He was among the staunchest supporters of Mahendralal Sirkar in the latter's struggle for establishing in 1876 the first science research institute in India, the Association for the Cultivation of Science.

Sirkar's position in the history of science in India is rather unique. He never allowed the 'they excel in science, we in spirituality' kind of loose thinking to enter his head. Convinced that Indians could establish their own nationality by mastering modern empiricist science,

Sirkar asserted that what we needed was not merely an appreciation of science, but the ability to do original scientific research. The British administration and the Indian compradors tried to persuade him that the time was not yet ripe for that; sufficed it that Indians should learn modern science and try to implement it. Undaunted, Mahendralal established the Cultivation, with the specific intention of producing Indian scientists, not science-trained mechanics. Side by side, Sirkar would also popularise science through public lectures based on experiments. In all these efforts, Lafont was his ablest comrade, asserting that unless India stood on her own legs in fundamental scientific research, she would forever remain dependent on the West.

J C Bose was admitted to St. Xavier's school in 1869 at the age of eleven. After passing Entrance from the Calcutta University he took the decision to graduate in science from St. Xavier's College. It was during this period that he became close with Lafont. The Baconian experimentalist was his real guru in science.

Behind this decision of Bose's was the inspiration of his father Bhagaban Chandra. A part of the British administration and a Brahma aristocrat, this man was remarkable for what might be termed his technophilia. His kind of patriotism saw the spread of technology among the masses as the sine qua non for India's well being. He established a number of technical schools, none of which, needless to say, succeeded economically. Later Jagadish Chandra would recall how in one such school he first received the impetus to invent something new. It was in such schools too that his proficiency in making tools flourished that stood him in such a good stead later in life.

Bose at Cambridge

Jagadish Chandra took his B A in science in 1880 from the Calcutta University. Once again his father, rather atypically for the time, wished that instead of going for the law or the arts, he should take up hard science as his career. That meant he should proceed to England, for there was then no institution in India where one could study proper, hard science. Bhagaban Chandra's pecuniary problems notwithstanding, Jagadish went to London to study medicine. At this stage the story takes a rather peculiar colour. Firstly, he fell ill, possibly from Kala Azar. To make matters worse, the noxious odour of the dissection room aggravated his condition. The authorities advised him to leave college. So he left London for Cambridge in 1882, got admitted to Christ's College and took chemistry, physics and botany as his subjects. Cambridge was then the international centre for physics and biology. Thus, from a colonial periphery having little scope for doing real science, Bose was, by a string of circumstances, catapulted right into the hub of modern empirical science.

His mind was already suffused with inductivist experimental methodology, thanks to the Baconian Father Lafont. At Christ's College he had some great scientists as his teachers. There was Lord Rayleigh, who had already done remarkable work in electromagnetism. Then there was Arthur Schuster, famous for his work on radiation. Another teacher, Richard Glazebrook, was to become the first Director of Britain's National Physical Laboratory. Sidney Vines taught him botany. For a time he studied under Francis Darwin, who was a collaborator of his father Charles's *The Power of Movements in Plants*, an area which Bose was later to enter.

Thus, Bose received excellent training in both physical science and bioscience. We also find that he had little interest in higher mathematics, nor did he come in touch with any great mathematician. All these were crucial factors later in determining his choice of problems.

In 1884 he got the Tripos in Natural Sciences, doing fairly well at the exams.

Here we might do well to have a glimpse at those important events and discoveries between 1870 and 1884 that might have influenced Bose, situated as he was in the focal point of world science.

1870: Darwin's *The Descent of Man*

1874: Karl Ferdinand Braun (1850-1918) uses semi-conductor crystals to make electric current uni-directional

1880: Pierre Curie discovers piezo-electric effect

Among these, Braun's discovery is of particular importance in our present context. In 1874 he noted that by using some semi-conductors electric current can be made to flow in a single direction. Much later, in 1900, he would make crystal diodes and crystal radios using this method. This is important because it was this Braun who would collaborate with Marconi in improving the latter's radio equipment and would receive the Nobel Prize jointly with Marconi in 1909. Was Bose aware of Braun's work while at Cambridge? One does not know for sure.³

Bose and Hertzian Waves

On coming back to India, the humiliation he had to suffer in the hands of a section of the colonial administration is well recorded. It was only at the behest of the liberal Lord Ripon that Bose was finally appointed professor at Presidency College in 1885. From this time his links with Lafont were re-established. Lafont was then regularly giving lecture-demonstrations on the latest developments in physics at the Cultivation. Bose also began taking regular classes there on electricity and magnetism. This went on till 1888. Then, all of a sudden, he stopped taking classes there. Why?

The year 1888 is momentous in the history of science. Already in 1887 Heinrich Hertz had discovered photoelectric effect. The following year he published the path-breaking report on the "electrical ray" experiment. The paper was, however, in German.⁴ Did Bose know German? One is not sure. However, it is a safe bet that Father Lafont did know it. Nevertheless, that epoch-making paper of Hertz's must have been translated in no time. At any rate, Bose, who was already much interested in the matter, must have had information about Hertz's experiments. 'Its accounts have already been published in *Nature* and it is quite possible that while teaching electro-magnetism at the [Presidency] College, Bose was aware of Hertz's work.'⁵

Then followed the 'mysterious' eight years of silence, which was broken only in 1894. Apparently, one fine morning in 1894 he resolved to become a 'creative scientist', that he would realise the dreams of Mahendralal Sirkar by rewriting India's national identity in terms of modern science.⁶ And, lo and behold, he did become a creative scientist in 1895!

Obviously, the real explanation is, as Atri Mukhopadhyay says: 'Actually he had taken a long preparation for this work, may be right from 1887 November, when Hertz's paper was first published in Germany. ... He had stopped giving lectures at the Cultivation. The annual proceedings of the eleventh year of the Cultivation clearly mention in April 1888 that he was busy with his work on electrical waves.'⁷

Bose's *Annus Mirabilis*: Clearing a Confusion

1895 has been hailed as Jagadish Chandra Bose's *annus mirabilis*. Let us have a brief look at his achievements that year as presented in all standard books:

1. Describes his transmitter and receiver at the Asiatic Society, Calcutta, in May 1895.
2. Gives public demonstration at Town Hall, Calcutta, 1895.
3. Publishes paper in *The Electrician*, London, December 1895.

4. His paper is read before Royal Society, London, December, 1895.

Regarding item number 2, i.e., the public demonstration at the Town Hall, this is what he himself wrote many years later:

Invisible light can easily pass through bricks and houses. Thus it might be possible to send wireless messages through this. I had demonstrated this by showing various experiments at the Town Hall, Calcutta in 1895. Sir William Mackenzie, Lt. Governor of Bengal was present there. The electric waves penetrated his huge bulk and two other closed rooms and effected all sorts of disturbance in a third room. They fired an iron shell, exploded a pistol and blew away a heap of gunpowder.⁸

There appears to be a bit of confusion here as to the details of this demonstration. For one thing, Bengal never had any Lt-Governor named Sir William Mackenzie. However, during the period mentioned by Bose, Sir Alexander Mackenzie was the Lt-Governor of Bengal (1895-1897), who had taken charge only on 18 December 1895.⁹ Thus, the said demonstration could only have taken place after that date.

Bose, however, does not give any specific date, not even the month. Nor does one find any mention of the event in the contemporary press during the period 18 December to 31 December 1895. This is highly unusual, given the fact that the newly appointed Lt.-Governor himself was present at the occasion.

However, one does find a report in the Amrita Bazar Patrika on Monday, February 24, 1896 (page number 6, column 2). Under the heading Sir A Mackenzie at the B.I. Association¹⁰, the report says:

Friday last [i.e., 20 February 1896 - A.L.] witnessed a most gratifying scene, viz, a splendid conversazione at the British Indian Association Rooms, at which His Honour Sir Alexander and Lady Mackenzie together with other high officials of the European Service and members of the Legislative Council were most cordially entertained by the leading members of the Calcutta Native Society.

The paper goes on to report:

Professor J. C. Bose's electric performances added a most enjoyable air of scientific pastime, which was thoroughly liked by all present.

Therefore, it should be obvious that recollecting many years after the event, Bose had confused the details, which is nothing very unusual. The corrected details are:

Date of the Demonstration: 20 February 1896

Venue: British Indian Association

VIP's present: Lt-Governor Sir Alexander Mackenzie and Lady Mackenzie.

Bose's Radio-Research

Taking his cue from TaT The French scientist Eduard Branley's discovery made in 1890, Oliver Lodge had in 1894, developed his coherer. A coherer is an electrical device whose function is based on the fact that metal filings, which are normally non-conductive, become conducting when placed within the range of electro-magnetic waves. The loose filings, having air-gaps between them, fuse a little together, i.e., they 'cohere'. Hence the name.

Bose went on to make significant improvements in 1898 to the primitive Branly-Lodge coherer. Bose's invention of the 'iron-mercury-iron coherer with a telephone detector' was reported in the Proceedings of the Royal Society in April 1899, which was to have a crucial role in the designing of Marconi's radio apparatus. Nevertheless, Bose had not intended to and

did not invent the artefact called the radio. He himself was very clear on that point. While praising Marconi's practical perseverance, he never for a moment considered the Italian a scientist:

His wonderful perseverance and ability in deriving practical advantage out of science have ushered in a new era on earth. The world has become really small. Previously, one could send messages to faraway places only through the telegraph; now they can be sent everywhere without taking recourse to wires.¹¹

This is in complete accord with the assessments of historians of science. Bernal, for example, made a clear distinction between 'the trained theorist and the gifted amateur.'

Lodge, Bose and Popov he placed in the first category and Marconi in the second, observing that 'full commercial success did not, however, here go to the trained scientist but to the gifted amateur.'¹²

But then, what was Bose trying to achieve through such wonderfully original experiments, the instruments for which were famously devised all by himself? Let us once again turn to his own account:

The German professor Hertz was the first to scientifically produce waves in space. Nevertheless, his waves, being too large, used to move in curves instead of in straight lines. ... In order to delicately prove that visible and invisible light both had the same properties, it was necessary to curtail the lengths of the invisible waves. I had invented an instrument that produced ethereal waves only a sixth of an inch in length.

What did he want to show with the help of his instrument?

Now I shall describe the experiment to demonstrate that visible and invisible light have the same properties.

Firstly, that invisible light moves in a straight line is proven by the fact that when an artificial eye [i.e., a galvanometer] is placed directly in front of the channel through which electric waves come out of the lantern, its needle is deflected. If the eye is placed at a side, no sign of any excitement will be noticed.

Just as a mirror reflects visible light and the reflection follows a rule, similarly invisible light too gets reflected in the same manner and follows the same rule.

Visible light causes molecular changes through impact. I have been able to demonstrate through experiments that invisible light also does the same.¹³

It is thus clear that he was trying to show that visible light and electro-magnetic waves had the same properties; that, visible light was a kind of electro-magnetic wave. He did succeed in showing this and deriving theoretical satisfaction out of it. Thus his 'grand plan' was to show the unity between the light waves and electromagnetic waves.

He was fully aware of the practical and commercial implications of this research, but simply opted out of the race. Maybe his father's patriotism and his Upanishad-honed nationalism had a role to play in not only making this choice but in choosing his next programme of research. It is on this changeover that we shall now concentrate.

The Changeover

Uptill now we have seen a linear development. A colonial scientist, goaded on by his father and teacher, was convinced that India's national identity could be built up by breaking the myth that Indians were good not at empirical science but only in speculative philosophy. In other

words, he had to beat the West in its own game, by following its own methodology. This he accomplished. His entire radio research was conducted strictly within the accepted reductionist framework of modern physics. He had learnt, possibly from Lafont, how to separate one's metaphysical and religious beliefs from actual scientific research. That he was eminently conscious about this is shown from a brilliant essay *Manan o Karan* (Intellection and Praxis). There he wrote:

Unless scientific truth, like the horse of the Asvamedha Yajna, comes out victorious by defeating all enemy territory, the job is not finished. Thus, the scientist has always to exert a self-restraint. He is ever anxious lest he is duped by his own mind. For this, he has, at every step, to synchronize the promptings of his inner mind with the outer world. If the two do not synchronize, he can by no means accept any one as true.¹⁴

Naturally,

The path the scientist has to traverse is extremely rough. He has to follow the unpromising path of observation and experimentation and always exercise self-restraint. He is ever anxious lest he is duped by his own mind. For this, he has, at every step, to synchronize the promptings of his inner mind with the outer world. If the two do not synchronize, he can by no means accept any one as true.¹⁵

In this remarkable anticipation of the Popperian principle of falsifiability as the distinctive criterion of physical science, Bose shows how incisive his understanding was of the issues involved in the philosophy of science, particularly the methodology of science. One cannot but marvel at his caveat that the scientist himself might be 'duped by his own mind'.

One is therefore taken aback to find that at the conclusion of a scientific paper presented at the Royal Institution in 1901, J C Bose says:

It was when I came on this mute witness of life and saw an all-pervading unity that binds together all things ... the mote that thrills on ripples of light, the teeming life on earth and the radiant suns that shine on it ... it was then that for the first time I understood the message proclaimed by my ancestors on the banks of the Ganges thirty centuries ago - "They who behold the One, in all the changing manifoldness of the universe, unto them belongs eternal truth, unto none else, unto none else, unto none else."

Obviously his grand plan has taken on an unmistakably nationalistic and metaphysical colour. It is history that Sister Nivedita, who was present at the conference, gleefully reported this statement to Rabindranath Tagore in Calcutta who was simply bowled over at this perceived triumph of ancient Indian wisdom over the crass materialism of upstart 'Western science.' Be that as it may, it very clearly showed a shift in Bose's stand so far as the demarcation between religious metaphysics and scientific method was concerned. What had happened in the meantime that could have occasioned this change?

Two important things have happened: one internal to science, the other external. In August 1900 Bose presented at the International Physical Conference in Paris a paper entitled 'On the Similarity of Effect on Stimulus on Inorganic and Living Substances.' He explained that in the course of conducting research on various metallic receivers he had noted that just as fatigued animal muscle recovered its activity after an interval of rest, so did his metallic receivers. He presented a comparative study of the response of nonliving and living substances, particularly muscles, to electric stimuli, and concluded that there was 'no break of continuity' between the living and the non-living. One could not draw a line demarcating the purely physical phenomenon from the physiological, the 'phenomenon of dead matter' from that 'peculiar to the living.'¹⁶

Both Nivedita and Vivekananda were present at the Paris conference. Both were filled with nationalistic pride at Bose's performance. The ecstatic words in which Vivekananda hailed Bose's lecture 'could have applied as much to' the former's famous Chicago lecture seven years earlier. But, 'the contrast is also striking: in Chicago Vivekananda had carried the vedantic philosophy of India to the West; in Paris, Bose the Indian was meeting the west on its own particular terms.'¹⁷

Later, Bose tried to show that not only metals and muscles, but plants, even ordinary plants, responded in a remarkably similar fashion to electric stimuli. With his usual expertise in devising innovative instruments, he meticulously recorded these responses and from the similarity of these responses arrived at the theory that the same phenomenon of life was flowing through the animal kingdom, the plant kingdom and the inert kingdom of materials. This theory stood on the single hypothesis that response to electric stimuli was the sign of life. How far is this premise tenable and how did Bose test this hypothesis?

Dasgupta shows that, scientifically speaking, Bose might have derived this idea from the English physiologist Augustus Waller,¹⁸ who had, as early as 1887 recorded electric currents generated by the heart.¹⁹ However, the difference between the two hypotheses was that while Waller considered electrical response as only the necessary condition for proving the presence of life, Bose took it as both necessary and sufficient. Bose did not explain his reasons for extending Waller's hypothesis thus. For him, recordable electric response indicated the presence of life.

That missing link is provided by the philosophy of advaitavad.

Vivekananda, Nivedita and Advaitabad

In 1898 Bose had met Sister Nivedita, the firebrand Irish disciple of Vivekananda, for the first time. On the very first day of their meeting at Calcutta, they had the following conversation:²⁰

Bose smiled and asked, 'Do you want scientific verification to establish advaitabad? ... Do you believe that the realisation of wisdom and science are the same thing?'

Nivedita said, 'The Upanishads do point in that direction.'

Nevertheless, he did not hide his displeasure at the way Vivekananda had made an avatar of Ramakrishna Paramahansa whom Bose detested as a confirmed misogynist. Surprisingly and uncharacteristically, Nivedita did not protest. Not only that, within a short time she was so mesmerised by Bose that she offered to and started editing Bose's scientific papers. It is apparently rather intriguing that despite such serious ethical and theological differences, Nivedita went ahead to cultivate Bose, that too with the specific approval of Vivekananda. Lizelle Reymond, the French biographer of Sister Nivedita, explains that while the two chose to disagree on theological niceties, they did agree on a scientific-philosophical programme. What was that programme? 'It is through Bose that Nivedita realised that even the mysterious advaitabad did contain verifiable truth.'²¹

Actually, this is what Vivekananda had been harping on in his numerous lectures in Europe and the USA subsequent to his Chicago lectures in 1893. Three points clearly emerge from Vivekananda's speeches:

- ò There is no discontinuity between the living and the non-living.
- ò Inorganic matter possessed electrical responsiveness, which was also the fundamental property of life itself.

ò Advaitavad and samkhya are replete with the idea of continuity amongst inorganic, vegetative and animal entities.

The similarities between their approaches are at least as striking as those between the responses of metals and muscle tissues to electric stimuli.

It is clear that despite Bose's fundamental ethical and theological differences with Vivekananda, they concurred so far as philosophy was concerned. They both believed in the infallibility of the philosophy of advaitabad. Vivekananda needed the required empirical verification for this philosophy from a man of science and Jagadish Chandra was only too ready to provide it. Nivedita was a catalytic factor in the philosophical union of the two great minds.

In a letter to Tagore from London (30 August 1901), Bose writes about this unification dream as if in a trance:

I doubt whether I shall ever be able to pick up the thread if I even temporarily break away from this obsession of ideas that now possesses me. Just think, at this very moment I have completed a wonderful experiment. In order to bridge the abysmal gap that exists between animals and the non-living, I was trying to see whether I could find the life-response curves of plants. And just now I got the magnificent result from the experiment — One! One! They are all One indeed! Now I will attack the problem on two sides, placing the plants in the middle — the same instrument, the same curve-recorder — I shall place first a plant, then an organism, the next moment a non-living matter and show — the same handwriting! Can you imagine what this will lead to! How many sciences will be unified!²²

Thus, Bose's grand plan had now taken on a grander shape. Now he was convinced that there was unity not only between the various forms of electromagnetic waves, but between life and non-life, as enunciated in Samkara's advaitabad and that establishing this unity will lead to the grand unification of the sciences. This, he said, would be his life's work. He was trying to 'restore the lost mysticism of science, to "humanize" its mechanical world-view.' However, in terms of actual scientific research, 'while his project was to transcend the boundaries between the animals, the plants, and the inert objects, his work was ultimately reduced to showing the similarities only between animals and plants.'²³

Did all this amount to abandoning science in favour of metaphysics?

We shall come back to the problem in a moment. Before that, two other possible factors behind Bose's abandoning of radio wave research after achieving such spectacular success need to be considered.

Mathematics and Colonialism

When Marconi on 12 December 1901 made the first trans-Atlantic radio transmission from Poldhu, Cornwall to St. John's, New Foundland, across 2170 miles, the problematic had already changed. The problem now was to see whether these waves were capable of traversing and being received at very long distances. Any contemporary physicist worth the name would say that electromagnetic waves would not be received at long distances, for in the absence of any mirror-like roof above, they would simply float away. However, because Marconi 'the gifted amateur' did not know enough physics, he ventured to send the waves from Poldhu, England and found that they were received across the Atlantic in New Foundland, USA! In the following decades research along these lines led to the wonderful discovery of the ionosphere, which reflected the radio waves back to the earth. Curiously, Bose had

absolutely no role, nor apparently any interest, in these exciting developments. And yet, given his insight into the nature of the electromagnetic waves, he could very well have contributed to this development. Why was he absent from this field?

We have seen that while he had learnt physics, chemistry and botany from the best possible sources and was an experimentalist par excellence, his acquaintance with higher mathematics was not very deep. It is common knowledge that physical research in the twentieth century became more and more dependent on intricate mathematics. This could be one reason why Bose might have felt ill at ease in this field.

Secondly, for a colonial scientist, it was simply impossible to plan his practical research on such a majestic scale as Marconi did. Indeed, without his keen business acumen, even Marconi would not have been able to do so. Already in July 1897 Marconi had formed The Wireless Telegraph & Signal Company Limited. In 1900 this was re-named Marconi's Wireless Telegraph Company Limited.

Not only did it involve substantial outlay of capital, but it also entailed a scientific infrastructure and institutional support on a scale that only a scientist of the metropolis could expect to have.

The above two factors, combined with his philosophical and nationalist ideas, might have conspired to make Bose change his field of research.

Metaphysics, Science and Falsifiability

Now we finally come to the question: Did Bose, by frankly adhering to advaitabad, abandon science in favour of metaphysics?

Popper has a very interesting point to make in relation to the role of metaphysics in science: 'From Thales to Einstein, from ancient atomism to Descartes' speculation about matter, from the speculations of Gilbert and Newton and Leibniz and Boscovic about forces to those of Faraday and Einstein about the fields of forces, metaphysical ideas have shown the way.'²⁴ It is indeed so. But, as he takes so much pains to show, these metaphysical ideas have to pass through the filter of the criterion of falsifiability before they become science. He would 'certainly admit a system as empirical or scientific only if it is capable of being tested by experience. These considerations suggest that not the verifiability but the falsifiability of a system is to be taken as a criterion of demarcation' between science and metaphysics.²⁵

Therefore, the fact that Bose indulged in metaphysics cannot be held against him as a scientist. The point is, did he apply the filter of falsifiability or testability before admitting metaphysical concepts into the realm of science? He did not. He never answers the question why should response to electric stimuli be considered as the sign of life? He simply accepts it as a priori truth, because it accords well with the philosophy of advaitabad, which, according to him, enshrines the highest ancient Indian wisdom. In Popperian terms, he only seeks verification of advaitavadi 'truth', never attempting to put it to the 'crucial test'. It is also peculiar that in his enthusiasm for the philosophy of advaitavad, he simply forgets the other Indian systems, particularly Nyaya and Vaisheshika, which were at least equally great and which advocated a methodology and logic clearly at variance with advaitavad.

In this, as in many other things, he was again a follower of Vivekananda's ideas. It must, however, be made clear that as a philosopher, Vivekananda was certainly within his rights to promote advaitavad as the philosophy of everything. He was not a scientist and had no obligation to examine his statements by putting them through the crucial tests. But Bose was. Can a

scientist accept one philosophy as true a priori and then try to fit empirically obtained facts to that theory? In other words, despite his memorable caveat, he was duped by his own mind.

As an interesting parallel, we can consider the dilemma faced by Darwin. While starting on the Beagle voyage, he was still a believer in the fixity of the species. And yet, when the ornithologist John Gould showed in 1837 that the mockingbirds collected by Darwin on three different islands in the Galapagos archipelago were three distinct species and not varieties of the same species, he changed that belief.

Further, when John Herschel, whom Darwin himself revered as 'one of the greatest philosophers' of his time, criticised natural selection as 'the law of higgledy-piggledy', Darwin defended himself in no uncertain terms. 'The point which you raise on intelligent Design has perplexed me beyond measure; ... One cannot look at this Universe with all living productions & man without believing that all has been intelligently designed; yet when I look to each individual organism, I can see no evidence of this. For I am not prepared to admit that God designed the feathers in the tail of the rock-pigeon to vary in a highly peculiar manner in order that man might select such variations & make a Fan-tail; & if this be not admitted . . . then I cannot see design in the variations of structure in animals in a state of nature ...'.

To cap it all, in a letter to Julia Wedgwood on July 11, 1861, he wrote: 'The mind refuses to look at this universe, being what it is, without having been designed; yet, where one would most expect design, viz. in the structure of a sentient being, the more I think on the subject, the less I can see proof of design.'

Here we find a scientist forced to sacrifice his belief in the teeth of hard empirical facts. Instead, he could have tried to fit his facts to his belief, as many of his contemporaries did. That is why Darwinism represents such a great triumph of scientific method as well. The contrast with Bose is indeed remarkable.

Another instructive instance of philosophy-science interface is Einstein. In his early youth he imbibed Mach's neo-positivism. So much so that he considered Mach his philosophical guru of his youth. But his scientific practice convinced him of the folly of neo-positivism and he categorically stated that Mach was 'un bon macanicien' but a 'deplorable philosophe.' In 1926, in response to Heisenberg's question, he said, 'Perhaps I did use such philosophy earlier, and also wrote it, but it is nonsense all the same.'²⁶

Finally, one can always consider the negative example of the Lysenko affair. Here was again a case of an extra-scientific ideology lording it over science. This has been rightly condemned as the worst kind of ideological interference in science. If that is accepted, then one can legitimately question: why should Bose's adherence to the extra-scientific advaitavadi principle in the second phase of his scientific career be hailed as a triumph of ancient Indian wisdom over 'Western' science?

Can it be said that this is a typical instance of science in India getting caught between the two cultures?

Notes

- 1 J. D. Bernal, *Science in History*, Vol. I, The MIT Press, Massachusetts, 1983 edition, p. 39
- 2 Eric Hobsbawm, *The Age of Revolution: 1789-1848*, Abacus, London, 2003 edition, pp. 355-356
- 3 Many years later he would recall how he had conducted an experiment to uni-direct light rays in the same manner as electric current. 'Although ether waves enter women's tresses in a random manner, while going out they take an absolutely coherent path. I had collected from barbers' shops in Britain hair-samples of various races. Among these, the French ladies' jet-black locks were the most effective. The golden

locks of German ladies were much inferior in this regard. When I demonstrated this new theory before the assembly of French savants, they were much delighted. They were convinced that this proved beyond doubt their superiority over an enemy nation. Needless to say, I refrained from giving this demonstration at Berlin.' *Avyakata* (1921), [Unmanifest], Basu Vigyan Mandir, Kolkata, 1989, p. 49. Translation mine.

- 4 This epoch-making paper *Uber Strahlen elektrischer Kraft* (On the Power of Electrical Rays), was published in *Sitzungsberichte der Berliner Akademie der Wissenschaften*.
- 5 Atri Mukhopadhyay, 'Why Jagadish Chandra', *Anushtup* J C Bose Special Number, 2008, p. 19. Translation mine.
- 6 See Subrata Dasgupta, *Jagadis Chandra Bose and the Indian Response to Western Science*, OUP, New Delhi, 1999
- 7 Mukhopadhyay, *ibid*.
- 8 *Avyakta* (1921), p. 49. Translation mine.
- 9 http://en.wikipedia.org/wiki/Governor_of_Bengal
- 10 I am indebted to my friend Tarak Ganguly for fishing out this invaluable piece of evidence.
- 11 *Avyakata*, [Unmanifest], p. 50. An editorial note to the article informs that although it was published in 1921 in the *Moslem Bharat*, 'possibly it had been written much earlier.'
- 12 Bernal, *Science in History*, Vol. III, p. 774
- 13 Translated from *Avyakata*, [Unmanifest], Basu Vigyan Mandir, Kolkata, 1989, pp. 39-42. An editorial note to the article informs that although it was published in 1921 in the *Moslem Bharat*, 'possibly it had been written much earlier.'
- 14 *Avyakta*, p. 137. Translation mine.
- 15 *ibid*, p.88. Translation mine.
- 16 Dasgupta, p. 109
- 17 Dasgupta, p.110
- 18 Dasgupta, p. 129
- 19 Based on Waller's device and overcoming its inadequacies, the Dutch physiologist Willem Einthoven (1860-1927) obtained the first electrocardiogram (ECG) in 1901. Was Bose aware of it?
- 20 Debanjan Sengupta, 'Nivedita o Jagadish Chandra, Ek Vyatikrami Bandhuta'(A rare kind of Friendship), *Anushtup*, J C Bose Special Number, 2008, p. 158. Translation mine
- 21 Lizelle Reymond, Nivedita, fille de l'Inde, 1945. Quoted from Narayani Devi's Bengali Translation Nivedita, Umachal Prakashani, Kolkata, 1955, p. 273. See note 18.
- 22 Letter No. 34, London, 30 August 1901, *Patrabali* (Bose's Letters to Tagore), reprinted in *Anushtup*, J C Bose Special Number, 2008. Translation mine.
- 23 Pratik Chakrabarty, 'Science in India in the Twentieth Century' in J. B. Dasgupta (ed.), *Science, Technology, Imperialism and War, Centre for Studies in Civilizations*, New Delhi, 2007, p.131
- 24 Karl Popper, *The Logic of Scientific Discovery*, Routledge, London and New York, 2002 ed., p. xxiii
- 25 Popper, p.18
- 26 Steven Weinberg, *Dreams of a Final Theory*, Vintage, London, 1993, p.143 **P A S**

Declaration

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(Goutam Banerjee)

GALILEO GALILEI
 Dialogue Concerning the Two Chief World Systems –
 Ptolemaic & Copernican *translated by Stillman Drake,*
foreword by Albert Einstein

Take note, theologians, that in your desire to make matters of faith out of propositions relating to the fixity of sun and earth you run the risk of eventually having to condemn as heretics those who would declare the earth to stand still and the sun to change position – eventually, I say, at such a time as it might be physically or logically proved that the earth moves and the sun stands still.

– Note added by Galileo in the preliminary leaves of his own copy of the Dialogue.

Galileo's *Dialogue Concerning the Two Chief World Systems* is a mine of information for anyone interested in the cultural history of the Western world and its influence upon economic and political development.

A man is here revealed who possesses the passionate will, the intelligence, and the courage to stand up as the representative of rational thinking against the host of those who, relying on the ignorance of the people and the indolence of teachers in priest's and scholar's garb, maintain and defend their positions of authority. His unusual literary gift enables him to address the educated men of his age in such clear and impressive language as to overcome the anthropocentric and mythical thinking of his contemporaries and to lead them back to an objective and causal attitude toward the cosmos, an attitude which had become lost to humanity with the decline of Greek culture.

In speaking this way I notice that I, too, am falling in with the general weakness of those who, intoxicated with devotion, exaggerate the stature of their heroes. It may well be that during the seventeenth century the paralysis of mind brought about by the rigid authoritarian tradition of the Dark Ages had already so far abated that the fetters of an obsolete intellectual tradition could not have held much longer – with or without Galileo.

Yet these doubts concern only a particular case of the general problem concerning the extent to which the course of history can be decisively influenced by single individuals whose qualities impress us as accidental and unique. As is understandable, our age takes a more sceptical view of the role of the individual than did the eighteenth and the first half of the nineteenth century. For the extensive specialization of the professions and of knowledge lets the individual appear "replaceable," as it were, like a part of a mass-produced machine.

Fortunately, our appreciation of the *Dialogue* as a historical document does not depend upon our attitude toward such precarious questions. To begin with, the *Dialogue* gives an extremely lively and persuasive exposition of the then prevailing views on the structure of the cosmos in the large. The naive picture of the earth as a flat disc, combined with obscure ideas about star-filled space and the motions of the celestial bodies, prevalent in the early Middle Ages, represented a deterioration of the much earlier conceptions of the Greeks, and in particular of Aristotle's ideas and of Ptolemy's consistent spatial concept of the celestial bodies and their motions. The conception of the world still prevailing at Galileo's time may be

described as follows:

There is space, and within it there is a preferred point, the center of the universe. Matter – at least its denser portion – tends to approach this point as closely as possible. Consequently, matter has assumed approximately spherical shape (earth). Owing to this formation of the earth the center of the terrestrial sphere practically coincides with that of the universe. Sun, moon, and stars are prevented from falling toward the center of the universe by being fastened onto rigid (transparent) spherical shells whose centers are identical with that of the universe (or space). These spherical shells revolve around the immovable globe (or center of the universe) with slightly differing angular velocities. The lunar shell has the smallest radius; it encloses everything "terrestrial." The outer shells with their heavenly bodies represent the "celestial sphere" whose objects are envisaged as eternal, indestructible, and inalterable, in contrast to the "lower, terrestrial sphere" which is enclosed by the lunar shell and contains everything that is transitory, perishable, and "corruptible."

Naturally, this naive picture cannot be blamed on the Greek astronomers who, in representing the motions of the celestial bodies, used abstract geometrical constructions which grew more and more complicated with the increasing precision of astronomical observation. Lacking a theory of mechanics they tried to reduce all complicated (apparent) motions to the simplest motions they could conceive, namely uniform circular motions and superpositions thereof. Attachment to the idea of circular motion as the truly natural one is still clearly discernible in Galileo; probably it is responsible for the fact that he did not fully recognize the law of inertia and its fundamental significance.

Thus, briefly, had the ideas of later Greece been crudely adapted to the barbarian, primitive mentality of the Europeans of that time. Though not causal, those Hellenistic ideas had nevertheless been objective and free from animistic views – a merit which, however, can be only conditionally conceded to Aristotelian cosmology.

In advocating and fighting for the Copernican theory Galileo was not only motivated by a striving to simplify the representation of the celestial motions. His aim was to substitute for a petrified and barren system of ideas the unbiased and strenuous quest for a deeper and more consistent comprehension of the physical and astronomical facts.

The form of dialogue used in his work may be partly due to Plato's shining example; it enabled Galileo to apply his extraordinary literary talent to the sharp and vivid confrontation of opinions. To be sure, he wanted to avoid an open commitment in these controversial questions that would have delivered him to destruction by the Inquisition. Galileo has, in fact, been expressly forbidden to advocate the Copernican theory. Apart from its revolutionary factual content the *Dialogue* represents a down right roguish attempt to comply with this order in appearance and yet in fact to disregard it. Unfortunately, it turned out that the Holy Inquisition was unable to appreciate adequately such subtle humor.

The theory of the immovable earth was based on the hypothesis that an abstract center of the universe exists. Supposedly, this center causes the fall of heavy bodies at the earth's surface, since material bodies have the tendency to approach the center of the universe as far as the earth's impenetrability permits. This leads to the approximately spherical shape of the earth.

Galileo opposes the introduction of this "nothing" (center of the universe) that is yet supposed to act on material bodies; he considers this quite unsatisfactory.

But he also draws attention to the fact that this unsatisfactory hypothesis accomplishes too little. Although it accounts for the spherical shape of the earth it does not explain the

spherical shape of the other heavenly bodies. However, the lunar phases and the phases of Venus, which latter he had discovered with the newly invented telescope, proved that spherical shape of these two celestial bodies; and the detailed observation of the sunspots proved the same for the sun. Actually, at Galileo's time there was hardly any doubt left as to the spherical shape of the planets and stars.

Therefore, the hypothesis of the "center of the universe" had to be replaced by one which would explain the spherical shape of the stars, and not only that of the earth. Galileo says quite clearly that there must exist some kind of interaction (tendency to mutual approach) of the matter constituting a star. The same cause has to be responsible (after relinquishing the "center of the universe") for the free fall of heavy bodies at the earth's surface.

Let me interpolate here that a close analogy exists between Galileo's rejection of the hypothesis of a center of the universe for the explanation of the fall of heavy bodies, and the rejection of the hypothesis of an inertial system for the explanation of the inertial behavior of matter. (The latter is the basis of the theory of general relativity) Common to both hypotheses is the introduction of a conceptual object with the following properties :

1. It is not assumed to be real, like ponderable matter (or a "field").
2. It determines the behavior of real objects, but it is in no way affected by them.

The introduction of such conceptual elements, though not exactly inadmissible from a purely logical point of view, is repugnant to the scientific instinct.

Galileo also recognized that the effect of gravity on freely falling bodies manifests itself in a vertical acceleration of constant value; likewise that an unaccelerated horizontal motion can be superposed on this vertical accelerated motion.

These discoveries contain essentially – at least qualitatively – the basis of the theory later formulated by Newton. But first of all the general formulation of the principle of inertia is lacking, although this would have been easy to obtain from Galileo's law of falling bodies by a limiting process. (Transition to vanishing vertical acceleration,) Lacking also is the idea that the same matter which causes a vertical acceleration at the surface of a heavenly body can also accelerate another heavenly body; and that such accelerations together with inertia can produce revolving motions. There was achieved, however, the knowledge that the presence of matter (earth) causes an acceleration of free bodies (at the surface of the earth).

It is difficult for us today to appreciate the imaginative power made manifest in the precise formulation of the concept of acceleration and in the recognition of its physical significance.

Once the conception of the center of the universe had, with good reason, been rejected, the idea of the earth, was deprived of its justification. The question of what, in describing the motion of heavenly bodies, should be considered "at rest" became thus a question of convenience. Following Aristotle and Copernicus, the advantages of assuming the sun to be at rest are set forth (according to Galileo not a pure convention but a hypothesis which is either "true" or "false"). Naturally, it is argued that it is simpler to assume a rotation of the earth around its axis than a common revolution of all fixed stars around the earth. Furthermore, the assumption of a revolution of the earth around the sun makes the motions of the inner and outer planets appear similar and does away with the troublesome retrograde motions of the outer planets, or rather explains them by the motion of the earth around the sun.

Convincing as these arguments may be – in particular coupled with the circumstance, detected by Galileo, that Jupiter with its moons represents so to speak a Copernican system in miniature – they still are only of a qualitative nature. For since we human beings are tied to the earth, our observations will never directly reveal to us the "true" planetary motions, but

only the intersections of the lines of sight (earth-planet) with the "fixed-star sphere." A support of the Copernican system over and above qualitative arguments was possible only by determining the "true orbits" of the planets – a problem of almost insurmountable difficulty, which however, was solved by Kepler (during Galileo's lifetime) in a truly ingenious fashion. But this decisive progress did not leave any traces in Galileo's life work – a grotesque illustration of the fact that creative individuals are often not receptive.

Galileo takes great pains to demonstrate that the hypothesis of the rotation and revolution of the earth is not refuted by the fact that we do not observe any mechanical effects of these motions. Strictly speaking, such a demonstration was impossible because a complete theory of mechanics was lacking. I think it is just in the struggle with this problem that Galileo's originality is demonstrated with particular force. Galileo is, of course, also concerned to show that the fixed stars are too remote for parallaxes produced by the yearly motion of the earth to be detectable with the measuring instruments of his time. This investigation also is ingenious, not withstanding its primitiveness.

It was Galileo's longing for a mechanical proof of the motion of the earth which misled him into formulating a wrong theory of the tides. The fascinating arguments in the last conversation would hardly have been accepted as proofs by Galileo, has his temperament not got the better of him. It is hard for me to resist the temptation to deal with this subject more fully.

The *leitmotif* which I recognize in Galileo's work is the passionate fight against any kind of dogma based on authority. Only experience and careful reflection are accepted by him as criteria of truth. Nowadays it is hard for us to grasp how sinister and revolutionary such an attitude appeared at Galileo's time, when merely to doubt the truth of opinions which had no basis but authority was considered a capital crime and punished accordingly. Actually we are by no means so far removed from such a situation even today as many of us would like to flatter ourselves; but in theory, at least, the principle of unbiased thought has won out, and most people are willing to pay lip service to this principle.

It has often been maintained that Galileo became the father of modern science by replacing the speculative, deductive method with the empirical, experimental method. I believe, however, that this interpretation would not stand close scrutiny. There is no empirical method without speculative concepts do not reveal, on closer investigation, the empirical material from which they stem. To put into sharp contrast the empirical and the deductive attitude is misleading, and was entirely foreign to Galileo. Actually it was not until the nineteenth century that logical (mathematical) systems whose structures were completely independent of any empirical content had been cleanly extracted. Moreover, the experimental methods at Galileo's disposal were so imperfect that only the boldest speculation could possibly bridge the gaps between the empirical data. (For example, there existed no means to measure times shorter than a second.) The antithesis Empiricism vs. Rationalism does not appear as a controversial point in Galileo's work. Galileo opposes the deductive methods of Aristotle and his adherents only when he considers their premises arbitrary or untenable, and he does not rebuke his opponents for the mere fact of using deductive methods. In the first dialogue, he emphasizes in several passages that according to Aristotle, too, even the most plausible deduction must be put aside if it is incompatible with empirical findings. And on the other hand, Galileo himself makes considerable use of logical deduction. His endeavors are not so much directed at "factual knowledge" as at "comprehension." But to comprehend is essentially to draw conclusions from an already accepted logical system.

Authorized translation by Sonja Bargmann.

Foreword to Galileo's *Dialogue* (1632) by Albert Einstein

[2009 has been declared as the International Year of Astronomy by the United Nations in commemoration of Galileo's utilization of the telescope. As we know – and the contemporaries of Galileo soon knew in 1609 – that Galileo did not invent the instrument but only improved upon it and turned it to the sky. Galileo's observations, however, revolutionized modern science in general and Astronomy in particular.

Galileo's exposition of the heliocentric theory (as opposed to the longstanding geocentric and geostatic theories) appeared in his *Dialogo sopra i due massimi sistemi del mondo Tolemaico, e Copernicano* (*Dialogue concerning the two chief world systems Ptolemaic & Copernican*) written in Italian (not in Latin, then the lingua franca of all scholars in Europe) and published in 1632. A new English translation by Stillman Drake was brought out by the University of California Press (Berkeley and Los Angeles) in 1962. Albert Einstein was invited to write a Foreword to this translation. Einstein wrote it in German. It was printed along with the English translation by Sonja Bargmann in the parallel text form (German in verso and English in recto).

The "Foreword" merits several re-readings. Einstein highlights the "rational thinking" as well as the "unusual literary gift" of Galileo in adapting the Platonic Dialogue form, the "revolutionary factual content" of the *Dialogue* and its "subtle humour". Einstein points out that Kepler's solution of the "true orbits" of the planets, a decisive progress made during Galileo's lifetime, did not leave any traces in Galileo's lifeworks. Einstein then dryly comments: "a grotesque illustration of the fact that creative individuals are not receptive."

Einstein sums up Galileo's achievement as follows: "The *Leitmotif* which I recognize in Galileo's work is the passionate fight against any kind of dogma based on authority. Only experience and careful reflection are accepted by him as criteria of truth." He extols Galileo's credit by placing him in the historical context: "Now a days it is hard for us to grasp how sinister and revolutionary such an attitude appeared at Galileo's kind ..."

Einstein concludes by pointing out that it would be wrong to say "that Galileo became the father of modern science by replacing the speculative, deductive method with the empirical, experimental method. ... to put into sharp contrast the empirical and the deductive attitude is misleading and was entirely foreign to Galileo. ... The antithesis Empiricism vs. Rationalism does not appear as a controversial point in Galileo's work." Galileo's opposition to Aristotle has often been misunderstood. In several passages in the first dialogue Galileo himself stressed the fact "that according to Aristotle, too, even the most possible deduction must be put aside if it is incompatible with empirical findings." Moreover, "Galileo himself makes considerable use of logical deduction."

Einstein's "Foreword" thus provides much food for thought and illuminates the way to the understanding of the logic and philosophy of modern science.

Ramkrishna Bhattacharya] P A S

Charles Darwin and Karl Marx

Howard Selsam

Last year the scientific world observed the one hundredth anniversary of the first public announcement of the theory of evolution through natural selection. On July 1, 1858, the papers of Charles Robert Darwin and Alfred Russell Wallace were presented to a meeting of the Linnaean Society in London. Both men had independently arrived at the same theory – one as a result of a voyage around the world as "naturalist" on the British naval vessel, the *Beagle*: the other collecting specimens for years in the jungles of the Amazon and among the islands of Indonesia.

This year a far wider public is celebrating the publication of Darwin's great classic, *The Origin of Species*. It is barely noticed that 1959 is also the centenary of the publication of another epoch-making work by a scientific pioneer in a very different field. A second printing of Darwin's work was probably already under way when a one thousand copy edition of an obscure treatise was published in Germany by an emigré then living in London. It was Karl Marx's *Critique of Political Economy*. And just as Darwin's work put an end to the separate creation of species, Marx's put an end to the notion that bourgeois economy was the eternal and natural order of society.

Darwin's book ushered in a revolution in the natural sciences, radically changing and transforming man's conception of living things and their development. Marx's book initiated a revolution in the social sciences – uncovering laws of social movement and creating new possibilities for radical social transformation.

Interestingly, the very titles of the books indicated that their authors recognized they were pioneering in new areas and advancing radically new areas. Marx's work bore the title, *A Contribution to the Critique of Political Economy*. Darwin's original proposed title was *An Abstract of an Essay on The Origin of Species by Natural Selection*. Both authors believed themselves to be opening up new approaches, new subjects, and that their works were only outlines, abstracts, or introductions to what needed to be done.

Marx lived most of his life as an exile, among outcasts, all the time in poverty and debt, and often in bad health. Darwin never needed to earn a penny in his whole life and never had to ask for money from anyone except his father, who always gave it to him. He lived like a modest country squire on a small estate at Down, just about twenty miles from Marx's little flat in London. Like Marx he suffered from bad health all his adult life.

The two men never met. It is not even certain that they had any genuine mutual acquaintances. Yet there were several interesting exchanges and inter-connections that place them in the same world. The Curator of the London Zoological Garden, the eminent biologist, E. Ray Lankester, was one of the handful of friends present, along with such stalwart fighters as Engels, Liebknecht, and Lafargue when Marx was buried. Lankester corresponded with Darwin and was much admired by him. Marx's son-in-law, Edward Aveling, spent an afternoon with Darwin at Down in 1881. Aveling was struck by Darwin's combination of power and charm, which, in spite of his being tall and Marx short, made them seem to him so similar.

Marx and Darwin had one exchange. In 1873 Marx sent Darwin a copy of the second

German edition of *Capital*. (There is an oft-repeated rumor that Marx asked Darwin's permission to allow *Capital* to be dedicated to him, but to the best of my knowledge there is no evidence for this and the story seems purely apocryphal. Its punch line was that Darwin declined the honor.) Darwin replied October 1, 1873 as follows.

Dear Sir : I thank you for the honor which you have done me by sending me your great work on *Capital*; and I heartily wish that I were more worthy to receive it, by understanding more of the deep and important subject of political economy. Though our studies have been so different, I believe that we both earnestly desire the extension of knowledge; and this, in the long run, is sure to add to the happiness of mankind.

The letter, published by Aveling in his account of his visit with Darwin, is most unrevealing. From the general nature of Darwin's letters, and he wrote letters by the thousands, one judges it to be completely perfunctory. One cannot tell, without further evidence, whether he had heard of Marx and knew what *Capital* contained or not. He would have found a number of references to himself but this was commonplace to him, especially in books from Germany and America. On the other hand, had he known who Marx was, and anything of his life-work, he would most likely have written in exactly the same way. Darwin was determined to do nothing that would interfere with the acceptance by the learned world of what he had worked so hard to achieve and was so profoundly convinced of, namely, the theory of evolution. He studiously avoided all religious pronouncements and controversies and would certainly not get involved with whatever he might have heard Marx and his friends from many nations were up to. The question, therefore, whether Darwin knew of Marx, or had any opinions concerning the direction of his thought and activities, thus far remains completely unanswered.

On the other hand, Marx was an enthusiastic Darwinian and is said to have read virtually all his many volumes. Wilhelm Liebknecht even said that Marx recognized the significance of Darwin before the publication of the *Origin of Species* in 1859, but gives no evidence to support this assertion.

Darwin died in 1882 and was buried with "pomp and circumstance," in Westminster Abbey alongside of England's greatest scientific, military and political leaders. Marx died a year later and was unostentatiously buried in his wife's grave in Highgate cemetery, London, without even a headstone to mark the spot.

Few would deny today either the contribution to our knowledge of the world of these two men or their enormous impact on our, and all future time. Yet there is a vast difference in how they are regarded. Darwin's theory of biological evolution has swept all opposition aside. Evolution is as unassailable as the Copernican astronomy. Species arise and perish through ascertainable natural laws as surely as the earth moves. Opposition, once intense and powerful, has dwindled to virtually nothing in scientific and scholarly circles. Darwinism is synonymous with evolution, and evolution has become an accepted fact.

Marx's theory is under constant attack. He is forever being belittled, refuted, or dismissed as irrelevant to the contemporary British and American form of capitalism. This is true except for the one-third of the world that has been revolutionized in fact by his theories, together with millions in the capitalist and colonial worlds who accept his teachings and a small number of scholars who are able to approach his thought objectively.

There is a good reason for this difference. Darwin completed the bourgeois revolution in man's world-outlook, the final overthrow of ancient slave and medieval feudal views. He knocked the last prop out from under a God-centered universe made for man. His theory of

evolution was welcomed by advanced bourgeois thinkers. It seemed to give capitalism its final blessing. To the clergy and idealist moralists it proclaimed "laissez-faire." They were henceforth to have no more place in human affairs than God had in natural ones. Species evolve, society develops in accordance with natural laws, not moral considerations. Capital appeared now as the *natural* system of society, involving as it did the principles of struggle, competition, survival of the fittest. (Marx and Engels had much to say on this, as we shall see later.) Marx's theories challenged the whole bourgeois order and still do. They called for an end of all class rule; called for competition and struggle not simply to survive but for a better life for all mankind.

Thus it was that these two giant thinkers in two different realms, exact contemporaries, experienced such different receptions. Both were revolutionaries in their thought. But one completed one revolution while the other laid the theoretical foundation and indeed the basic organizational principles of a new one.

It is significant that both evolutionary and socialist theories were much in the air when Marx and Darwin reached adult life. This fact provides interesting points of similarity in understanding the experience and thought of these two men.

First, current socialist theories were idealist. They were based on Utopian ideas of what ought to be, of disinterested people of good will, with no leverage in concrete reality. Evolutionary theories were similarly idealist, based on either animal desires and purposes or an over-all divine plan. Both Marx and Darwin rejected these, in their respective spheres, as totally inadequate.

Secondly, Marx and Darwin were led to their discoveries by long and deep personal experience. As editor of the *Rheinische Zeitung*, Marx saw the failure of bourgeois reformist theories. Then forced to move towards socialism he was buffeted for years by the varied labor-socialist anarchist currents of Western Europe he worked among. Darwin set out on his voyage round the world innocently enough, but was led irrevocably, through his nearly five years of observation of the strange forms of plant and animal life, past and present, to seek a theory of evolution through purely natural means.

Through these intensive experiences both men were led to break with traditional ideas. They were led to achieve new approaches and hypotheses, and devoted the remainder of their lives to the quest for ever more data to justify and support their revolutionary theories. It is interesting how they were both to record their transition to their new ways of thinking as a rather sudden and vivid insight following a long period of searching for a solution to their respective problems. Darwin achieved his new theory in 1837 at the age of twenty-eight. Marx reports his transforming insight as occurring in 1844 when he was twenty-seven years old.

As in the case of all great scientific innovations, the thought of neither was born as complete or final. Both knew that what they had started would require - ever further development. It is appropriate, therefore, that when we use the terms Darwinism or Marxism we do not mean systems of thought completed and finished once and for all by these two men. We mean, rather, fundamental directions, methods, approaches which they originated and which have been and always will have to be enriched, developed and qualified with changes in the objective world and new developments in knowledge. Needless to say, both men firmly believed and clearly understood that such developments and qualifications of their systems were natural and inevitable.

Marx and Engels wrote many passages expressing their appreciation of what Darwin

achieved and its relationship to what they were doing. This was, unfortunately, strictly a one-way street. But one remark of Darwin, made in his mid-twenties at the end of his voyage on the *Beagle* strikingly indicates his awareness of the central problem Marx set out to solve.

Darwin hated slavery bitterly. He saw no justification in nature for it. He saw slavery as a purely arbitrary social relationship imposed and maintained by brute force. Indeed, in a passage first published in 1933, in his original *Diary of the Voyage of the Beagle*, Darwin had written under the date of July 3, 1832, a passage on the prospective struggle for liberation of Brazilian slaves, that has a ring suggestive of the liberation of the working class in the *Communist Manifesto*. But in discussing slavery at the end of his voyage he asks and answers the question whether the slaves are worse off than our own English poor. No! he answers decisively, the condition of the poor in the English factory towns does not make slavery any more palatable. And here Darwin takes the offensive and exclaims: "If the misery of our poor be caused not by the laws of nature, but by our institutions, great is our sin..."

Darwin never returned to this question but Marx's life-work was devoted to proving that the poverty of the workers in the capitalist countries was a product of man-made institutions, not of natural law. It was the very essence of Marxism, however, to take poverty amidst plenty out of the realm of "sin" by treating it scientifically, uncovering the historical causes from which it arose and the conditions necessary for its being overcome.

One other extraordinary social insight of Darwin's is worth mentioning. First confronted with the savages of Tierra del Fuego, he noted that the difference between savages and civilized men is even greater than that between wild and domesticated animals. In a letter to one of his sisters he expressed himself even more clearly than in the published *Journal*. To her he wrote: "The difference between a domesticated and wild animal is far more strikingly marked in man ... with difficulty we see a fellow creature." Thus Darwin, for perhaps the first time in history not only equated the process of civilization with that of the domestication of animals, but saw man as the animal that, unlike all others, domesticated himself. This clearly foreshadows both the title and content of the late V. Gordon Childe's work, *Man Makes Himself*. Although, in general, inattentive to questions of social anthropology, Darwin suggested one of the principles that have become basic in modern scientific ethnology and pre-history.

Darwin's *Origin of Species* was an exciting book to Marx and Engels. Here was the most concrete scientific confirmation of dialectics they had yet seen. Nothing was fixed and unchangeable in organic nature any more than in society. Everything has a history; everything arises and perishes. As Engels was to write in his *Feuerbach* many years later, Darwin's discovery along with that of the cell and of the transformation of energy, put an end to all possible static or metaphysical world views. Furthermore, Darwin showed that development in nature occurs through struggle, through what Marx and Engels, following Hegel, called contradictions. When Marx first read the *Origin* in 1860 he wrote to Engels: "This is the book which contains the basis in natural history for our view. "And a few weeks later he wrote to Lassalle:

Darwin's book is very important and serves me and a basis in natural science for the class struggle in history."

The fullest statement of what they believed to be the relation between Darwin's discovery and that of Marx was expressed by Engels at Marx's graveside some twenty-two years later. He said :

Just as Darwin discovered the law of evolution in organic nature, so Marx discovered that law of evolution in human history; he discovered the simple fact, hitherto concealed by an overgrowth of ideal-

ogy, that mankind must first of all eat and drink, have shelter and clothing, before it can pursue politics, science, religion, art, etc.; and that therefore the production of the immediate material means of subsistence and consequently the degree of economic development attained by a given people or during a given epoch, form the foundation upon which the state institutions, the legal conceptions, the art and even the religious ideas of the people concerned have been evolved, and in the light of which these things must therefore be explained, instead of *vice versa* as had hitherto been the case.

Selected Works, 1, p. 16

In short, just as Darwin had explained the evolution of the nonhuman organic world without divine plan on one hand or the conscious purpose of the organisms concerned on the other, so did Marx explain the development of the institutions of human society and their successive forms on the basis of social laws, in conformity with which alone men can achieve their aims and fulfill their ideals.

Just as Darwin found that species develop or perish depending on their ability to solve their life problems, especially those of obtaining food, protecting themselves from predators and securing an adequate rate of reproduction, so Marx discovered that societies change, old forms die and new ones arise, depending on their ability to solve their problems, the most fundamental of which is that of the fullest utilization of the instruments of production through forms of social organization appropriate to them.

It has long been noted and already mentioned here that the acceptance and public success of Darwinism was influenced in part by its seeming to justify existing predatory society. What has come to be called "Social Darwinism" has two distinct sides. One was the attempt to establish the idea that the class struggle is a struggle between the more fit and the less fit. The other was the idea that the different races and peoples of mankind are on different levels of development from the lower animals, with the white peoples of Northern Europe the highest level in the evolutionary scale. The aim of the first of these propositions was to prove the superiority of the capitalist class over the working class; that of the second to justify the exploitation and even extermination of "savages" and what are today politely called the "underdeveloped" peoples of the world. Professor Richard Hofstadter has given an excellent account of these views and the struggles waged over them in his *Social Darwinism in American Thought*. Like other discerning students of Darwin and Darwinism, Hofstadter points to Darwin's own shortcomings in these respects while emphasizing the fact that these were not characteristic of Darwin's moral sentiments which were based theoretically on the doctrine that human nature is securely founded in the social instincts.

Although, as we have seen earlier, Marx found in Darwin "a basis in natural science for the class struggle in history," he and Engels throughout the rest of their lives strongly opposed any attempt to explain human society and its evolution in terms of the biological "struggle for life." In a letter to Dr. Kugelmann, a German physician friend, Marx accused F. A. Lange, the idealist historian of materialist philosophy, of falsely trying to bring the whole of history under a single great natural law, "the struggle for life as *represented historically in varying and definite forms of society*," has done nothing but "translate every concrete struggle into the phrase, 'struggle for life,' and this phrase itself into the Malthusian population fantasy." (Italics mine.) This criticism gives us an excellent example of Marx's scientific empirical method. Human society constitutes a distinct level and cannot be explained by principles derived from the non-human world; neither can it be understood apart from its specific forms.

But Marx and Engels did more than oppose the application of Darwin's struggle for existence to the human world. They took the offensive by showing that the very attempt at such application was itself an indictment of capitalist society. Engels wrote: "Darwin did not know what a bitter satire he wrote on mankind and especially on his fellow-countrymen when he proved that free competition, the struggle for existence, which the economists prize as the greatest historical achievement, is the normal state of the *animal kingdom*." Similarly Engels wrote elsewhere: "The standpoint of the animal in nature appears as the last word in human development." In other words, while the bourgeoisie had taken up Darwin so enthusiastically because he seemed to justify the dog-eat-dog ethics of capitalism, actually his theories showed that under capitalism mankind has not yet risen above the "law of the jungle" of the animal world. As Engels said elsewhere, "Nothing discredits modern bourgeois development so much" as this fact. In the light of this approach to Darwinism the criticism that Marxism seeks to reduce everything to economics becomes positively ludicrous. One should say rather that it is trying to raise economics from an animal to a truly human level: trying to gain human mastery over the economy so that man's mode of getting a living serves truly human purposes instead of operating on the level of tooth and claw.

To begin to do justice to the relationship of Marxism and Darwinism, two special questions require further investigation. The first is that of the relationship of animal organs and their development to human tools and their development (nature's technology and man's technology). The second is whether there is any sense in which natural selection operates in or among human societies.

Marx, speaking in *Capital* of our need for a critical history of technology, says: "Darwin has interested us in the history of nature's Technology, i.e., in the formation of the organs of plants and animals, which organs serve as instruments of production for sustaining life. Does not the history of the productive organs of man, of organs that are the material basis of all social organization, deserve equal attention?" (*Capital*, 1, 406n.) Darwin raised to a scientific level the study of the role of the organs and limbs of animals in respect to their getting a living. Marx did the same with the tools and machines by which man lives. Darwin saw how the forms of getting a living — through burrowing, grazing, stalking; eating fruits, nuts or insects, etc. — are determined by the particular organs an animal has in relation to its environment, and in turn determine the life-pattern of the species. Marx established the principle that the economic structure of society corresponds to a definite stage in the material powers of production, that is of the tools used by man to get his living (wood, stone, bronze, iron, machines, steam-power, etc.). He concluded, further, that these "relations of production" constitute "the real foundation on which rise legal and political superstructures and to which correspond definite forms of social consciousness. The mode of production in material life determines the general character of the social, political and spiritual processes of life." (*Critique of Political Economy*, p.11).

Exploration of the question of the similarities and differences between human tools and animal organs, together with the principles determining their development, poses many interesting problems, most important of which is that of the function of the human brain in the evolutionary process. To say this is in no way to question the importance of the hand in the evolution of man. All evidence points towards some complex interrelationship between the development of the hand and the brain. What we are concerned with now is the evolutionary process subsequent to the rise of both.

The questions of the origin and the function of the brain led to some fundamental conflicts

between Darwin and Wallace. Though this came in later years to take the form of a struggle between a teleological approach on the part of Wallace, with some kind of divine guidance postulated, as against Darwin's determined agnosticism, it nevertheless reveals something of a dialectical versus a mechanical approach.

It is interesting to note that Wallace was a life-long socialist who began as an Owenite. He never forgot his experiences of the worst days of the Industrial Revolution and remained all his life a champion of working people and the poor generally. In 1888 Wallace brought out a volume entitled *Bad Times* which was an essay on the current depression and its causes in war expenditure, increase of speculation and of millionaires, and the depopulation of rural districts. In 1898 he published *The Wonderful Century : Its Successes and Its Failures*. The nineteenth century's successes lay in its development of the whole gamut of the natural sciences (in which he himself was a great pioneer figure), together with the application of science to production. The last three chapters, on its failures, contain an impassioned indictment of capitalism and conclude with these ringing and prophetic words :

The flowing tide is with us. ... And as this century has witnessed a material and intellectual advance wholly unprecedented in the history of human progress, so the coming century will reap the full fruition of that advance, in a moral and social upheaval of an equally new and unprecedented kind, and equally great in amount.

In the years after his first paper on evolution through natural selection Wallace was concerned with the problem of human evolution as opposed to the mechanisms he and Darwin had advanced to explain animal evolution. Dissatisfied with Darwin's rather mechanistic theory of evolution as applied to man biologically, and having no adequate answer, he fell back into teleology. Yet in his theory of the function of human tools in man's evolution as opposed to that of the bodily organs in animal evolution, and in his conception of the unique role of the brain in man's evolutionary process, Wallace came closer to Marxist historical materialism than Darwin ever did.

In a paper of 1864 Wallace expressed the new view that with the emergence of the human brain a creature had arisen who, for the first time in the history of life had escaped from the specialization of *parts* toward which evolution seemed always to progress. This process, he thought, ended with the rise of *homo sapiens*. In his brain man had developed an organ which enabled him to escape further biological specialization. Man could increasingly assign to his clothing and tools the specific activities for which the animals had to develop their own specialized organs. In human society, therefore, specialization became a matter of technology. With man, mind becomes more important than mere bodily structures.

Wallace does not seem to have dealt with the question of the hand and it would be interesting to study his views on man's evolution at this point in his career with those of Engels in his article, "The Part Played by Labor in the Transition from Ape to Man." It is possible that Wallace was a better Darwinian, and much farther from Lamarck than Engels was. In any case, he could not but have recognized the importance of the hand in his stress on the role of tools in man's evolution.

Man, Wallace believes, has taken away from nature the power of change she exercised over all other animals. Man meets changes in nature by changing his tools, clothing and habitation. "Man does this," he said, "by means of his intellect alone which enables him with an unchanged body still to keep in harmony with the changing universe." It is interesting to note how Wallace's view of man's "harmony with the changing universe" falls short of Marx's

view of man's mind as enabling him to *change* the universe, purposefully and directionally. Darwin did write of his admiration for this "mose striking and original paper," but does not seem to have given it any further thought.

In this same essay of 1864 on the action of natural selection on man, Wallace saw that with division of labor and mutual assistance natural selection in man is therefore checked. But he adds the suggestive thought that among primitive populations those which have the distinctly human qualities of acting in concert for protection and obtaining food, have foresight for the future, and so on, would have an advantage over others that lacked these qualities. The first would "have an advantage in the struggle for existence over other tribes" and in that way natural selection would operate.

All this suggests a connection between what Darwin did for the animal world and what Marx was doing for the understanding of the social laws of human development. Here Wallace seems to provide something of the "missing link."

This foray of Wallace into the realm of social evolution has already brought us to the second special question we set out to discuss: whether there is anything comparable to natural selection in human history. If there is any such thing it would, of course, be very different and properly better called "social selection," inasmuch as it operates through the actions, ideas and purposes of men working within historically evolved forces of production and the institutions erected on those foundations. As has been emphasized by those hostile to the whole scientific trend in the modern world, the term "natural selection", as both Darwin and Wallace well knew, was a meraphor borrowed from the "artificial selection" of the plant and animal breeder. (See, for example, Jacques Barzum, *Marx, Darwin, Wagner*.) Yet, a concept may be no less valuable in science – in the seminal sense of enabling us to move towards a closer approximation to reality – for being metaphorical. The ancient idea of the "music of the spheres" helped to lead Kepler to the discovery of his third law of planetary motion.

Although Marx and Engels never speak explicitly of natural selection as operating in relation to classes and societies, the idea of a "law" governing the succession of one form of society over another permeates the whole of historical materialism. And this would certainly not be an impossible extension of the principle from one level of organization to another (with appropriate qualifications) if Professor J.D. Bernal can extend it to all forms of inanimate matter ("The Origin of Life," *Mainstream*, April, 1958.) Marx and Engels always fought against mechanical transference of natural selection to society, especially when it took the form of "survival of the fittest". But we must be clear as to what they were opposing. It was the Spencerian or Social-Darwinian type of thought that made all social progress come about through the ruthless struggle of all against all. For this is a concept of no scientific validity whatsoever, inasmuch as it sees societies as *nothing* but individuals and never defines fitness in objective and socially meaningful terms. The mere command of wealth or power has no biological significance and the phrase is reduced to a complete tautology, from which it can escape only if it is given a moral connotation – those are on top who ought to be on top.

Marx and Engels worked throughout their lives with the two-pronged conviction that classes and social-economic systems survive, advance, or are eliminated by a process of social selection that is comparable to that of natural selection in the organic world. A class sinks into history, remaining only as an historical fact or perhaps as a living fossil, for the same reason a species does – that is, through its inability to adapt or adjust itself to changing conditions. Similarly with a society or a structure of economic relations, an economic system.

Here two principles are believed to operate for all societies that are in movement; all societies that is, with the exception of those which in relative isolation achieve a degree of stability that can be disturbed only when the isolation is destroyed. Darwin's writings are full of this in the plant and animal world.

The first of these principles is that of struggle, either within a society or between societies; struggle that is essentially that of classes. The second is that the society with the more advanced technology and the ability to use it to its fullest (in stricter Marxist terms, the society with the higher mode of production), and the class that can advance technology, or the development and use of the forces of production, more than the existing dominant class, must eventually triumph.

Such are some general principles of Marxism as opposed to theories of the process of social revolution in any given place and time. It is interesting to apply them to the contemporary world situation in the period of the triumph of socialism in one-third of the world and the movement towards competitive coexistence of socialism and capitalism. A three-fold struggle is taking place, all in the framework of the struggle for survival of opposing social systems and opposing classes. This consists of the class struggle within the advanced capitalist world; the struggle between the capitalist and socialist worlds for increasing productivity, high living standards, better education, health and higher culture; and the struggle of the colonial and semi-colonial areas of the world for freedom and industrial development. Is it too much to say that in peace, or in war if that should happen, victory (if there is any) will go to the social form that has achieved the highest potential for the development of the tools that are man's organs and the ability to use them with the greatest effectiveness for the raising of the living standards and the educational and cultural level of all the people? This is the theoretical basis for the theory of peaceful and competitive coexistence of the world's two great social systems.

It is not the purpose of this article to go into the details of this projected peaceful struggle of these two systems. It is called frequently a battle for men's minds. It is, over all, the struggle to convince presently non-committed people and countries that one or the other system will give them a better life, fulfill their highest hopes and aspirations. As Wallace saw in his account of the relations of primitive tribes, moral as well as material values are involved. Individual rights and freedoms as well as the most effective democratic forms for the participation of all the people in the determination of the conditions of their lives and direction of their development are likewise an essential feature of this struggle.

It might well be said that this is the greatest experiment of all times – probably the greatest that ever will occur on our earth. Its progress can be objectively measured. It will not be won by mere slogans. In the end the masses of the earth's people will decide which system will better serve their purposes – planned social ownership for use or anarchic production for private profit. This is selection on a high social level, its outcome determined by the decision of men themselves. But while the decision will be human the process is no less natural in the sense of operating in accordance with knowable economic and social laws. Men make their history, as Engels was fond of saying but they do not make it out of whole cloth. They make it blindly or intelligently, depending upon the extent of their knowledge of the laws of social development and their ability to use them. Animals evolve blindly. Men *can* evolve rationally.

It would hardly be too much to say that Darwin and Marx more completely represent the

nineteenth century than any other of its great men. They mark a divide between all past science, natural and social and all future thought. Both had ardent partisans and opponents. Both created great, broad, sweeping theories that opened up vast new vistas and that require endless development, modification, and qualification. One striking difference in the thought of these two giants that Marxism embraces Darwinism, leaving to biologists the working out of the innumerable controversial details. Darwinism stands apart, seemingly separable from Marxism. Yet it is evident to any objective observer, as it was to Wallace, that a theory of social evolution is required by the theory of biological evolution. And if one takes Darwin's thoroughly materialist stand, such a social science must be solidly against all forms of teleology and idealism. It is a most plausible thesis that as time goes on Marx and Darwin will appear ever closer together to those who study them, because the difference and separateness is trifling compared to all they had in common. One can well change Engels' final words at Marx's grave to include both men: "Their names will live through the centuries and so also will their works."

[*Mainstream* (USA), June 1959] P A S

Philosophy of Technology in the Americas in the Last Twenty-Five Years

Paul T. Durbin

Abstract

This article summarizes and analyzes some of the most important contributions to the voluminous literature in philosophy of technology that has been produced during the past twenty-five years in North, Central, and South America. (Major focus is on North America.) The survey emphasizes the variety of standards the authors have attempted to measure up to, and ends with a plea that, whatever the standard invoked, an overarching standard ought to be to contribute to the solution of real-world problems of technological society.

Introduction

In the Americas, North, Central and South, there has been something close to an explosion in the literature of philosophy of technology in the last twenty-five years. Since I have been the principal editor of most of the publications of the *Society for Philosophy and Technology* (SPT) during that time, a great deal of the work has passed through my editorial hands. I have always tried to assure that contributions to this body of literature meet the highest standards. But there is a problem here – namely, that these philosophers try to live up to very different kinds of standards.

Recently, I attended an international conference in Germany (Karlsruhe, May 1997) [Agazzi and Lenk (1998)] on "Advances in the Philosophy of Technology". I will repeat here a short definitional survey I gave there.

I begin with the dominant view in United States philosophy departments at the present time. Like scientific advance, analytical philosophers assume, there can be philosophical progress, with one contribution building on others, and on and on. In the United States, this has become the ideal of academic progress.

However, once this academic standard was extended, by departmental committees and deans, to almost every field of higher learning, it began to come under attack. Critics maintain that, when the standard is applied in humanities fields such as literature, history, and the arts – and many of the critics would lump philosophy together with other humanistic disciplines – it is totally inappropriate. The only measuring rod we can use in these fields in greater and greater originality – especially in terms of persuading whatever are perceived to be the relevant audiences.

A few transcendentalist metaphysicians and theologians object to both the strict (progressive) academic standard and the much broader "originality" standard; they say both are retrogressive chasing after increasingly trivial minutiae. The only real progress moves in the opposite direction, toward more and more comprehensive syntheses – ever closer approaches to truth or beauty or goodness (sometimes capitalized as Truth, Beauty, and Goodness).

There are also "right-side-up" dialectical-materialist neo-Hegelians – and others – who insist on real social progress as the only appropriate standard.

Finally, still others insist on what I would call an Aristotelian model, recognizing that academic fields are divided along disciplinary lines, each with its own standards. At least some of the sciences meet the criterion of progress within limited domains; but most intellectual endeavors can make only "intensive" or "qualitative" progress, providing no more than a deeper appreciation of, or new insights into, old truths, traditional arts and crafts, and also such newer methodologies as those associated with computers and other new technologies.

If we now look at what has been accomplished in philosophy of technology in the Americas in recent decades, how should we judge it using these standards?

North American Philosophy of Technology

A1. Analytical Approaches (I)

Nearly everyone agrees that the benchmark contribution to North American philosophy of technology is Carl Mitcham's *Thinking through Technology* [Mitcham (1994)]. And Mitcham's main contribution is taken to be his conceptual framework of (a) technological knowledge and (b) technological volition leading to (c) the technological activities of making and using (d) technological objects or artifacts (in the broadest sense). About this, Mitcham says that "a framework should be both definite enough to provide some guidance and open enough to allow for adjustments and the possibility of winding up with new ideas. If it is to be philosophical", he adds, "it should raise philosophical questions while remaining hospitable to different responses to those questions" [Mitcham (1994), p. 160]. And he thinks his framework (which he tentatively links to Aristotle's *Categories*) meets these standards.

Two things need to be said about Mitcham's analysis. One is that a number of analytical philosophers think the approach is fundamentally wrong-headed (however well intentioned); I will return to them in a moment (section A2, below). But the other side of the coin is that Mitcham's framework does build on earlier work.

First, Mitcham's analysis picks up on a number of European-based attempts to distinguish technology from science and to reassess the once-dominant view about the relationship between the two (assuming they are somehow distinct). The best known North American interpreter of Martin Heidegger's critique of technological culture is Albert Borgmann [Borgmann (1984), (1992)]. His "device paradigm" description of modern, technology driven consumer culture, with its call to citizens of technological cultures to return to "focal things and practices", has become a mainstay of North American philosophy of technology. Some even say

it has generated the first genuine tradition – with younger scholars (for example, Strong (1995)) expanding on the work of their mentors – in North American philosophy of technology. (A Borgmann *Festschrift*, edited by Higgs, Light, and Strong, should be published in late 1998 or early 1999.)

Heidegger was also an influence on Don Ihde [Ihde (1979), (1983), (1990), (1993)], perhaps the most prolific of American philosophers of technology. But a stronger influence on him was Edmund Husserl, and Ihde's most common focus has been on the way culture – including technological culture and its many instruments and gadgets – shapes perception. Ihde thinks of himself, thus, as a phenomenologist, and much of his work focuses on epistemological concern. Ihde's phenomenology of technology is widely esteemed, and his version of a Husserlian approach is both unique and uniquely American. But it is not analytical in any narrow sense either.

The same is true of Langdon Winner [Winner (1977), (1986)]. The title of his first major book, *Autonomous Technology*, owes much to another European critic of technological culture, Jacques Ellul, though Winner gives the theory of autonomous technology a decidedly non-European turn. (In this pairing, Mitcham learned much more from Ellul than from Winner.) What Winner has become famous for is the theory he calls “technological politics” – that technologies should be critiqued not for their uses or misuses, but for the political structures built right into them – especially their authoritarian or anti-democratic features.

Although Mitcham's (re-) definition of technology depends, to some extent, on all of these philosophers, European and North American, he develops his own framework most immediately from earlier analytical frameworks provided by Robert McGinn (1978), (1991)] and Stephen Kline [Kline (1985)]. What McGinn, Kline, and Mitcham are attempting to do is provide a set of characteristics that uniquely single out the institution of (modern) technology, distinguishing it from such other modern institutions as science, art, religion, and sports. And Mitcham's is the most comprehensive of such attempts.

However, it is possible to question whether or not the highlighted characteristics really differentiate modern technology from its closest neighbor institution, modern technologized science. [See Cordero (1998), writing from an analytical perspective; also Barnes, Bloor, and Henry (1996), representing a sociological perspective.]

A2. *Analytical Approaches* (II)

A totally different sort of analytical approach to philosophy of technology can also be taken. It is one that is unconcerned about characteristics alleged to differentiate between scientific and technological institutions and practices. Instead, authors such as Shrader-Frechette [Shrader-Frechette (1980), (1991), (1993)] and Cranor [Cranor (1993)] take as a starting point actual methodologies used by scientific-technical experts – their favorite example is cost-benefit analysis; they then critique those methods, employing the standards of the strictest methods borrowed from philosophy of science. (Shrader-Frechette adds to this an ethical critique, challenging risk assessors to be more equitable and broadly democratic.) These contributions to North American philosophy of technology, without doubt, measure up to even the strictest standards of academic progress.

B. *A Postmodern Critique*

North Americans have joined in the critique of science and technology – or “technoscience” – in the name of “postmodernism”. One particularly striking example of this approach can be

seen in *Narrative Experiments: The Discursive Authority of Science and Technology* [Ormiston and Sassower (1989)]. The focus is clear in the subtitle: neither technology nor science should be accepted as authoritative on its own terms. The two go together, as “technoscience,” and its/their authority has been won in a discursive struggle within a cultural and linguistic context. What is more, science and technology have won out over competing narratives at a particular point (really, many points) in history; and their authority was achieved simultaneously with the legitimation of their modes of discourse. Finally, these modes of discourse are no more nor less cyclical than patterns in the humanities. At their most provocative, Ormiston and Sassower say that science and technology are not separate; they fall within the class of humanities disciplines or discourse.

It is against views of this sort that the most vociferous defenders of scientific and technological objectivity have railed [Gross and Levitt (1994)]. According to these critics of postmodern critiques, abandoning the standard of scientific objectivity does incredible disservice to legions of well-meaning – and successful – scientists and engineers. But there are also less extreme critics of the critical view, even within the broad range of science and technology criticisms labeled “postmodern,” and whose advocates tend to accept standards of progress less strict than the strictest of academic standards. [See, for a summary of such views, Rouse (1996).]

C. *Metaphysical Critiques*

Above, I listed Carl Mitcham among analytical critics of technology, along with neo-Heideggerians like Albert Borgmann or phenomenologists like Don Ihde. But the truth of the matter is that almost all of the philosophers of technology in North America who have been strongly influenced by Heidegger or Ellul are not primarily interested in definitional or conceptual issues. Their true focus is on the place of philosophy, understood traditionally in a sense that gives primacy to metaphysics, within a world dominated by means rather than ends. They are culture critics, attempting to comprehend the world-taken-for-granted in mundane thinking. This is the only way to understand Heidegger's “existential” claims about a framework that constrains (modern) technical thinking – or, similarly, to understand Ellul's claims about Technique as the idol of our age [Lovekin (1991)].

Mitcham (1994) ends his book with references to a romantic Heidegger: “In Heidegger's existential analysis there is a paradox, that the personal that is revealed through the technical is also undermined thereby” [Mitcham (1994), p. 297]. Although Mitcham recognizes “inherent weaknesses” in the romantic critique of technology, he clearly wishes they could be overcome.

What kind of standard does a metaphysical (or Heideggerian-existential) critique of technology invoke? Analytical philosophers accuse such metaphysical thinkers of retreating to the past. Hegel-oriented philosophers [see Verene (1997)] claim that a “comprehensive” approach is the standard that philosophers have always appealed to, down through the ages of Western philosophy.

D. *Ethics and Technology*

I would like to, but it would be impossible to provide a brief summary here of the vast North American literature on applied ethics that touches on technology – from biomedical ethics to research ethics to computer ethics and environmental ethics. In the USA, engineering ethics [Harris, Pritchard, and Rabins (1997)] and environmental ethics have suffered the same fate as applied ethics generally; that is, purists have tended to question the academic credentials

of most (some would say all) engineering and environmental ethicists. They are, the critics say, not doing real ethics, but a less worthy application. [For a counter proposal in environmental ethics, see Light and Katz (1995).]

E. *Political Philosophy and Technology*

Once North American philosophers began to take technology seriously, the traditional view of technology as applied was rarely viewed as a serious alternative. Langdon Winner [Winner (1977), (1986)], mentioned earlier, was one of the earliest philosophers to make this point.

Among North Americans writing about the politics of technology in the period covered here, I will refer to only two groups.

Marxists – and especially neo-Marxists influenced by Marcuse – argued that the ills of contemporary society, while they are related to technology and the social demands of living in a technological society, call for revolution if they are to be solved.

One neo-Marxist philosopher influenced by Marcuse, Andrew Feenberg [Feenberg (1991)], has questioned this, arguing that it is possible to spell out certain conditions under which we might achieve a more just, worker-oriented society without revolution.

Arguing for social-democratic evolution rather than socialist revolution, North American philosophers of technology following in the footsteps of the pre-eminent American Pragmatist philosopher, John Dewey, have put their faith in piecemeal social reform as the way to keep technological ills under democratic social control. Larry Hickman [Hickman (1990)] is the leading spokesperson for this group. He wrestles with (and against) all the “metaphysical” thinkers mentioned earlier, arguing that the right kind of instrumental rationality can avoid the excesses of both the left and the right in dealing with technosocial problems.

My own work [Durbin (1992)] falls within this tradition of piecemeal social reform as a remedy for technosocial ills. What I appeal to is the success that progressive activists have had, and the hope that their success will continue in the future.

What sort of standards do praxis-oriented philosophers of technology appeal to? We tend to recall Karl Marx’s statement that he was not so much interested in understanding the world as in changing it. Most Marx-based philosophers insist on wholesale, even worldwide, revolutionary change; we progressives will be satisfied if a reasonable number of local technosocial ills can be dealt with successfully, at least temporarily. Any more sweeping changes must start there.

Latin American Philosophy of Technology

A. *Parallels to North America*

Carl Mitcham [Mitcham (1993)] has produced an invaluable summary of work in the philosophy of technology in Spanish speaking countries. A major portion of the work he has collected as representative of Latin America represents a strong parallel with recent North American philosophy of technology.

In Chile, Mitcham cites contributions by a Heideggerian, a neo-Marxist, and an analytically-inclined philosopher trained in North America. For Costa Rica, Mitcham includes philosophers trained in North America or strongly influenced by North Americans. I would hazard a guess that these philosophers, if asked, would want their work judged by standards similar to those invoked in North American universities.

B. *A More Concrete Focus*

Other Latin American philosophers have been more concrete. In 1995, it was proposed that

the *Society for Philosophy and Technology* should hold its next international conference (1996) in Mexico. The Mexican organizers chose to focus on a practical topic, “Technology, Economic Development, and Sustainability”. The resulting proceedings volume [Martinez Contreras, Gutierrez Lombardo, and Durbin (1997)] includes over a dozen contributions – just counting those by Mexicans – that are directly or indirectly related to the theme. Some of these philosophers focus on the concept of sustainability, others on ethics and sustainability, and still others on a variety of topics related to development and the environment (including women’s issues).

Recognizing that each has his or her particular focus, it seems safe to say that the standard by which many of them would want to be judged is not academic. What they are concerned about is whether, and to what extent, philosophy can contribute to the solution of the environmental problems that have accompanied economic development initiatives in their country. (Other authors focused on other countries, not only in Latin America but throughout the Spanish speaking world.)

Conclusion

What lessons might we draw from this survey? The most obvious lesson is that philosophers of technology, in both North America and Latin America, seldom have academic rigor as their primary focus. Some good work, following the lines of academic philosophy of science, does exist. But many more of these philosophers would prefer to be judged by other standards, and quite a few are critical of academic standards in the first place.

For my part, I believe the most important standard for all philosophers of technology ought to be practical. Will the philosophical work contribute, in any significant way, to the genuine solution of urgent techno-social problems? The urgency of these problems is very great, and I think we all have a social responsibility, and a golden opportunity, to help deal with the problems.

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Fifty Years of Lokayata

[The publication of *Lokayata : A Study in Ancient Indian Materialism* (1959) by Debiprasad Chattopadhyaya (1918-1993) is a landmark in the annals of Indian philosophy. It ushered in a new era by throwing much needed light on the origin of materialism in India, following the method first hammered out by George Thomson (1903-1984) in his now-classic analysis of ancient Greek society and "the first philosophers" it produced.

Chattopadhyaya's investigation was hailed on all hands as a truly creative contribution to the study of Indian philosophy. Reviewers, Indologists and / or specialists in philosophy, both Marxists and non-Marxists, admitted that *Lokayata* was a path-breaking work, worthy to be studied by the students of anthropology, history of ideas, philosophy and sociology.

In the fiftieth year of its publication, *PAS* reproduces Dipak Nandy's long review article of *Lokayata* published in *Marxism Today*, monthly organ of the then Communist Party of Great Britain, in January 1962. It is followed by a note sent by N.P. Anikeev from Moscow (*MT*, December 1962). George Thomson, Professor of Greek in the University of Birmingham, later came out with a rejoinder to Anikeev (*MT*, February 1963).

To these three are appended a personal, handwritten letter to Chattopadhyaya from Professor Joseph Needham, author of the monumental *Science and Civilisation in China*, and the recipient's reply.

The materials have been gathered from the personal collection of Professor Prabhas Kumar Sinha (1918-2008) and the private papers of Debiprasad Chattopadhyaya.

Ramkrishna Bhattacharya

Courtesy : Aditi and Atasi Chattopadhyaya]

Ancient Indian Materialism

Dipak Nandy

The Vice-President of India, Mr. Radhakrishnan, recently stated that "the characteristic of Indian thought is that it has paid greater attention to the inner world of man than to the outer world". Indeed, the course of Indian thought, as told in the standard accounts, might well be described as "Variations on an Idealistic Theme".

Was there then no tradition of materialist thought in ancient India? The question is not quite so remote and academic as it may appear at first sight. For it has been the claim of anti-Marxists, both in India and elsewhere, that Marxist materialism is fundamentally alien to Indian categories of thought and experience: it is a foreign ideology. To this two answers were possible. First, of course, that the argument that Marxism is alien to such and such a nation or people or continent has been produced with respect to every continent, nation and people since the rise of Marxism. It was alien to Russia for many of the intelligentsia before 1917; it was alien to China; it is alien to Britain and her traditions. It is, apparently, alien everywhere.

But, secondly, we have known for a long time that there has been in India a body of

thought which stood significantly apart from the mainstream of Indian philosophic idealism. The Charvakas of ancient India appear to have arrived at a position as near materialism (we thought) as the dominating context of idealist thought would permit. The only difficulty in describing this body of thought as "materialism" (implying at least a moderately coherent and systematic account of the world) has been the simple and shattering problem of ignorance: *we don't know at first hand what these people actually thought.*

This is a curious but not wholly unfamiliar situation in the history of human thought, especially of radical thought. Our knowledge of the second-century Christian gnostics, for example, derives almost entirely from the "refutations" of their thought by the Church fathers. So with the Lokayata Philosophy of ancient India. What survives of this school of thought amounts to scarcely more than grotesque parodies of their position by their opponents.

It has thus been left to Indian Marxists to piece together such evidence as we have, and to reconstruct the story of Indian materialist thought, its social roots, and the story of its survival in many forms to the present day. Not unnaturally orthodox historians of Indian philosophy have been content in the main to accept the distorted accounts as adequate, or even to argue that since no one could have held such patently absurd views *such views were not held.* Recently, however, there appeared a pioneering work in the field of Indian philosophy by D.P. Chattopadhyaya which makes it impossible to maintain that the Lokayata philosophy did not exist.¹ It is there, triumphantly alive in his pages.

Before we turn to him, it would be useful to summarise what was previously known to the generality of scholars. As he himself acknowledges, the bulk of the extant material relating to the Lokayata view is to be found in the pages of Professor S.N. Dasgupta's monumental *History of Indian Philosophy* (1922-55), a work of erudition and scholarship for which no praise is too high. But Dasgupta merely presented the evidence – he did not (perhaps could not) draw the necessary conclusions which that evidence suggested.

To begin with, the meaning of the word *Lokayata* is important, for in Indian philosophy etymology is an essential adjunct to philosophy proper. *Lokayata* is a compound word which can mean one of two things. *Loka* can be used in the sense of "this world", as opposed to the next, or in the sense of "the people"; *ayata* can mean either "based on" or "prevalent among". So *Lokayata* may be translated as a philosophy which is based on the material phenomenal universe, or, equally, a philosophy which is prevalent among the people.

This philosophy of the material world, which was also a popular philosophy, was reckoned to be on the one hand extremely ancient (Dasgupta wanted to put it down as an ideological import from the Sumerian civilisation) and at the same time quite recent – witness the running polemic conducted by idealist philosophers down to the fourteenth century A.D. There are, as we have said, no extant Lokayata texts, but that there was an authoritative text with at least two commentaries on it, is beyond question. The earlier of the two commentaries has been dated by some scholars to before 300 B.C.

The Lokayata Philosophy

What did the Lokayata philosophy consist of? The most generally accepted view of the ancients is that expressed, for instance, by the Buddhists: Follow not the Lokayata which

¹ Debiprasad Chattopadhyaya, *Lokayata : A Study in Ancient Indian Materialism*. People's Publishing House, New Delhi, 1959. Rs. 27.50

does not strive towards an accumulation of virtue. "The Lokayata leads to mischievous things and cannot lead to the path of Heaven or that of release² and is only a tricky disputation which does not increase true wisdom." wrote one Buddhist commentator. A Jaina writer said, "They are given to pleasures, amusements and sensual lust; they are greedy, fettered, passionate, covetous, the slaves of love and hate."

But there are more specific indications about Lokayata beliefs than these vague and sweeping indictments. Roughly, the Lokayatikas (i.e. those who held Lokayata views) may be credited with three distinctive positions : they have a theory of knowledge, they have a theory of being, and they have their own characteristic scheme of values.

To take these in order : the Lokayatikas, it is said, deny inference based on inductive generalisation, and hence also deny causality. This derives from their theory of knowledge. For them, all knowledge is derived from direct sense-perception. They do not, like Bishop Berkeley, assert that "to be is to be perceived," but they do say that not to be perceived is not to exist. This may be taken as a denial of occult or metaphysical entities whose existence cannot be verified by sense-perception. Their rejection of causality follows from this. Traditional philosophers have taken particular directly perceived facts, say, fire, and others, say, smoke. In between these direct perceptibles they have interposed a non-perceptible, a "cause". To assert as they do, that *fire is the cause of smoke* is to go beyond what is given in experience. Experience gives us the antecedent (fire) and the consequent (smoke), but it nowhere gives us a "cause". (In technical language, a "cause" would have to be a universal, and universals cannot be perceived.)

This is, of course, remarkably like Hume, and just as Hume was driven to admit after *his* denial of causality that in actual practice the ordinary business of life proceeds pretty smoothly on the assumption that causal relations do exist, so the Lokayatikas admitted the usefulness of inductive generalisations and the postulation of causes. The terms in which this admission is couched are important, in that they give us a clue as to the real point of their argument against inference and causality. Purandara, a seventh-century materialist, "admits the usefulness of inference in determining the nature of all worldly things, where perceptual experience is available; *but inference cannot be employed for establishing any dogma regarding the transcendental world, or life after death ...* which cannot be available to ordinary perceptual experience" [emphasis added]. Their argument then is not sceptical but materialist: they object to inference as a logical technique only when it is used to demonstrate the existence of supra-sensible states or transcendental beings. This, they say, would be bad logic.

Consistent with this approach, the Lokayatikas reject verbal authority as a criterion of truth. That is to say, they reject the sacred texts as a court of appeal in matters relating to knowing about and living in the world. In any case, they argued, the sacred texts contradict one another at so many points that no consistent doctrine can possibly be erected on them.

Theory of Being

Then there is their theory of being. The Upanishads³ assert that the world is constituted of five elements: earth, water, air, fire and space. The Lokayatikas reject "space" (on the ground

² *moksa* = release, liberation from the bondage of the material world, held to be the ultimate goal of human life.

³ *Upanishad* = literally, "secret knowledge" (as contrasted with *Veda* = "knowledge" with no strings). These are religious treatises of the Vedic school, of about 600-500 B.C.

that it is not present in perception) and accept only four elements, all of them physical. There are two aspects of their theory of being.

(1) In the natural world, they believe that these constituent elements and their motion sufficiently explain everything that happens, without reference to divine or transcendental explanations. "Fire is hot; water, cold; and the air is temperate to the touch. Who could have brought these distinctions into being if they were not of the very nature of these objects?" reads an aphorism attributed to them. They were, in short, naturalistic philosophers who wanted to explain phenomena by reference solely to the nature of the constituent elements of matter.

(2) Consonant with this rejection of the divine in the sphere of natural phenomena, they reject, in the human sphere, the existence of the soul. There is a reference in one of the Upanishads to certain heretics (identified by Jayanta, a later commentator (*sic*), as the Lokayatikas) who believe that "consciousness arises from the elements of matter and vanishes with them and there is no consciousness after death". A Jaina text refers to heretics (again identified by a later commentator, Silanka, as the Lokayatikas) who are reported to have said:

"So long as there is the body there is the soul, and there is no soul apart from this body, so the soul is identical with the body; when the body is dead there is no soul. When the body is burnt no soul is seen and all that is seen are but the white bones. ... There is no separate soul which suffers pain and enjoys pleasures and migrates to the other world after the death of the body, for even if the body is cut into pieces no soul can be perceived ..."

It is clear from these quotations that there is no place in Lokayata ontology for the suprasensuous or the transcendental. The connection between this and their scheme of values is obvious; the last quotation goes on to say that, because of the essentially materialistic character of Lokayata thought, they are also moral nihilists:

"The Lokayatikas thus think that there is no fault in killing living beings, since striking a living body with a weapon is like striking the ground. These Lokayatikas, therefore, cannot make any distinction between good and bad deeds as they do not know of any principle on which such a distinction can be made, and there is thus no morality according to them."

This is a common cry against materialists, obviously untrue as we shall see. Another witness said of them that "with them a pigeon today is better than a peacock tomorrow [and it is] better to have a sure penny today than an uncertain guinea tomorrow". On such grounds as these, others, including the famous idealist philosopher, Samkaracharya, tried to account for the popular appeal of Lokayata views: the stupid mob are easily attracted by this kind of "good digestion and no conscience" philosophy. Not all commentators, however, were disposed to take this view. Kautilya, the fourth century B.C. author of the *Artha shastra* ("manual of policy") reckoned Lokayata, along with Sankhya and Yoga [to be discussed later], as *logical sciences*, and there are numerous references in older texts which show that Lokayata views were embraced by a considerable number of influential and respected people who could scarcely be lumped together with the mindless rabble.

It is not easy to decide from this whether the Lokayatikas were academic, if heterodox, materialists, or sophisticated demagogues preaching (and practising) a doctrine of wine, women and song. And Buddhaghoso, a fifth century A.D. follower of Buddha, did not resolve the problem when he described Lokayata philosophy as a *vitanda-vada-sattham*, i.e. the science

of *vitanda-vada*. Now *vitanda* means a sophistical argument playing on logical fallacies with no positive thesis to offer of its own; the sole intention is to confuse one's opponent. *Vada*, on the other hand, is the exact opposite: it is a discussion involving the presentation of a positive thesis which is debated in fair and scrupulously logical manner. Lokayata was, apparently, both these things at once!

Contradiction could hardly go further, and the picture one gets (even when tidied up, as here) is so confused that it is not surprising that some historians have despaired of finding any Lokayata school at all. "We are not convinced," wrote de la Vallee Poussin, "that a materialistic 'school', a 'system', in the exact sense of the word existed." What, then does Mr. Chattopadhyaya make of it all?

Reinterpreting Ancient Texts

It is difficult to summarise a book of six-hundred-odd pages marked by a boldness of interpretation, solid learning, and breadth of outlook such as we have here. From an amusing account of the confusion in the ranks of scholars faced with the problem of Lokayata, he moves to a brilliant exercise in reinterpretation of some misunderstood ancient texts which are shown to be relevant to the problem of reconstructing Lokayata thought. A long excursion into the historical background sketches in the social matrix of tribal matriarchal communities in which the materialistic outlook flourished, which gave birth also to Tantrism.⁴ The "proto-materialism" of Lokayata is then shown to develop into the philosophic materialism of Sankhya (one of the oldest of the "six systems" of Indian philosophy). The birth of idealist thought (for it is Mr. Chattopadhyaya's contention that the materialistic outlook antedates idealism) closes the account.

He begins by showing that the central text on which scholars have relied for their understanding of Lokayata, the *Sarva Darshana Samgraha* ("encyclopaedia of all the systems") of the fourteenth century A.D. writer Madhava, is thoroughly misleading. A time-gap of some 2,000 years separates him from the thinkers he is criticising. He himself was so diametrically opposed to the Lokayata outlook, that his attempt to state their position by explaining how *he would defend them* (this is his method of exposition) is at best hopelessly one-sided. And because later historians have started from the assumption that Madhava was the central witness on the Lokayata school and have taken the authenticity of his account for granted, it meant necessarily that they were more or less incapable of making coherent sense of the other evidence about Lokayata before them. The Lokayata school is thus reduced to a knot of fractious sceptics, without any positive views of their own, indulging on the one hand in sophistical destruction of the religious beliefs of people, and on the other in a crude and callous hedonism.

Chattopadhyaya will have none of this. The essential down-to-earth nature of Lokayata logic and epistemology is undeniable, but it is not modern empiricism in disguise. It would be unhistorical to regard their this-worldliness as though it were equivalent to a modern secular outlook. The Lokayata school denied the existence of the Brahmanic gods, the reality of the after-life, the efficacy of the Brahmanic tradition. They had an outlook of their own, and this

⁴ Tantrism was a system of quasi-magical practices, related in later forms to alchemy, and involving physical culture and rites, by means of which various desirable ends (material wealth, immortality etc.) were to be achieved.

was bound up no less with a specific set of ritual practices and beliefs. The clash between the Brahmanic and Lokayata traditions is not a conflict between the orthodox-religious and the secular-sceptical-empiricist.

"The full picture that we have ... is not that of certain isolated sophists indulging in useless disputations; *it is rather the picture of a clash of two cultures*. The exponents of one were preaching God, heaven and immortality and, as a means to attain these, the efficacy of the Vedic sacrifices. The other represented the standpoint of the people and was trying to defend their material interests" (36) [emphasis added].

What was this "culture," "deeply rooted in the masses of the people," which furnished the source of such a strong opposition to the Vedic religion? Many ancient Indian texts refer to certain opinions as the *asura* view.⁵ These were known to be prevalent in India long before the Aryan invasion from the north took place. Two important views are found to be attributed to the *asuras*: that the self is identical with the body (as opposed to the non-material soul), and that the origin of the universe is the result of a process similar to that of sexual reproduction. The first point obviously connects the *asura* view to the Lokayata position: the second is related quite clearly to those ritual practices known as Tantrism, which were based on the belief (1) that the *deha*, i.e. the human body, is a microcosm of the universe, so that action in the one produces effects in the other, and (2) that creation or production of any kind is fundamentally sexual in type. So the creation of the universe, according to the Tantrikas, is sexual in character; moreover, they believed, the production of the means of subsistence, agriculture for instance, could be enhanced by a preceding sexual union. (For this reason they are accused down the centuries of practising sexual orgies, of being incurably promiscuous, morally depraved, and so on!) It is clear then that we have a complex of beliefs and practices tied up with a primitive stage of social development, and that this complex is consistently associated with the *asuras*. Who are the *asuras*?

The Asuras

They are the natives of India whom the Aryan invaders of the second millennium B.C. encountered in their course. The *asuras*, it is said, have fortifications, they are dark-complexioned, flat-nosed and of "unintelligible speech". Indra, the leading God of the Indian pantheon, the Hindu Jupiter, is known as "the destroyer of fortresses" as well as "the scourge of the *asuras*". The recent excavations of Sir Mortimer Wheeler and others have uncovered in the remains of Mohenjo-daro and Harappa of the Indus civilisation traces of extensive fortifications, which enable us to date with some plausibility the final destruction of these cities and connect it with the Aryan invasion c. 1500 B.C.⁶ "The Indus civilisation, however, embraced in its orbit more than just these two highly developed "city-states," and it seems clear that *asuras* for these early writers were not only those who used fortresses. It referred to all those people "who were considered by the inheritors of the Vedic tradition to be their aliens [who]

⁵ *asura* = literally, demon. The *Bhagavad Gita*, the Bible of Hinduism, has this to say about *asuras* in Chapter 16, entitled Divine and Demonic Tendencies: "In this world there are two kinds of beings: those whose nature tends towards the Divine, and those who have demonic tendencies. *Asuras* ... maintain that the scriptures are a lie, and that the universe is not based upon a moral law, but godless, conceived in lust and created by copulation, without any other cause. They offer sacrifice to God in name only, for outward show, without following the sacred rituals." The *asuras* thus have a non-Vedic cosmology and practise non-Vedic rituals.

⁶ A good account of this may be read in Stuart Piggott's *Prehistoric India* (Pelican, 1952), Chs. 6 and 7.

enjoyed a culture basically different from the Brahmanic one" (42).

That these people were organised in tribal communities is evident from the references of the early Vedic texts as well as the descriptions left by Greek travellers of later times; and it is in the organisation and subsequent history of these tribal communities that the roots of Lokayata beliefs and practices are to be found. These indigenous communities were matriarchal in organisation and subsisted principally on agriculture. At this early stage of social development, when manual and mental labour had not been separated from their unity in the processes of production, it was possible for an outlook to arise which is here characterised as "primitive proto-materialism", an instinctive attribution of primacy to material existence. (Readers of Professor George Thomson's work, whose inspiration the author acknowledges, will be familiar with the argument.) In the matriarchal organisation of these communities is to be found the explanation of the overwhelming importance attached to the female principle in both Tantrism and Sankhya, as well as the assertion of the equality of men and women which is found in Tantrism, so fundamentally at variance with the theory and practice of traditional Indian society.

In the clash between the Vedic Aryans and these tribal communities, the latter were broken up and what might be described as a wholesale social reconstruction was effected. By the time of the Buddha (who died c. 483 B.C.), this had become clear-cut policy. Kautilya, the Machiavelli of India, characteristically put it all down in cold blood in the *Artha shastra*. The tribal communities, whose military prowess and group solidarity had been commented on by the Buddha and others, were broken up into small and self-contained agricultural villages. Mother-right was equally violently suppressed. Here was an artificial and externally induced change in the social structure.

"for it was not a case of the natural disintegration of the tribal societies consequent upon the advancement of productive technique ... The whole process led to a peculiar social set-up which may be roughly characterised as *despotism above with incompletely destroyed tribal society in the villages below*. The cumulative effect ... is that the Indian masses have retained in their lives strong elements that are traceable to the tribal society" (179).

One of the most illuminating sections of this book, incidentally, traces the origin of the caste system, that most confused of Indian historical problems, to this process of "incomplete detribalisation".

It will be clear from this why Lokayata, the philosophy of this world, was also the philosophy of the people. In its origins it was not strictly speaking, a "philosophy" as we understand that word. Lokayata, writes Chattopadhyaya,

"was possibly a broad word used to refer to the popular 'cults', which, though opposed to the Brahmanical rituals, were nevertheless characterised by rituals of a this-worldly character. The followers of the Brahmanical culture called Lokayata the *asura-view*" (46).

But out of this background there emerged Tantrism and Sankhya, whose significance for the development of Indian thought cannot be overestimated.

We have seen that sexual immorality was frequently attributed to the Lokayatikas. The exact nature of these practices, so shocking to the Brahmanical writers (who, incidentally, overlooked traces of just such practices in the early Vedic texts themselves), reveals that the Lokayata tradition had a definite connection with Tantrism, both of which Chattopadhyaya shows as rooted in the practice of agricultural magic. The Vedic people, by contrast to the

surrounding tribal societies, were predominantly pastoral and patriarchal. To the Vedic writers, therefore, the dominant position of women among the *asuras* was evidence of their degenerate character. So too those fertility ritual practices which are common to all primitive agricultural communities. It is here that the real nature of Tantrism is to be sought.

Tantrism

For Tantrism, like Lokayata, is both extremely ancient (traces of it are to be found in the Indus civilisation remains) and also contemporary: it has survived among lower-caste sects to the present day, in the process acquiring accretions of Hindu, Buddhist and other systems, with their concepts of "virtue", "liberation" and the like which have no logical connection with the essentially materialist and physicalist outlook of Tantrism proper.

Tantra means "propagation" and as we have seen the fundamental characteristic of Tantrism, which remains constant in all its later developments, is its conception of nature and natural processes on the model of the human body (*dehavada*). The character of production is sexual, and this involves two interacting principles, the male and the female. In Tantrika alchemical literature these principles are identified with the familiar alchemical substances, mica and mercury. Indian alchemy, however, in contrast with European, conceived the female principle (*shakti*) to be dominant. Now Chattopadhyaya's account of Tantrika origins makes this difference of outlook intelligible.

The importance of Tantrism lies in its inbuilt orientation towards the material world and mastery over it, even though such mastery is sought by means of magic rather than a scientific understanding of natural laws. This orientation is so strong that even when later Tantra had grafted on to it idealist concepts like "liberation" and "immortality", these were invariably understood in a physicalist sense: immortality is to be sought in the culture of the body (hence *yoga*). However, the distinction between magic and science at *this* stage of human development is much too sharp. As Joseph Needham has argued in connection with Taoism in China (which, as he has shown, has many connections with Indian Tantrism), "science and magic are in their earliest stages indistinguishable ... Magic and science were originally united in a single undifferentiated complex of manual operations." This practical and manipulative relation with nature accounts for the materialist approach of Tantrism, its concern with physical and physiological processes. It also explains why Tantrism was the bearer of scientific thought in India, for if the Lokayatikas can claim to be the first logicians of India, the Tantrikas must be reckoned among the first scientists. They discovered, for instance, that the brain and not the heart is the seat of consciousness, advancing from Aristotle to Galen. But the most remarkable feature of the Tantrikas is their *outlook*. India is known to be *par excellence* the land of tradition and custom, where philosophy typically takes the form of commentaries on texts transmitted down the generations. How astonishing it is then to come across in Tantrika literature statements like the following :

"I have performed the aforementioned experiments with my own hands and have seen them with my own eyes. They are not recorded from mere hearsay or from the dictation of a teacher. These are being promulgated for the benefit of mankind."

"I shall give publicity only to such processes as I have been able to verify by my own experiments."

"Those mercurial operations alone have found a place in my book, which I have been able to put to tests. Those who teach without being able to perform experiments labour in vain."

With their emphasis on experiment and verification, their rejection of authority and their refusal to take opinions on trust, not to mention the concern "for the benefit of mankind", these remarks might have come out of the era of the birth of modern science in seventeenth-century Europe.

Matter or Consciousness

Perhaps the most exciting chapter of Chattopadhyaya's story is his demonstration that the Lokayata and Tantrika tradition found its theoretical formulation in what is regarded as one of the most important schools of Indian philosophy, Sankhya. The resemblance between Sankhya and the heretical Lokayata school was in fact noticed by earlier writers. Original Sankhya was definitely atheistic, and Silanka, for instance, acutely observed that the Sankhya doctrine was virtually indistinguishable from Lokayata in its rejection of the soul.

The Sankhya system (certainly pre-Buddhistic in origin) was known as *pradhana karana vada*, i.e. a doctrine of the first cause or ultimate reality, as opposed to the Vedanta⁷ philosophy, which was called *brahma karana vada*, i.e. the doctrine of the Brahman, the principle of consciousness, as the ultimate reality and first cause. The opposition was between those who held, with the Vedantists, that consciousness is the ultimate ground of what ever exists (*chetana karana vada*), and those who held, like the Sankhya and Lokayata schools, that matter, unconsciousness, is the ultimate reality (*a-chetana karana vada*). The *pradhana* of Sankhya is *prakriti*, which may be roughly translated as non-sentient and non-evolved matter. Here, then, we have the conflict between idealism and materialism on the philosophical level.

The distinctive features of Sankhya philosophy are: a theory of matter, a theory of causality, a theory of evolution and a theory of mind. All these are, of course, linked together in original Sankhya (which, too, like Lokayata, has to be largely reconstructed) into a consistent materialist philosophy.

We may start from the Sankhya view of causality. This was known as the doctrine of *sat karya vada*, which I propose to translate as the theory of "the latent effect". (It has often been rendered as the theory of "the pre-existent effect" which is certainly not what the Sankhya philosophers meant.) In any causal sequence, Sankhya held, the effect is already latent in the cause. The classic analogy of the acorn and the oak is apt here: the oak (effect) is latent in the acorn (cause). It represents a development of the acorn and to that extent is different from it. But it is latent in the acorn in the sense that the development of the acorn by the laws of its nature alone, without reference to external agency, produces the oak.

The point of this theory of causality is that it is (or at any rate attempts to be) a materialist theory. To say that the effect is different from the cause *tout court* is to say that something is created out of nothing. "What exists not, can by no operation of cause be brought into effect." The Sankhya theorists, rejecting the entire notion of the creation of being out of nothing, argued back from effect to cause on the principle that like produces like. That is to say, starting from the indubitable reality of the material world and the causal relations to be perceived in it, they worked back to the first cause or primary state of the universe. Their theory of causality ensured that this primary state was not dissolved into an act of creation out of nothingness.

⁷ *Vedanta* = literally, the end of the *Veda*. The name given to the later systematisation of Vedic thought, so that it was seen as the culmination of the philosophy of the Vedas.

Evolution of Matter

Sankhya held that the ultimate reality of the universe was *prakriti*, undifferentiated and nonsentient matter, out of which the differentiated world as we know it has evolved. (*Prakriti*, it may be noted, is feminine in character.) Sankhya cosmology considered that primeval unitary state of being as constituted of the harmonious equilibrium of three elements (*gunas*); the *sattva*, the *rajas*, and the *tamas*. *Tamas* is the principle which lies behind the solidity of objects; it is mass, or the inertia of Newtonian mechanics, the resistance offered by bodies to an impressed force. *Rajas* is the principle that lies behind action, and may properly be translated as energy. Finally, *sattva* is the principle exemplified, for instance, by the flame: it is light, pure and it illuminates. (It is possible that the concept of *sattva* is an attempt of these materialist thinkers to find an adequate, i.e. non-reductive, description of consciousness as a phenomenon). The state of equilibrium of these three elements is described as the *avyakta* or "unexpressed" phase. From this stage, however, primeval matter passes into the *vyakta*, the "expressed" phase, it begins to differentiate itself as the initial state of equilibrium breaks down.

What starts the process? Sankhya is silent on the point, and later adherents, anxious to bring the system in line with the Vedanta school, ascribed the initiating role in evolution to the *purusa*, the male principle, conceived as the principle of awareness or sentience. Now this element (while it did exist in original Sankhya) when credited with an active role in the evolutionary process raises, as we should expect, acute contradictions, in a consistently materialist scheme, contradictions which were brilliantly exploited by the eighth-century philosopher Samkara. There is no reason, however, why Sankhya, which was so squarely based on the concept of the self-development of matter, needed to call in an external agency such as awareness to start off the evolutionary process. Chattopadhyaya is almost certainly right in saying that this is a later development (distortion would probably be the correct term).

Evolution in Sankhya is periodic or cyclical. There is a first ascending stage in which the process consists (to quote Seal) "in the development of the differentiated within the undifferentiated of the determinate within the indeterminate, of the coherent within the incoherent". This development proceeds on the basis of the uneven distribution of the three elements, which means that even determinate objects are in a constant state of flux. There is then the descending stage, in which the process turns into its opposite, as it were, and differentiation and development give place to dissolution, until the whole system returns to its original latent state of indeterminate *prakriti*. This is not, however, the dead universe of Jeans' and Eddingtons's fancy, for nature, even in dissolution, retains the inherent principle of movement, its spontaneous activity. One cycle succeeds another.

Two points are to be noted in the Sankhya account of nature and evolution. Change, in Sankhya, is conceived as real change. The doctrine of the latent effect does not mean that cause and effect, pre-evolved (*avyakta*) and evolved (*vyakta*) phases, are at bottom the same. The evolutionary theory of Sankhya is called *parinama vada*, roughly, the doctrine that change consists in a real transformation, the acquisition of a new form. The point will be clearer if we contrast this view with the view of the Nyaya-Vaisesika school, for instance, which saw change as change of place only, mere mechanical motion. Where Sankhya conceives matter to be spontaneously active, self-moving, Nyaya-Vaisesika attributed change and motion to an agency external to the body moved. Sankhya was an evolutionary doctrine where Nyaya-

Vaisesika was a mechanistic one, if these terms are not anachronistic in the context of ancient Indian philosophy.

Theory of Mind

The uneven distribution of the three elements mentioned above needs to be looked at because it furnishes us with the Sankhya theory of mind. In the material world we may distinguish between bodies at rest, bodies in motion, and (let us say) human activity. Bodies at rest will exhibit a predominance of the inertial principle, energy will be latent and *sattva* will be sub-latent. Bodies in motion will exhibit a predominance of energy, inertia being latent and *sattva* sub-latent. In human movements; energy and *sattva* (the principle of consciousness) predominate, inertia being latent. Finally, in states of consciousness as such (e.g. thinking) *sattva* predominates, while energy and inertia remain latent and sub-latent.

How does this involve a theory of mind? What the Sankhya view implies, according to Chattopadhyaya, is that

“even in states of consciousness, the characteristics of crude matter must be latently present. It is tempting to comment here that if we agree to integrate later scientific knowledge with this standpoint, we have to restate it as the view that thought or consciousness is not without a latent cerebral process. It will be the fundamental premise of a materialistic theory of knowledge. Though the early Sankhya philosophers were yet to be acquainted with the connection of consciousness with the cerebral process, there is no doubt that they were trying to understand intelligence, self-consciousness, mind and the sense-organs as essentially products of matter” (455-6).

This in rough outline is the Sankhya philosophy as it originally stood. It did not remain in this consistent form, and by the time that the first extant Sankhya texts are being written (about the fifth century A.D.), idealist accretions have already gathered round its central tenets, grossly impairing its internal consistency as a system. The “Achilles’ heel” of Sankhya, as Chattopadhyaya aptly comments, proved to be the concept of the *purusa*, the male, representing that which is passive and conscious, as distinct from *prakriti*, female, active and insentient. In original Sankhya the *purusa*-consciousness had no role to play at all, as it logically could not, being *udasina*, i.e. indifferent, the uninvolved spectator watching the spontaneous unfolding of the cosmic process. When later writers, attempting to bring Sankhya in line with the Vedanta doctrine of the primacy of consciousness tried to foist the primary role on to the *purusa*, the system became self-contradictory: a purely passive entity was endowed with the supremely active role of initiating and guiding the process of evolution. One may reflect here that in the process of formulating the instinctive materialism of Lokayata in conceptual terms in Sankhya, the way was opened for the emergence of idealism within materialist thought. Such a conclusion, implying that the very act of philosophising is, as it were, tainted at the source, would however be too sweeping. A more historical view might suggest that a fully consistent materialist philosophy (which is not less philosophical for being materialist) would have to await the development of men’s understanding of nature and of themselves beyond the point at which Sankhya arose.

□ □ □

It is not possible here to trace in detail the fascinating story of the emergence of idealism in Indian philosophy, the orthodox Vedic tradition, which itself arose on the ruins of a primitive

proto-materialism, nor the final collapse of materialist philosophy into a fatalistic determinism while the Buddha’s teaching of withdrawal and release from the world swept through the country. It is there to be read in Chattopadhyaya’s book.

It is not out of place to say here, though, that the distinguishing feature of this book is the systematic and convincing way in which the history of philosophy is reconstructed and linked to social structure and social change. Anyone concerned, for instance, with the anomalous position of the *purusa*, the male principle, in Sankhya thought, will find his comments on the role of the male in matriarchal society both provoking and suggestive. The analysis of the rise of Buddhism against the background of the stupendous social transformation of the India of the time is simply brilliant.

Marxism, wrote Engels, “is above all a guide to study, not a lever for construction. All history must be studied afresh. ...” If the Marxist method needed any vindication, this book amply provides it, for out of a chaotic mass of material, each part meaningless in isolation, it has produced a systematic, coherent and fruitful synthesis. Fruitful, because it raises a host of questions, of fact and interpretation, which must be pursued in detail. It is to be hoped that Indian Marxists will follow up Chattopadhyaya’s path-breaking work with the hard thinking and research that it calls for. In any case, the problems he has raised will not, one suspects, be answered until scholars have at least come to grips with the Marxist method.

What, finally, is the importance of the Lokayata tradition for Marxists today? The concluding world, the moral of the book so to speak, may be left to the author himself. Lokayata, he writes,

“was crude, naive and primitive, and has little to compare with the self-conscious materialistic philosophy of original Sankhya, not to speak of the scientific materialism of today. Nevertheless, the recognition of this proto-materialism has its importance for the modern materialist and this importance can be compared to that of the recognition of primitive communism by the scientific socialist. He lays stress on it not because he dreams of returning to it; his purpose is rather to show that human relations based on private ownership and class-exploitation are not without a beginning and end. ... Thus also is spiritualism and idealism, so often claimed as inherent in Indian thought ; we will do without these in the future as we did in the past.” P A S

More on Ancient Indian Materialism

N. P. Anikeev

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Dipak Nandy’s article “Ancient Indian materialism” (*Marxism Today*, January 1962) devoted to an analysis of D.P. Chattopadhyaya’s *Lokayata. A Study in Ancient Indian Materialism*, is interesting and pithy.

While subscribing fully to D. Nandy’s high estimation of D.P. Chattopadhyaya’s work, I would like for my part to dwell on certain points concerning research into the history of philosophy, connected with the problems investigated in it sufficient elucidation.

In the first place there is the question of the author's treatment of the general laws of the origin and development of philosophical thought in India. The strong side of the book and its scientific merit is to be found in the fact that the author steadfastly holds to the Marxist principle of materialistic determinism in his analysis of the early forms of Indian philosophy and reveals their dependence on the conditions of the life of society; he constantly emphasises that the objective world is reflected in human consciousness only by passing through the prism of social relationships and social practice. But D.P. Chattopadhyaya underestimates the fact that for Marxist research into the history of philosophy, this principle is not sufficient by itself, that it is necessarily supplemented by another principle important from the methodological point of view when analysing spiritual phenomena – namely, the necessity of considering also social consciousness (and above all in forms as remote from its economic base as philosophy and religion) as giving rise to relatively independent phenomena not directly and spontaneously emerging from the character of social relations.

As F. Engels noted, once philosophy has arisen from the mythological consciousness of "the pre-historic period" it acquires a relative independence in its further existence, an inner logic of its own development qualitatively specific only for it and its own content, inherent only to it; and only in the final reckoning conditioned by social-economic reality.

"Prehistoric Content" of Philosophy

True, the application of this general principle to an analysis of Indian philosophy meets considerable and sometimes even insurmountable difficulties, connected first and foremost with the indeterminate or very conditional dating of most of the philosophical material of ancient India. But all the same, facts already known permit us to note the general framework within which philosophy became detached from the mythological concepts of primitive society, how independent philosophical problems took shape and their further development. The separate hymns of Veda, and especially Upanishada (*sic*), are evidence of this. In them questions about the origin of being, about the first cause, the substance of the world, about the unity of man with it, about the essence of mental phenomena and consciousness and so on, are discussed, i.e. the very same problems as are discussed at a corresponding stage of ancient Greek philosophy.

Of course these general laws of the philosophical process had a number of specific peculiarities on Indian soil. The most important of these was that here the philosophical problems are resolved to a significant degree on the basis of the mythological material of pre-class society, which for a comparatively long time remained their arsenal and breeding ground, their building material so to speak; this is exactly what Engels called the "prehistoric content" of philosophy. And in examining the philosophical systems of class societies, it is quite understandable that an analysis of the specific importance and persistence of contemporary but genetically far more ancient forms of the world outlook of primitive society; a demonstration of how these permeate the developed ideology of later epochs; and even the real content and part played in later philosophical systems – all this is an important and necessary feature in investigating the history of Indian philosophy. In this connection D.P. Chattopadhyaya has carried out much useful work the significance of which it is hard to exaggerate.

However, the book sometimes gives the impression that its author sees in this aspect the particular task of research into the history of philosophy. He often reduces the positive content

of a philosophy exactly to its "building material", to these residual forms of the primitive world outlook, seeing in them the meaning of philosophical development and not infrequently losing sight of the value, from the standpoint of scientific understanding, of the logical and intellectual requirements of philosophical systems. It is not by chance, therefore, that D. P. Chattopadhyaya devotes little attention to an analysis of the particular philosophical problems of Lokayata, Tantrism, Sankhya and early Buddhism – the fundamental schools considered in the book.

Such inattention to the analysis of the content of these schools' philosophical structure proper is most probably explained not so much by the fact that the author consciously omits this problem, as by the fact that from his position it is very difficult to explain these theories by direct inference from social relation. Thus, for example, it is difficult to agree with D.P. Chattopadhyaya that *prakriti* and *purusha* – the fundamental categories of so developed and comparatively undiluted a philosophical system as Sankhya – are no more than simple analogies of the active role of women and the passive role of men in the agricultural economy of ancient society. Of course, one cannot deny the probability that historically the roots of these concepts go back to the social relations pointed out by the author. But philosophical analysis requires above all that the real function of these categories in the whole philosophical system be taken into account; the conceptual function fulfilled by them; the objective contradictions of the process of cognition of reality resolved with their help; relations of reality which are refracted by theoretical thought through the prism of its own laws and which are assimilated by it in concepts, categories and constructions specific to it.

Outlook of Primitive Society

One cannot fully agree with the author's evaluation of the world outlook of primitive society as exclusively materialistic, or rather protomaterialistic in its basis, even taking into account his constant reservations about the undeveloped and primitive characters of this outlook. On the one hand D.P. Chattopadhyaya quite justly emphasises its link with the practical productive activity of people, its down-to-earth direction alien to any kind of other-worldly aspirations of idealism and religion. But, on the other hand, he underestimates the fact that the views of primitive society, just because of their undeveloped and primitive character, are a distorted reflection of the objective relations of natural and social reality which appear in forms of mystification – totemism, magic ritual, cult rites and so on. "The low economic development of the prehistoric period", observed F. Engels in his day, "had as its supplementation, and at times as a condition and even as a reason, false concepts about nature." (K. Marx and F. Engels, *Selected Works*, Vol. II. p.474.) So that in evaluating this phenomenon a more careful and flexible approach is needed, and its contradictory and dual character should not be overlooked. The further progress of scientific and philosophical knowledge consisted, by the way, of the elimination of just these early notions of primitive society. And the rich factual material adduced by the author himself confirms this general law of human knowledge, for the rational and scientific ideas contained in the materialistic schools investigated by him, stand opposed in their essence to naive mythological views, although they often appear in their clothing.

Materialism v. Idealism

In this process the decisive role belonged of course to materialist teachings, but one cannot deny (which seems to be the standpoint of D.P. Chattopadhyaya) the definite part played in

the process also of idealist teachings, as witness for instance the Upanishads, in opposition to the ceremonious rites, ritualism, sacrifices and so on. Of course this does not exclude the fact that idealism, as the author justly shows, provided in essence the theoretical foundation of religion, and in one or another form came in the end to recognise all this cult of ritual as *karma-marg* (way of action) – the lowest path of attainment of god through action, as distinct from the higher path *jnana-marg* – attainment of god through knowledge.

Moreover, while correctly noting the antithesis in principle between the social and gnoseological roots of idealism and those of materialism, D.P. Chattopadhyaya often interprets this antithesis somewhat one-sidedly. Thus sometimes he gives the impression that, in linking materialism with the matriarchal relations among the indigenous Dravidian agricultural population in India, and idealism with the patriarchal relations of the Veda Aryans, he distinguishes these trends in a vacuum, and transfers the struggle between them from the inner-philosophical sphere to the external sphere of mutual relations between two different ethnic components of the Indian people; in other words, he to some extent covers over the class nature of these trends and substitutes for it a cultural, ethnic and racial content which only in part coincides with the social. And it cannot be denied that materialistic views also were propounded in the Aryan environment, while idealism and religion found a place too among the Dravidian agricultural population. In reality the struggle between idealism and materialism is of a much more complex and contradictory character, appearing often simultaneously in the struggle of different currents within the framework of one and the same philosophical school.

Despite the fact that not all questions are elucidated with equal convincingness in the book, it should all the same be evaluated positively as a whole. The book attracts by its broad grasp of factual material, by its bold formulations and deep scientific analysis of many fundamental problems of Indian philosophy, by its critical approach to the dogmas established in Indology, and by its polemical fervour. D.P. Chattopadhyaya's work is a serious contribution to the Marxist study of the history of Indian philosophy. In conclusion it is important to note also that the author relies widely on works of such Marxist research workers in ancient Indian history as S.A. Dange, D.D. Kosambi and others. He fruitfully uses the work of the progressive English scholars, G. Thomson and Needham, who likewise are striving to approach the history of the ancient world from materialist positions. At the same time the results of the investigations of D.P. Chattopadhyaya himself strengthen and fortify the conclusions of these scholars, which bears witness to the establishment of a united front of Marxist scholars from different countries in the study of the ancient period of the spiritual development of mankind. **P A S**

Ancient Philosophy and the Class Struggle

George Thomson

Last December there appeared in this journal, under the title *More on Ancient Indian Materialism*, a tribute to D.P. Chattopadhyaya's book *Lokayata* (1959) from N. P. Anikeev of the Soviet Academy of Sciences. With all that he says in praise of this fine book I am in wholehearted agreement.

In particular, I welcome the following:

Of course, these general laws of the philosophical process had a number of specific peculiarities on Indian soil. The most important of these was that here the philosophical problems are resolved to a significant degree on the basis of the mythological material of pre-class society, which for a comparatively long time remained their arsenal and breeding ground; this is exactly what Engels called the "prehistoric content" of philosophy. And in examining the philosophical systems of class societies, it is quite understandable that an analysis of the specific importance and persistence of contemporary but genetically far more ancient forms of the world outlook of primitive society; a demonstration of how these permeate the developed ideology of later epochs, and even the real content and part played in later philosophical systems – all this is an important and necessary feature in investigating the history of Indian philosophy. In this connection D.P. Chattopadhyaya has carried out much useful work, the significance of which it is hard to exaggerate.

Anikeev is right to acclaim the author's achievement in revealing for the first time the transition from mythology to philosophy in Indian thought. This process, however, was by no means confined to India. It has long been known that a similar transition lies behind Greek and Chinese philosophy. Do Anikeev and his colleagues accept this? It is an important question, calling for a clear answer, because, as I will try to show, a great deal depends on it.

Why Study Ancient Philosophy?

Why do we study ancient philosophy? I have given what I believe to be the correct answer to this question in my preface to the Russian edition of *The First Philosophers* (1959) :

The struggle for socialism and communism is not merely a struggle to reorganise the process of material production and the structure of society. It is also a struggle to change the minds of men, and in particular to dispel the illusions of class society, which still blind us to the infinite possibilities of development that await mankind with the transition to communism. We shall be able to dispel those illusions all the more effectively if we understand the historical conditions in which they were created.

In other words, we must study ancient society in such a way as to reveal the emergence of those "common forms or general ideas" which, as stated in the *Communist Manifesto*, are common to all epochs of class society.

In the pursuit of this aim there is, of course, a great deal to be learnt directly from Marx and Engels, deeply versed as they were in European philosophy. With oriental philosophy, however, the case is rather different. Even the best bourgeois work in this field suffers from a grave lack of historical understanding. Hence the importance of Chattopadhyaya's book and

the work now being done in China. We have now the possibility of organising a concerted attack on ancient Greek, ancient Indian and ancient Chinese philosophy. Starting from our general understanding of the historical process involved in the transition from primitive to ancient society, we must analyse those "common forms or general ideas" as they emerged out of primitive thought in their different manifestations in Greece, India and China. In this way these three fields, which in bourgeois scholarship have always been studied in isolation from one another, will be unified, and the whole domain of ancient philosophy will be captured by historical materialism.

It is clear that Anikeev is aware of these possibilities, for at the close of his article he refers to the formation of "a united front of Marxist scholars from different countries in the study of the ancient period of the spiritual development of mankind". In order to exploit them, however, it is necessary not only that we should define our aims as precisely as possible, but also – even more important – that we should reach full agreement in respect of our theoretical method. It is from this point of view that I wish to criticise certain reservations made by Anikeev in his appreciation of Chattopadhyaya's book and also certain formulations regarding ancient philosophy in the new Soviet textbook, *Fundamentals of Marxism-Leninism* (English edition, 1961). It seems to me that in both cases there is a dangerous tendency to treat the development of the ideological superstructure in isolation from the social and economic relations which it reflects.

Basis and Superstructure

First of all, let it be made quite clear that, according to Marxism, the interconnection between the ideological superstructure and the economic basis is complex and indirect, being mediated by the relations of production. This matter is discussed by Engels in *Ludwig Feuerbach*. After showing how the growth of the state gives rise to legal ideas, which are then developed systematically by the jurists, in whose minds the juristic form becomes everything and the economic content nothing, he goes on :

Still higher ideological, that is such as are still further removed from the material, economic basis take the form of philosophy and religion. Here the interconnection between the ideas and their material conditions of existence becomes more and more obscured by intermediate links. But the interconnection exists. (Marx-Engels. *Selected Works*, Vol. I, p.464).

After some further remarks on philosophy and religion he concludes :

We see, therefore, that religion, once formed, always contains traditional material, just as in all ideological domains tradition forms a great conservative force. But the transformations which this material undergoes spring from class relations, that is to say, out of the economic relations of the persons who execute these transformations. (p.468).

From this it follows that the "traditional material" of religion, philosophy, law and every other ideological domain, no matter how highly elaborated by its exponents, no matter how highly elaborated by its exponents, no matter how far it may develop an inner logical of its own, must always be studied historically, because only in that way can we find the key to its origin and development.

Engels returns to the subject in one of his letters, where he deals in passing with the ideology of primitive society :

As to the realms of ideology which soar still higher into the air, religion, philosophy, etc., these have a prehistoric stock, found already in existence and taken over in the historical

period, of what we should today call bunk. These various false conceptions of nature, of man's own being, of spirits, magic forces, etc., have for the most part only a negative economic basis; but the low economic development of the prehistoric period is supplemented and also partially conditioned and even caused by the false conceptions of nature. And even though economic necessity was the main driving force of the progressive knowledge of nature and becomes ever more so, it would surely be pedantic to try and find economic causes for all this primitive nonsense. The history of science is the history of the gradual clearing away of this nonsense or of its replacement by fresh but already less absurd nonsense. The people who deal with this belong in their turn to special spheres in the division of labour and appear to themselves to be working in an independent field. And in so far as they form an independent group within the social division of labour, in so far do their productions, including their errors, react back as an influence upon the whole development of society, even on its economic development. But all the same they themselves remain under the dominating influence of economic development. (*Selected Works*, Vol. I, pp. 386-7).

First Materialists

Here his remarks may be supplemented in the light of what is now known of totemism, the characteristic ideology of tribal society, which had not been discovered in his day. The form in which this "prehistoric stock" of false conceptions was taken over by civilised society was not its primitive form; it had already, in the higher stages of tribal society, begun to disintegrate in response to the emergence of incipient class contradictions, and with the advent of class society this process of disintegration and distortion was carried still further by the priesthood. Moreover, along with these false conceptions, reflecting the low economic level, it contained also certain positive elements, reflecting the economic and social relations of primitive communism. I refer to such ideas as the idea of growth through division, of perpetual change, of the conflict and interpenetration of opposites. These ideas, expressed in mythical form, constitute the crude proto-materialism of primitive society, reflecting the unity, at a low economic level, of theory and practice and the absence of class antagonisms. And in Greece, India and China alike, these ideas were taken over, re-interpreted and transformed into the first theories of philosophical materialism.

Historical Determination

Let us now turn to Anikeev, who presents the matter in a somewhat different light :

The strong side of the book and its scientific merit is to be found in the fact that the author steadfastly holds to the Marxist principle of materialistic determinism in his analysis of the early forms of Indian philosophy, and reveals their dependence on the conditions of life of society; he constantly emphasises that the objective world is reflected in the human consciousness only by passing through the prism of social relationships and social practice. But D.P. Chattopadhyaya underestimates the fact that for Marxist research into the history of philosophy this principle is not sufficient by itself, that it is necessarily supplemented by another principle important from the methodological point of view in analysing spiritual phenomena – namely, the necessity of considering also social consciousness (and above all in forms so remote from its economic basis as philosophy and religions) as giving rise to relatively independent phenomena not directly and spontaneously emerging from the character of social relations.

It seems to me that this second principle is only valid to the extent that it is included in the first. Perhaps that is what Anikeev means when he speaks of it as "supplementing" the first. Of course, in analysing the mature forms of a philosophy, it is not *enough* to trace them back

to their primitive origins: we must go on to analyse their further development and show how for all their apparent independence, they reflect the further development of society itself. If that is what Anikeev means it is true and not denied: but his second principle is formulated in such a way as to suggest that he may mean something different.

Later on he re-states his position as follows. Referring to the ideas of Prakiti and purusha, he writes.

Of course, one cannot deny the probability that historically the roots of these concepts go back to the social relations pointed out by the author. But philosophical analysis requires above all that the real function of these categories be taken into account: the conceptual functions fulfilled by them; the objective contradictions of the process of cognition of reality resolved with their help; relations of reality which are refracted by theoretical thought through the prism of its own laws and which are assimilated by it in concepts, categories and constructions specific to it.

Here his first principle is presented as though it were separable from the second and subordinate to it; and so it appears that the main task of the historian of philosophy is not historical at all but consists in the "philosophical analysis" of these "relatively independent phenomena" as such. If this is which Anikeev means, it is incorrect. The principle of historical determination applies not only to the origin of ideas but to the whole course of their development, and not only to the elements of falsehood which they contain but also to the elements of truth; for, although the truth itself is not historically determined, our knowledge of it is. A true theory does not differ from a false theory in being "free" from historical determination, but in corresponding to objective reality. This is pointed out by Lenin in *Materialism and Empirio-criticism*:

In a world, every ideology is historically conditional, but it is unconditionally true that to every scientific ideology (as distinct, for instance, from religious ideology) there corresponds an objective truth, absolute nature ... (*Selected Works*, Vol. II, p. 198).

At this point, it seems to me, if I have understood him aright, Anikeev has parted company with historical materialism and taken up a position indistinguishable from that of bourgeois philosophers who treat philosophy as a closed system of pure thought.

Points in "The Fundamentals"

Let me now turn to the *Fundamentals*. In this comprehensive textbook there is no account of oriental philosophy, just as there is no account of oriental society – surely, a serious omission, giving to the whole work a European bias that is already out of date. There are, however, in Chapter I, Section I, a few paragraphs about Greek philosophy, and it is on these I wish to comment.

On page 22 we read :

In ancient Greece, the reactionary aristocrats destroyed the works of the materialist philosopher Democritus, the founder of the atomic theory of matter, who rejected divine intervention in human affairs. Another materialist philosopher, Anaxagoras, was banished from Athens as an atheist.

The works of Democritus were still extant in the second century A.D. There is no evidence that they were destroyed by "reactionary aristocrats", whoever they may have been, or that they were deliberately destroyed at all. The story about the banishment of Anaxagoras is not very well authenticated; but, if it is true, the initiative came from the opponents of Pericles, whose protege he was; and these were not "reactionary aristocrats", as the wording of this

passage might be taken to imply, but radical democrats, though I should hesitate to describe them as progressive, because in this context the distinction has very little meaning.

In the next paragraph we read :

The ancient Greek materialist philosopher Epicurus, a disciple of Democritus, revered by the ancients for having liberated man from the fear of God and for asserting the validity of science, was for two thousand years anathematised by the leaders of the Church, who falsely depicted him as an enemy of morality and a disseminator of vice.

Epicurus was revered by his own disciples, but not by anyone else. He was being denounced as a "disseminator of vice" long before the introduction of Christianity. For example, two of his disciples were expelled from Rome in 173 B.C. for "introducing pleasures".

Democritus and Epicurus are presented here, along with Anaxagoras, as the great representatives of ancient science. Strictly speaking, however, they were not scientists at all, but natural philosophers, their doctrines being based on rational speculation, not on observation and experiment. The pioneers of scientific investigation were Hippocrates, who was a medical practitioner opposed to the philosophers, and Aristotle, who was a pupil of Plato and an idealist. In order to explain these contradictions it is necessary to study the evolution of philosophy as a dialectical process reflecting the evolution of society itself; in other words, we must study it concretely and historically, using our dialectical method as a guiding thread. Otherwise the result can only be a vulgarisation of Marxism.

In the next paragraph we read:

The famous Alexandria library, which housed 700,000 works of the writers and scientists of antiquity, was burnt by Christian monks in A.D. 391. Pope Gregory I (A.D. 590-604), an inveterate enemy of secular science and learning, destroyed many valuable works of ancient authors, notably the works of materialist philosophers.

Christianity

The library at Alexandria is believed to have been destroyed in the course of an attack on the Temple of Serapis, which was scarcely a scientific institute. But the facts are disputed. It is not certain that it was destroyed at this date, or indeed by the Christians at all. Some leaders of the Church, such as Photius the Patriarch and Arethas of Caesarea, were patrons of classical learning who helped to preserve the ancient writings. In any case, these writings embodied the ideology of the old slave society, whereas the Church stood for the new feudal society. Which of these was reactionary and which was progressive?

The section from which these quotations are taken carries the heading: "The Development of Progressive Materialist Science in Struggle Against Reaction and Ignorance". No references are given for further reading and so there is nothing to direct the reader's attention to Engels' article, "On the Early History of Christianity", in which he wrote:

The history of early Christianity has notable points of resemblance with the modern working-class movement. Like the latter, Christianity was originally a movement of oppressed people; it first appeared as the religion of slaves and emancipated slaves, of poor people deprived of all right, of peoples subjugated or dispersed by Rome. Both Christianity and the workers' socialism preached forthcoming salvation from bondage and misery; Christianity places this salvation in a life beyond, after death, in heaven; socialism places it in this world, in a transformation of the social order. Both are persecuted and baited, their adherents are despised and made the object of exclusive laws, the former as enemies of the human race, the latter as enemies of the state, enemies of religion, the family, the social order. And in spite

of all persecution, nay, even spurred on by it, they forge victoriously, irresistibly ahead. Three hundred years after its appearance Christianity was the recognised state religion in the Roman world empire, and in barely sixty years socialism has won itself a position which makes its victory absolutely certain. (*Marx and Engels On Religion*, p. 313.)

To this it may be added that in its mediaeval form Christianity "was in correspondence to the needs of the time", being "the religious counterpart to feudalism". (Marx-Engels, *Selected Works*, Vol.1, p.466.)

Thus, according to Engels, early Christianity embodied the hopes and aspirations of the exploited masses heralding a new stage in the evolution of society: but according to the authors of *Fundamentals* it represented the forces of ignorance and reaction. Disregarding Engels, they take their stand with Edward Gibbon. They should have heeded Lenin's warning:

We must not in any circumstances fall into the abstract and idealist error of arguing the religious question from the standpoint of "reason", apart from the class struggle, as is not infrequently done by bourgeois radical democrats. ("Socialism and Religion," *Selected Works*, Vol. II, p.661.)

That is what the authors of *Fundamentals* have done. They have taken the conflict between science and religion out of its historical context and presented it as an abstraction; and in so doing they have abandoned the position of dialectical and historical materialism.

Similar weaknesses could be pointed out in other chapters. Some of these might have been avoided if the work of non-Soviet Marxists had not been so persistently ignored. The influence of bourgeois ideology penetrates all boundaries and presents a special danger to intellectuals cut off from practical activities. Further, so far as ancient philosophy is concerned, it is necessary to insist that creative work in this field can only be done by those who are historians as well as philosophers and are fully qualified in the ancient languages.

Creative Marxist

It is refreshing to turn back to Chattopadhyaya's book, because it is the work of a creative Marxist, who knows and loves his subject. Let me conclude by quoting from his Introduction:

There remains only one other question that I would like to answer in this Introduction. Looking back at the argument in its entirety, what value, from the Marxist point of view, do I propose to attach to it? Of course, the significance of the Sankhya in the Indian philosophical tradition is discussed in its proper place. But what is the significance of the primitive proto-materialism, which forms the substratum of both the Lokayata and the Vedic traditions? My answer is simple enough. Its value is comparable to the recognition of primitive communism in Marxism. The Marxists emphasise the importance of primitive communism not because they dream of a return to it. The purpose is rather to show that private property and the state machinery are not eternal adjuncts to human existence: "They will fall as inevitably as they arose at an earlier stage" (Engels). Similarly, the primitive protomaterialism is discussed, not for the purpose of a glorification of it, and surely these is not even the remotest apology for any return to it. Yet it has its value by way of showing that the spiritualistic outlook is not innate in man. It too will be finally washed away as inevitably as it arose at an earlier stage: if the spiritualistic outlook came into being, it will also, along with the social separation between manual and mental labour, pass away. This has some particular relevance for the understanding of the Indian philosophical tradition. For we are never tired of listening that spiritualism is an inherent feature of Indian thought. But, "Ah! Faustus, now hast thou but one bare hour to live!"

This inspiring statement of our aims provides, in my opinion, the correct theoretical basis for further advance on all three sectors of our united front. **P A S**

Exchange of Letters

Hotel Oriente
Barcelona

as from : CAIUS COLLEGE
CAMBRIDGE
ENGLAND

Spain 13th August 1960

Dear Debiprasad Chattopadhyaya,

I have been wanting to write to you for about a year to thank you for sending me your book "Lokayata" at the beginning of 1959, but I delayed until I had fully finished reading it and could express to you properly my deep appreciation of it. Now at last I can do this, and assure you that your work will have a truly treasured place on my shelves. It is truly extraordinary that we should have approached ancient Chinese and ancient Indian civilisation with such similar results. Of course I am not competent to criticise your presentation, but I can only say that it strikes me as exceedingly convincing. I am very happy to feel that my second volume's account of Taoism could have proved so useful to you.

During my reading I sometimes felt that you were almost too polite to modern conventionality and prudery and occidentally originating false-Christian attitudes to sex, but no doubt this was just a literary commonplace. I believe that the whole world has a great deal to learn from Tantrism as well as from Taoism. I only wish we could discuss it together. It would be delightful also to meet your Sakti whom you thank so charmingly in the preface. Next time I come to India I must make every effort to meet you.

Re page 308 on the distillation of mahua by the Gonds, we quoted a good paper on their technique recently in a monograph on Chinese alchemical apparatus, for the Yantra they use is a variant of the Mongolian or Chinese still. Re the naked ploughing rain magic on p. 291 did you see the autobiography of a man called Ghosh in three volumes "The cradle in the clouds", "Gazelles leaping" and "The Vermillion Boat"? He has a splendid account of this ceremony in which it seems he participated as a small boy. As for *moira*, bhaga and amsa (pp. 565 ff.) the Chinese counterpart is *few* - this word should be listed in the index of my Vol. 2 - I have just the same ideas as you about it. I was glad (pp. 623 ff.) that you too homologise rta with tao; in thinking of the Chinese equivalent for maya in its ancient sense of "craft" I think shu would be the word. I suppose it is not too difficult to see how "arts" could include "magic arts" or "dissimulation" whereby men or gods deceived each other on occasion, so that when the proto-materialism of primitive society decayed, it came to stand for the one total deceptiveness of Nature (as the disillusioned philosophers took it to be). Shu would be just the right word for this, but it did not undergo the same development in China for Taoism

remained, as you say, close to the real arts, crafts, and sciences, while Buddhism was a foreign religion so that new words were coined e.g. huan

With warmest greetings
Yours sincerely
Joseph Needham

P.S. I am on my way to an international congress in Portugal in honour of the 5th centenary of Prince Henry the Navigator, and an international colloquium on the history of the ship; where I am going to speak about the Chinese developments of the mariver's compass and of the stern-post rudder.

3 Sambhunath Pundit Street
Calcutta 20
1.11.60

My Dear Professor Needham,

I feel deeply grateful to you for your kind letter of 13th. August from Barcelona, on your way to the Portugal-conference. That you have read my book Lokayata is indeed a greater reward than all my labour deserves. You have moreover told me that some of my observations are correct and have suggested clues to further Chinese parallels. It is impossible to say how very inspiring all these are for me. How I wish I could work under you on a comparative study of the naturelistic trend in ancient Chinese and Indian philosophy. I have, however, to be content with your published works, particularly the recent illuminating volume on China, which I am trying to peruse with the best of my abilities. I shall also wait anxiously for your next visit to India.

I teach philosophy in a college here. That is perhaps all that I have to say about myself. As for further studies, I am now working on our Purva-Mimamsa philosophy and am finding it peculiarly fascinating. It did reach strikingly radical conclusions, some of which are quite near to our own. It argued elaborately for the rejection of the existence of God, in fact of any conscious agent interfering with the mechanical operation of nature. It laughed at the idea of creation and destruction. It claimed that the mighty deities of the Veda were but words, the worship of which was utterly meaningless. It defended an indifference to the ideal of moksa or liberation and defined 'heaven' as just 'pleasure' not necessarily other-worldly. Above all, it gave us perhaps the most serious refutation of epistemological idealism that we have in Indian philosophy. As a matter of fact, this reaction against idealism led the Purva-Mimamsa philosophers to build up a system of logic, epistemology and ontology (including atomism) which seems to be of major significance for our naturalistic philosophical heritage. At the same time, Purva-Mimamsa is most appallingly orthodox and conservative. The whole thing was nothing but a philosophical defence by later sophisticated thinkers – one of them, Kumarila, was indeed a veritable giant – of the basic assumption implicit in sympathetic magic, which the Vedic Yajna originally must have been. Taken as a whole, thus, the philosophy looks like a

puzzle : the most radical ideas emanating from an absurdly conservative standpoint. However, it is precisely this that seems to invest its study with a peculiar interest. Its very conservatism appears to give us the clue to its radicalism. I am inclined to understand it thus : Because of our stunted technological development, the tradition of ancient ritualism did survive in the country, the inheritors of which eventually found themselves confronted with a serious philosophical situation. On the one hand there developed the theistic philosophy of the later Vaisesike system while on the other there emerged the powerful idealistic epistemology and ontology of the Mahayana Buddhists and orthodox Vedantists. The later ritualists could clearly see that both theism and idealism went against the basic assumption of their magical rites. So they were led to refute both and to formulate a counter philosophy in accordance with the pre-spiritualistic and pre-idealistic assumption of the magical rites. The belief in magic had of course to die its natural death. Nevertheless, there survive for us a strikingly radical philosophy embodying the development of the ideological potentialities of what I have, in my Lokayata, hesitantly called the proto-materialism of the primitive society.

I am not aware of any European parallel. Perhaps the belief in the magical rites did not survive there to lead to such an interesting development. But could I search for some Chinese equivalent?

I know how very precious your time is and how overworked you are. But it will mean a great help for me if you could find the leisure to answer.

With respectful greetings,
Sincerely yours
Sd/-
(Debiprasad Chattopadhyaya) P A S

Dr. Dhirendranath Gangopadhyay Memorial Lecture 2009

Venue : Bangla Academi Conference Hall, Kolkata

Time : 31st December, 2009 at 5 p.m.

Speaker : Prof. Mihir Chakraborty

Subject : Philosophy of Mathematics of Kurt Goedel

All are cordially invited

Basham, Kosambi, and the Negation of Negation

Ramkrishna Bhattacharya

At the end of his rave review of D. D. Kosambi's *An Introduction to the Study of Indian History* (1956), A. L. Basham said:

We have found much to praise in Professor Kosambi's work, so perhaps he will forgive the final sting in the tail of this review. We must record our regret that an eminent mathematician has allowed himself to use the rather fatuous catch-phrase of Marxist dialectic, 'the negation of the negation' (p.162); for the inane looseness of the language of this phrase can be demonstrated by elementary mathematics:

$$-(-x) = x$$

and we are back where we started! (347)

Apparently Basham forgot that it was Hegel, not Marx, who had first spoken of the negation of negation in his *Science of Logic*; Marx merely applied it in his study of property in *Capital* (Vol. 1, Ch. 32) and Engels in *Anti-Dühring* extended the application of the law to nature, human society and thought, providing examples from plant genetics, zoology, geology, and mathematics. Engels further observed that Rousseau had anticipated Hegel in this regard.¹

Engels also disabused his readers of the notion that the negation of negation was a case of simple double negation; it involved sublation (*Aufheben*) as well.² Hegel explained sublation in the following way:

'To sublimate' has a twofold meaning in the language: on the one hand it means to *preserve, to maintain, and equally it also means to cause to cease, to put an end to*. Even 'to preserve' includes a negative element, namely, that something is removed from its influences, in order to preserve it. Thus what is sublated is at the same time preserved; it has only lost its immediacy but is not on that account annihilated.³ (Emphasis added)

In simpler terms, it is "the negation of a thing retaining some of its elements and structural links in the new phenomenon; these are incorporated in the new quality as components of its organic whole. Negation in the form of sublation means a *simultaneous overcoming and retaining of what is negated, overcoming in form and retaining in actual content*."⁴ (Emphasis added)²

Engels explained the negation of negation by way of an example from algebra:

Let us take any algebraic quantity we like: for example, a . If it is negated, we get $-a$ (minus a). If we negate that negation by multiplying $-a$ by $-a$, we get $+a^2$, i.e., the original positive quantity, but at a higher degree raised to its second power. It makes no difference in this case that we can obtain the same a^2 by multiplying the positive a by itself, thus likewise getting a^2 . For the negated negation is so securely entrenched in a^2 that the latter always has two square roots, namely a and $-a$. The fact that it is impossible to get rid of the negated negation, the negative root of the square acquires very obvious significance as soon as we come to quadratic equation.⁵

In spite of this clear exposition [$x(-x) = x^2$] Basham stuck to an example of simple negation and was blissfully unaware of the glaring fact that his ridicule was beside the point. Whether or not Engels's example is found totally satisfactory, it should be clear that there is

a gulf of difference between Basham's simplistic understanding of negation and the Hegelian-Marxian concept of negation and the negation of negation.

Speaking of the development of materialist philosophy from the ancient times to the modern, Engels says:

Generally speaking it is no longer philosophy at all, but a simple world outlook which has to be verified and implemented, not in a science of sciences standing apart, but in the positive sciences. Philosophy is therefore "sublated" here, that is, "both overcome and preserved"; overcome in its form and preserved in its real content.⁶

Kosambi himself elucidates this law of dialectics as follows:

In every stage, there resides an inherent quality of change and "inner contradiction", which leads eventually to a negation (not necessarily unique) of that stage or condition. The negation, quite naturally, is again negated, *but this does not mean a simple return to the original condition, rather to a totally different level*. (Emphasis added)⁷

Basham's banter then does not have the bite he supposed.

Let us now take a look at the passage in which Kosambi refers to this law of dialectics. Speaking of the Buddha, he writes:

It must be kept in mind that we are in the presence of the FIRST society divided into classes, linked indissolubly to a new form of production which could not be abolished without increasing that very misery of all human existence which is a recurrent theme of discourse. A famous *gāthā* gave the essence of Buddhism as "showing the cause of those phenomenon that arise from a cause, and its negation".⁸

Kosambi does not mention the source in which this *gāthā* is to be found. Apparently he had in mind the following couplet which contains the quintessence of the Buddha's teachings. Assaji (As'vajit in Sanskrit), a disciple of his Order, said to Sāriputta:

*ye dhammā hetuppabhavā tesam hetum tathāgato āha |
tesam ca yo nirodho evamvādi mahāsamaṇo ||*

All things which proceeds from a cause
The Tathagata has explained the cause,
And also has explained their ceasing.
This the great Adept has proclaimed.⁹

The word for 'cause' in Pali and Sanskrit is *hetu* and what Kosambi translates as 'negation' and Warren as 'ceasing' is *nirodha*. The Buddha enunciated *caturāryasatya*-s, the Four Noble Facts (or Truths), in terms of 1. suffering, 2. the cause of suffering, 3. the negation of suffering, and 4. the way to the negation of suffering.¹⁰ There is no reference to any negation of negation, but only to simple negation. It is to be noted that Kosambi does not find fault with the Buddha for not stating what in Marxist philosophy is called the third law of dialectics. On the other hand he says:

That all causation implies negation is the first step in dialectic. Advance to a higher level (by the "negation of the negation") necessitated far greater progress through more productive types of society than could have been visualized with the rudimentary productive mechanism of the 6th century B. C.¹¹

Kosambi here exhibits how a basic law of dialectics can be derived nearer home by

drawing upon the text of a Buddhist *gāthā* without having recourse to Hegel or Marx or Engels.

Kosambi then goes on to explicate what the Buddha's conception of *nirvāna* stands for:

The Buddhist *nirvāna* now appears to a casual reader like complete annihilation. When first propounded, it was a negation, return of the individual to the signless, undifferentiated state. The condition was to be achieved only by cumulative perfection in successive rebirths, till the personality was freed by its own efforts from subjection to *karma*, the necessity of transmigration.¹²

Kosambi then points out perspicuously the social significance of *nirvāna* as negation:

The memory of a classless, undifferentiated society remained as the legend of a golden age... when the good earth spontaneously produced ample food without labour because men had neither property nor greed. The transfer from individual to collective, social, cumulative effort, the return of society as a whole to the classless state, *on a far higher level of production* which would satisfy everyone's needs with as little human effort as the silent forces of nature – this was not visualized till the last century. (Emphasis added)¹³

As to "the legend of a golden age" Kosambi provides in parentheses the reference to *Agganna Sutta (Dīghanikāya 27)* which provides, anticipating Rousseau, a fascinating account of the origin of private property of land as also of kingship.¹⁴ Kosambi then compares this legend with "Kalanos in Strabo 15. 1. 64", i.e., the legend of Kalanos as found in the *Geography* of Strabo (c. 63 BCE – c. 24 CE). Kalanos, the Indian philosopher who had become "a slave to the table of Alexander", said:

In former times the world was full of corn and barley, as it is now of dust; the fountains then flowed, some with water and others with milk, or it might be with honey or with wine and with oil; but mankind by repletion and luxury became proud and insolent. Then Zeus, indignant at this state of things, made all disappear, and allotted to man a life of toil. When temperance, however, and other virtues had appeared once more in the world, an abundance of good things again arose. But at present the condition of satiety and wantonness was approaching, and threatened to do away with the existing state of things.¹⁵

The legend of the golden age with its wistful craving for spontaneous yield of crops is often found in Brahminical, Buddhist and Jain literatures.¹⁶ What concerns us here is Kosambi's observation that the Buddha stopped at negation and could not foresee the negation of negation, not, however, due to any personal shortcoming but simply because such an idea could not have arisen at the time when the class society had first made its appearance. It is only when capitalism with its sharp distinction between the two dominant classes, the bourgeoisie and the proletariat, has come into being, replacing the dominance of status that the possibility of a new classless society could be visualized. As Lukács observes:

[F]or pre-capitalist epochs and for the behaviour of many strata within capitalism whose economic roots lie in pre-capitalism, class consciousness is unable to achieve complete clarity and to influence the course of history consciously.¹⁷

This is true because class interests in pre-capitalist society never achieve full (economic) articulation. Hence the structuring of society into castes and estates means that economic elements are *inextricably* joined to political and economic factors. In contrast to this, the rule of the bourgeoisie means the abolition of the estate-system and this leaves to the organisation of society along class lines. (In many countries vestiges of the feudal system still survive, but this does not distract from the validity of this observation.)¹⁷ (Emphasis in the original)

Endowed with this class consciousness the proletariat would not only annihilate the bourgeoisie as a ruling class: it would do away with class division as such. There will be no exploiting class and hence no exploited class; a communistic society would replace the old class society. Private property in all its forms will be abolished and the new society would thus bring back the features of the old classless society which had been negated by the appearance of class society in different forms, in different countries, at different times. As class society itself was the negation of the pre-class society, so the classless society will be the negation of negation of the class society. As a Marxist, Kosambi believed that no idea could fall from the sky. On the other hand, every idea – political, philosophical, scientific or whatever – can and does originate when and only when the forces of production as well as the relations of production are conducive to the birth of a particular idea. This is the basic premise of the materialist conception of history.

We do not know what exactly prompted Hegel to speak of the negation of negation. He mentions this concept less than a dozen times in his *Science of Logic*. Yet to Marx and Engels the negation of negation was a key concept, coming third in the list of the laws of dialectics (the first being the unity and struggle of the opposites, and the second, the transition of quality into quantity and of quantity into quality). It is doubtful whether Hegel would ever agree to apply the law of the negation of negation (if he would concede to call it a law at all) to the next stage of social development as Marx did in *Capital*. In fact it was Engels rather than Marx who interpreted the negation of negation very elaborately in his *Anti-Dühring*. It may safely be asserted that the wide implications of the negation of negation are more apparent in the works of Marx and Engels rather than in Hegel. When Kosambi mentioned the visualization of a new kind of classless society (not a return to the original pre-class state) in the nineteenth century, he definitely had Marx and Engels, not Hegel, in mind.

At the same time it needs to be emphasized that Kosambi found the philosophical idea of *negation* coupled with *causality* concretely formulated in the Buddhist legend, elaborately stated in a Pali work and not abstractly as Hegel formulated it in his *Science of Logic*. Kosambi brings in the account of Kalanos to fortify the claim that the story of the origin of inequality in human society is not a stray one, but a part of the collective memory of the people who had just left the primitive pre-class state to a new class-differentiated one. Kosambi's genius lies in the fact that he finds the necessity of negation as a prerequisite of the negation of negation in the *gāthā* of Āsvajit which states the second and third Noble Facts (or Truths), namely, the cause of suffering and the negation of suffering.

Notes

1. *Anti-Dühring*, 179. For Marx-Engels's debt to Rousseau, see Della Volpe, *passim*. Although earlier translators preferred to write 'the negation of the negation', following the use of articles in the original German, later English and American writers like Cornforth and Gollobin prefer to omit the second 'the'. I too have followed them in this.
2. For a detailed exposition of the negation of negation, see Yu. A. Kharin, 155-58 and Ira Gollobin, 169-84. The latter has examined with enviable clarity the meanings of negation, mechanical negation versus dialectical negation, and the negation of negation, referring to the pre-scientific and scientific views and refuting the anti-scientific views.
3. Hegel, paragraph 185 (p. 44).
4. Kharin, 155-56.
5. *Anti-Dühring*, 174.
6. *Anti-Dühring*, 177. Kharin considers sublation to be "most important" of the varied manifestation of dialectical

negation as opposed to simple, mechanical negation, such as *a* and *-a*. Transformation and withering away or destructive negation are two other types of dialectical negation. For further details, see Kharin, 155-57.

7. *Exasperating Essays*, Intro., 1-2.
8. *An Introduction*, 1956 ed., 161; 1975 ed., 170-171.
9. *Mahavagga*, 39. The translation is quoted from Warren, 89. Another different (prose) translation of the *gatha* runs as follows:
Those things which proceed from a cause, of these the Truth-finder has told the cause, And that which is their stopping – the great recluse has such a doctrine. (*Mahavagga*, xii)
In place of Assaji, another Sravaka called Upasena is the speaker of this *gatha* in *Mahavastu-avadana*, 3:83. The verse in Buddhist Sanskrit runs as follows:

*ye dharma hetuprabhava hetum tesam tathagato hyavadat |
tesam ca yo nirodha evam vadi mahasramaṇaḥ ||*

"The Buddha hath the causes told
Of all things springing from a cause;
And also how things cease to be –
'Tis this the mighty monk proclaims." (Humphreys, 36)

The Sanskrit couplet is also found at the end of *Lalitavistara*, Ch.27.

10. For details see Ramkrishna Bhattacharya, 2003.
11. *An Introduction*, 1956 ed., 161-62; 1975 ed., 170-171.
12. *An Introduction*, 1956 ed., 162; 1975 ed., 170-171.
13. *An Introduction*, 1956 ed., 162; 1975 ed., 170-171.
14. A similar story is found in the anonymous Buddhist Sanskrit work, *Mahavastu-avadana*. Haraprasad Sastri has written an excellent article on this legend. See *Buddhadharma*, 141-47. Chattopadhyaya provides an abridged English version in *Lokayata*, 481-82.
15. McCrindle, 70. For another translation by H.L. Jones (Loeb Classical Library ed.), see R. C. Majumdar, 277.
16. For further details, see Bhattacharya, 2000 and 2004.
17. Lukács, 55.

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Soviet Psychology and the West

Brian and Joan Simon

The subject matter of psychology is man himself, above all his consciousness, his mental activity. Psychology, therefore, attempts to penetrate into what has long remained a mystery – the human mind or "soul". The very attempt raises fundamental philosophical questions. Can the human mind be the subject of scientific investigation or has man, as all religions claim, a "soul" which partakes of something extramaterial and so cannot be scientifically explained? Inevitably, therefore, psychology meets head on with idealist conceptions of the nature of man, even if psychologists are not always aware of the implications.

A scientific psychology must be based, consciously or not, on materialism. The development of psychology has, in fact, been closely linked with the development of philosophic materialism which in turn accompanied the rise of science, was the necessary condition for the separation of psychology from speculative philosophy, a separation heralded in the seventeenth century by the outlook of Hobbes and Locke in this country and by Descartes on the Continent. Profoundly influenced by materialism, David Hartley, in his *Observations on Man* (1749), was the first to attempt an explanation of the human mind on a strictly scientific basis – to account for human thinking and behaviour in terms of the higher nervous processes. Later Joseph Priestley, who, although a Unitarian minister, remained throughout his life a consistent materialist denying the existence of the soul, played a vital part in developing Hartley's associationist psychology. It is interesting to note that the pioneering work of Hobbes, Locke, Hartley, and particularly Priestley, is highly valued today in the Soviet Union – that their contribution to the development of psychology as a science is accorded very great importance.

Today psychology is widely studied throughout the world, in universities, research centres, medical institutions and elsewhere. Yet, except in certain areas of study, it has hardly gained the status of a science. There is in the western world no generally accepted unitary approach to the fundamental questions as to what constitutes man's mental life and how mental processes are formed. On the contrary, there is a wide variety of different, often mutually contradictory, theories about the motive forces governing human behaviour. Yet this is a matter that vitally concerns practice in many fields.

As things are the prospective teacher in a university education department may have to make the best of a situation in which he is presented, in a single course on psychology, with at least three differing interpretations. One lecturer, belonging to the psycho-analytical school, may explain all behaviour in terms of subconscious urges or drives, and conflicts of drives – so putting the major emphasis on the child's relations with his parents in the first few years of life. Early experiences, it is held, determine every aspect of the child's character and outlook; indeed if the lecturer is a follower of Melanie Klein he will suggest that the first three months, even six weeks, of life are decisive. A follower of the American school of social psychology may then interpret human behaviour quite differently – in terms of the various

groups to which the child belongs. Behaviour, he will insist, is entirely determined by the individual's social relations. The third lecturer, a follower of the school of mental testing or psychometry, will then explain the child's behaviour in terms of inborn abilities and endowments; a child learns and develops according to the structure of his abilities, which are biologically pre-determined.

Each of these approaches can, of course, be varied or qualified; each can merge into the other, and the same lecturer often has recourse to more than one to explain different aspects of personality. Nor is this all; there are many other schools of thought to draw on. One of these denies the existence of consciousness and regards the human being as a bundle of habits and skills which have been mechanically acquired. This is the "behaviourist" school, which has made its biggest impact in the United States. It was partly as a reaction against this theory that there developed, particularly in Central Europe, "Gestalt" psychology, which switched the emphasis back to consciousness but explains complex mental actions in a fundamentally mystical way – as the simple outcome of "insight". A great deal of experimental work is, of course, carried out, usually by psychologists whose approach is purely empirical, who lend their adhesion to no overall "theory". But the general picture is one of eclecticism and it is for this reason that psychology as a whole cannot claim the status of a science.

It is sometimes argued that this division of psychology into a variety of schools, often mutually conflicting, is no bad state of affairs in a young science; that from the conflict of different points of view, truth will finally emerge, indeed that this is the condition of advance. But there can be no doubt that the dominance of unscientific ideas and procedure holds up the advance of psychology on scientific lines. Only when psychologists begin to define what is involved in an objective, scientific approach to the study of mind can there be a general advance in this direction. For instance, the assumption which held sway for many years in Western psychology that intelligence is fixed and determined primarily by hereditary factors has focused attention on measurement rather than on the processes of mental development.

It is in this connection that Soviet psychology presents an interesting contrast, for, in the Soviet Union, though there is a great deal of controversy and discussion in the field of psychology as a whole, though the search for a strictly scientific approach and objective methods of research still goes on, there is agreement on fundamental issues, and in this sense a single, unitary approach to the study of consciousness. The last five or six years have seen a growing interest in Soviet psychology in the West. Lecture tours by Professors Luria, Ananiev, Smirnov and other leading figures are partly responsible for this, as well as growing participation in international conferences and the publication in translation of a number of books and articles. At the same time psychologists from Britain, but more especially that United States, have visited the Soviet Union, seen something of the work done and had many discussions with Soviet psychologists. The latter have stressed that they gain greatly from this increasing interchange of ideas and experience, and there can be no doubt that the Soviet approach to psychology will also have a growing influence in the West.

The Soviet Approach

What, then, is specific about the Soviet approach to psychology? What is it that enables Soviet psychologists to develop a unitary approach to the extremely complex questions involved?

The key factor is, of course, acceptance of the Marxist world outlook, as the summation

of a scientific approach to understanding human and social evolution. Thus, in contrast to many Western psychologists, Soviet psychology takes its departure from the principal standpoint of materialism, that matter is primary, consciousness secondary. Mental processes are the product of matter organised in a specific, highly complex way – the brain is the organ of thought. From this it follows that mental processes are an aspect of cerebral processes; that there are not two distinct processes – the physiological and the psychological – representing two quite distinct areas of study, but a single process with different aspects.¹ Direct study of the material substratum of thought – as Lenin put it – is one essential way into a scientific study of the phenomena of consciousness. It is precisely because Pavlov opened the way to experimental study of cerebral processes by objective means, and so to discovery of laws governing these processes, that his work has been so highly significant to the development of psychology as a science.

Looked at from another aspect, the materialist approach recognises that the objective world exists apart from man's consciousness and that sensation, perception and thought derive from the external world. In other words, man's consciousness reflects objective actuality. This reflection is in no sense a passive but an active process. Man is an active being in the environment, and his life consists in activity of specific kinds in specific conditions. It is in this activity in the real world that mental processes are formed. There is, therefore, an integral relationship between consciousness and activity – changes in the content and form of practical activity bring about changes in the organisation and development of the mental processes. This is the very essence of *dialectical materialism* – expressed by Marx in the famous sentence: "The coincidence of the changing of circumstances and of human activity can be conceived and rationally understood only as revolutionising practice." Man in changing his circumstances, changes himself. *This concept is of key importance for the study of psychology.*

Above all, the dialectical approach is vital. Dialectical materialism conceives of a range of forms of movement of matter, from simple change of place to complex changes in the thought processes: within this range one form of movement may be transformed into another, giving rise to new qualities – a transition to a new level. The relations of body and mind, the transition from sensation to body and mind, the transition from sensation to thought, from practical activity to ideas, is evident.

For anyone familiar with Marxist philosophy the significance of these points does not need to be argued. Nevertheless, it is sometimes held that many Western psychologists also accept a materialist outlook in practice, and that clarity on the philosophical question of the relation of being to consciousness is not significant for the study of psychology, which can be approached purely empirically. Soviet psychologists, however, argue that any attempt to

1. This very complex question is discussed in an article by S.L. Rubinstein: "As the reflex activity of the brain develops there arise new – mental – phenomena: sensations, perceptions, and the like. Consequently, there also appears a new subject for investigation, setting new tasks for study – the tasks of psychology. The reflex activity of the cortex is activity that is at once nervous (physiological) and mental, insofar as one and the same activity is regarded from different standpoints. Therefore, the task of studying it is twofold: it must be studied as nervous activity governed by the physiological laws of neurodynamics ... it must be studied as mental activity (the processes of perception and observation, memory, thought, and the like) ... The physiological laws of neurodynamics find in mental phenomena a new unique form of manifestation which is expressed in the laws of psychology". *Psychology is expressed in the laws of psychology*". *Psychology in the Soviet Union*, ed. Brian Simon (London, 1957), 267-8.

construct a science of mind must involve taking a firm standpoint on the relation of mind to matter; that it is impossible to leave the questions open, for to do so is to open the door to unscientific theories and methods, to uncritical borrowing from philosophic propositions.² It is because psychologists do not examine their ideas, supposing they are maintaining a neutral position, that a great deal of the framework of western psychology is said to be insecure. Nor is this all; pure empiricism means on the one hand that no co-ordinated, overall attack on the main problems can be mounted, since there is no comprehensive theoretical structure within which the main problems can be defined and subjected to experimental enquiry. On the other hand, paradoxically, the way is left open for the formulation of all kinds of purely speculative "general theories" – such as those underlying psycho-analysis which actively divert attention from the real problems requiring solution.

Features of Soviet Psychology

Against this background we may examine briefly some features of the work of Soviet psychologists which make clear the main characteristics of their approach. Of first importance is the emphasis laid on direct research into the physiology of higher nervous activity, the reflex nature of this activity. It is only through deeper understanding of the nature and functioning of the higher nervous processes that the laws governing these come to light, laws of neurodynamics which, as it were, spread over to the psychological plane and provide a necessary point of departure for considering purely mental phenomena. This research goes on both in neurological and psychological laboratories. In the latter, new techniques are being developed for investigating different types of higher nervous activity in human beings – a line of research regarded as fundamental to discovery of those anatomo-physiological characteristics which underly individual differences in temperament and form the prerequisites for the development of particular kinds of ability.

A variety of techniques is used in this research – from moving X-ray photographs of muscle movements in the throat while thinking to the more familiar electro-encephalographic techniques. Methods of forming conditioned reflexes in human beings, initially developed by Ivanov-Smolenski, are also widely used, while there is, in addition, much clinical study of disturbances in mental processes as a result of various forms of brain damage – psychopathological research which can throw a good deal of light on the normal functioning of the brain. This concentration on the physiology of higher nervous activity and the close links between such research and research in general psychology is a key feature. According to Professor A. N. Leontiev, vice-president of the Academy of Educational Sciences and Professor of psychology at Moscow University, the most important advances now being made lie on the borderland of physiology and psychology.

2. This view is to some extent corroborated by the following summary of attitudes among Western psychologists as to the relations of mind and matter: "Perhaps the most prevalent attitude of contemporary psychologists is to regard the problem as outside the scope of psychology as at present defined. This attitude, however, very naturally means in practice a refusal to admit that any such problem exists. This again turns out upon closer examination to mean among many psychologists that the answer to the problem is quite simple, and that philosophy has made itself much trouble over many unproductive and unreal problems. When we turn to ask what this simple and obvious answer is, we find persisting, without great alteration, a variety of answers prevalent in the nineteenth century, indeed a number of them prevalent in the ancient world. Many of them have however, taken on a special colouring as a result of the scientific and philosophical events of the last few decades." Gardner Murphy, *An Historical Introduction to Modern Psychology* (4th ed., London, 1938); p.391

A second characteristic feature of Soviet psychology is its heavy emphasis on a developmental – or "genetic" – approach. This emphasis illustrates the Marxist approach, an approach to mental phenomena not as ready-made "things in themselves" but as processes, developing through internal contradictions in dependence on external conditions. To take a simple example, Soviet psychologists reject the view that human abilities are inborn characteristics that simply unfold in the course of life. They hold that human abilities, such as mathematical or musical ability, arise and develop in the course of social living, that they are *formed*, particularly in the process of organised education. And so they turn to find out how such abilities are formed under the influence of specific kinds of teaching, precisely what is their structure, and so on. This enables in turn the development of teaching methods which can compensate for certain features inadequately formed in a particular child. In short, all mental abilities are seen as the resultant of an historical formation.

This genetic approach is typical of the whole outlook of Soviet psychologists. While accepting that different children are born with a differing physiological make-up, which *conditions* (but does not determine) their development – and devoting a good deal of energy to research into such differences – Soviet psychologists hold that what a child becomes, what particular mental abilities, moral outlook, personality, he develops, depends primarily on his activity in specific conditions. Hence the close connection of psychology with education, for this leads on to the point that it is of key importance to organise the child's activity in ways most conducive to optimum, all-round development.

A third feature of Soviet psychology is concentration on human learning. A great deal of research into learning has taken place in the West, particularly in the United States. But this research, undertaken in the framework of behaviourist ideas, is primarily into animal learning – rats, pigeons and octopuses usually acting as the subjects. In the Soviet Union, though there is, of course, research in animal psychology, the main effort has been to find objective methods of directly studying learning in children. Here very great advances have been made; educational psychology is one of the most developed branches, and experimental methods and findings are beginning to evoke considerable interest in the West particularly those relating to the role of language in mental development.

The explanation of this difference of emphasis may well be that to study human learning in the absence of any overall theoretical standpoint defining methods of approach is exceptionally difficult. An important factor, however, has been the dominance of theories of mental testing which have laid all the emphasis on maturation – on "spontaneous" as opposed to conscious, directed learning. When, during the discussion which resulted in the abandonment of mental testing in 1936, Soviet psychologists reassessed the role of educational psychology, they naturally found themselves face to face with the problem of learning and began to turn full attention to it. It may be said, therefore, that the Marxist approach, which led to a basic critique and outright rejection of the theory and practice of testing, essentially opened the way to new forms of study of human learning.

The great emphasis laid on the role of speech in mental development is another outstanding characteristic of Soviet psychology which owes much to Marxism. Observation and experiment have given rise to a firmly grounded view that the early mastery of speech by the child brings about an actual *reorganisation* of mental processes, a qualitatively new state in mental development and so in the control of behaviour. Experimental material testifying to the

decisive role of language in more complex mental processes is how very rich and has cast a great deal of light on matters that have been obscure. Professor Luria's lectures on this question some years ago in England and the United States evoked very great interest.

Wide Field of Research

In listing these characteristics of Soviet psychology there is a danger of giving a limited picture of the scope of the work done; there is no space to outline this in any detail, but some ideas may be gained by reference to the two large volumes recently published in Russian – *Psychological Science in the U.S.S.R.* – which summarise the main researches in key fields since 1917. The articles range from discussion of general theory and approach – for instance, the crucial question of determinism and the nature of thought – to detailed accounts of the process of research relating to sensation, perception, orientation in space and time, and to the problems of attention, memory, thinking, the formation of mental actions and speech. Professor Kostiuk's article on "The Psychology of Thinking" surveys an enormous variety of work in this field, while others testify to the new depth given to psychology by forging closer links with the physiology of higher nervous activity: i.e. those which deal with the mechanisms of speech, the speech mechanisms of thought, the conditioned reflex basis of higher mental processes. There are surveys of work on individual differences through study of types of higher nervous system and the formation of human abilities, research into problems of character, attitudes, emotions, work on personality formation (especially in relation to schooling) and of course, summaries of the extensive research into the mental development of young children and into a wide variety of aspects of the psychology of learning.

Psychopathology is well developed (the study of brain lesions and the rehabilitation of deranged functions being a particular field of interest) and connected with this there has been wide-ranging research relating to various forms of defect in children. Another field is the psychology of labour – now being given special emphasis – while a point of some interest is the extent of work on the psychology of sport, little developed in this country. Mention must also be made of the Georgian school of psychology, which has developed special experimental techniques for the investigation of what is called "set" – this relates particularly to attitudes, but has a close bearing on the study of other general and special psychological problems. (I saw some of the research in progress when visiting the Tbilisi institute of psychology last September, apparently the first English visitor for many years. B.S.)

Soviet psychology, then, covers a wide variety of work, work which precisely because of the unified approach and experimental foundations being laid, is ensuring the development of psychology as a science. Within this unitary approach there is, of course, room for a great deal of discussion and controversy on the validity of different interpretations and the value of various types of experimental techniques, and this certainly goes on. An interesting question, however, is that of the attitude of Soviet psychologists to the work of colleagues abroad – what aspects of western psychology do they accept and what do they reject? This is not an easy question to answer briefly but some points may be made.

What are Rejected?

There are four directions, or general theoretical positions, that are rejected by Soviet psychologists. The first of these is behaviourism, a theoretical standpoint which, paradoxically, owed a great deal to Pavlov's early work on conditioned reflexes but remains wedded to the old

mechanical materialist outlook, seeing the human being as the passive product of external stimuli, formed on a certain pattern by the environment. This means that, leaving consciousness out of account, the behaviourist interprets human and animal behaviour alike in terms of conditioned responses to given stimuli; that is, regards even the most complex mental phenomena as the product of simple training, a simple accumulation of mechanical responses.

Soviet psychologists do not, of course, in any sense deny the existence of consciousness. In their view man's mental life is *the* subject psychology investigates. Nor do they accept that mental development results from the simple action of the external world on the organism. On the contrary, organism and environment interpenetrate, and here the decisive role is played by the cortex of the brain which controls the process of interpenetration. Man is an active being in the environment and it is in his activity that mental development takes place. This activity is always in a social environment, among other people. Herein lies the key importance of language, a specifically human characteristic which gives human beings the capacity to analyse and synthesis, abstract and generalise; these are the basic processes which make up all forms of thought. It is the use of language that differentiates man qualitatively from the animals, that enables the child with the help of adults, to master the knowledge gained by humanity in the course of social-historical evolution. For man, the crucial relationship is not, as in the case of animals, with a given environment he can neither change nor control; for man the crucial relationships within which he purposefully acts are social relations.

The standpoint of Soviet psychology is, therefore, profoundly at variance with that of behaviourism. The latter influenced by Pavlovian theory, in particular those theories relating to language and its crucial significance to human development. It is these, taken up and developed first by Ivanov Smolenski and Krasnogorski and since in psychology, that have given rise to an immense body of research on quite different lines from that in the West, and opening up new perspectives.

The second standpoint unacceptable to Soviet psychologists is that of mental testing, or psychometry. Here again the fundamental premises are regarded as scientifically unsound. In their view, it is inadmissible to attempt to measure supposedly innate qualities without determining in a scientific way precisely what these properties are – the tests used for such a purpose can only embody purely speculative ideas about mental qualities. So this type of testing has proved sterile from a scientific point of view. The psychometrist is mechanistic if he claims that human mental development results from the action of the external environment on hereditary characteristics, these being regarded as two quite separate (discrete) factors. From this arises a metaphysical concept of mind as consisting of a hierarchy of mental factors, the highest of which is "intelligence", a purely hypothetical, inborn power not open to scientific investigation. This model of the human mind is upheld on the basis of mathematical analyses of the results of tests administered to thousands of people – in an attempt to reconstruct an abstract "man-in-general". It does not derive from any attempt to penetrate into the actual mental processes of living individuals in their activity in the real world. All this, in the view of Soviet psychologists, is the reverse of a scientific approach.

They also point to practice, to the harmful effects of mental testing when used for class ends. The Intelligence Quotient (I.Q.) derived from giving any child a mental test, as Professor Smirnov has pointed out, is at best a mere statement of the result of the child's learning. It gives, as it were, a snapshot of aspects of his intellectual level at a particular point in time,

but does not disclose why or how this level was achieved, what prevented the child from doing better, and so offers no guide to educational practice. Mental testing cannot, by its very nature, penetrate into the essence of mental processes, whereas, to quote Professor Smirnov, "the main concern of psychological research, employing strictly objective methods, is with mental activity proper, its substance, structure, mechanisms, i.e., precisely that which is disregarded in the case of test investigations". The aim of Soviet psychology, he goes on, "is to analyse the characteristics, the reasons and motives, the psychological mechanisms, of mental activity; this procedure alone opens the way to discovery of the essence of the activity and to an understanding of its result. This is how Soviet psychologists interpret the subject of psychology and the purpose of objective methods of investigation".³

Third, Soviet psychologists reject the stand point of the various schools of psycho-analysis, whether Freudian, jungian or other. They are not, of course, unique in this, since psycho-analytical theory is regarded sceptically by many psychologists in the West, particularly experimental psychologists. In the Soviet view psycho-analysis is riddled with speculative notions having no basis in objective, scientific investigation. Explanations of the mind in terms of dark, primeval biological urges, or race memory and so on, are regarded as having nothing in common with science. Freud's early work, when he set out to investigate the higher nervous processes underlying neuroses, is regarded as positive; but from the moment that he abandoned this road to construct theories based on introspective evidence he is regarded as having turned his back on science.

Today there is a new development in that certain findings in the area of neurophysiology seem to offer support to aspects of Freudian theory, a point on which neo-Freudians – not hitherto interested in establishing physiological foundations for their views – have seized. This, Soviet psychologists claim, they can only do by ignoring innumerable experimental facts which emphasise the key importance of consciousness and of higher nervous activity.⁴ In this connection it should be noted that, while entirely rejecting the unscientific propositions of Freudianism Soviet psychologists do not, of course, set aside the conception that there can be a conflict of drives producing mental disorder; on the contrary, a great deal of research has been done in this direction in the light of Pavlovian theory in physiology, psychiatry and psychology.⁵

Social Psychology

Finally, much of the work done in the West, particularly in the United States, under the heading of social psychology, is regarded with scepticism. This must not be taken to imply that Soviet psychologists are not interested in the relation between the individual and the group of collective;

3. *Psychology in the Soviet Union*, 189.

4. See F. V. Bassin, "Freud in the Light of Contemporary Scientific Discussion" *S.C.R. Psychology Bulletin*, Vol. 6 Nos. 1 and 2.

5. An important early work on this topic is A.R. Luria. *The Nature of Human Conflicts. An Objective Study of Disorganisation and Control of Human Behaviour* (1932), recently reprinted in the U.S. (1960). As for the unconscious, Soviet psychologists state the matter this way: "Since they regard consciousness as the highest form of mind, Soviet psychologists give it a leading importance by comparison with the unconscious; the latter is not ignored but takes a subordinate place to conscious activity which is the basic object of investigation." *Psychological Science in the U.S.S.R.* (Moscow, 1959), 5.

indeed they are profoundly concerned with the question of the formation of personality in this sense, which has the closest bearing on the formation of moral traits required for the establishment of communist relations. Their scepticism arises in part from the tendency, very evident in the United States, to subordinate social psychology to the requirements of class society, to place in the centre of the picture "adjustment" of the individual to existing capitalist relations, to conduct "management" studies in industry and so on. Further, social psychology, as it has developed in the United States, evades or by passes the essential subject matter of psychology as Soviet psychologists see it – the mental processes of the individual; Soviet psychologists, on the other hand, study the development of the individual *in dependence* on his social relations, the groups surrounding him.⁶ Here, then, again, is a basic difference in approach. Nevertheless, Soviet psychologists have begun recently to show interest in some of the techniques in this field, for instance, those of sociometry, pioneered by Moreno. It may also be mentioned here that they are paying considerable attention to other aspects of psychological study formerly neglected, for instance, cybernetics, information theory and the use of statistical techniques such as factor analysis (though not, of course, in relation to mental testing).

These four areas might seem, to the layman, to cover a wide field of western psychology, but this is not exactly so. A considerable amount of experimental work is, of course, carried on in the West in which Soviet psychologists show deep interest. This is naturally greatest in those fields that about on their own main concerns – that is, in work in neurophysiology and psychopathology and also experimental study of sensation, perception and thought. There is also much interest in cognitive studies and, as might be expected, Soviet psychologists are extremely well informed as to developments in the West.

How, in their turn, do western psychologists assess Soviet psychology? It can be said that some American psychologists are becoming deeply interested in the whole approach of Soviet psychology. This is partly explained by the fact that there are research institutions which have been working for decades on the study of conditioning and that today many researchers are seeking a way out from the dead end of behaviourism. It is interesting to find leading American psychologists, who some years ago were hostile and criticised Soviet psychology strongly as doctrinaire, showing a sympathetic attitude to theories which they now understand more fully, and even championing them. This change of approach is very significant.

Western Views of Soviet Psychology

The general attitude of western psychologists is more difficult to assess, not least because Soviet psychology is so little known. But some sort of objective assessment may be made on the basis of reviews of *Psychology in the Soviet Union* which contained a reasonable representative set of papers covering the main fields of work.⁷

Some critics discerned a tendency to force experimental results and interpretations to fit Pavlovian theory, one or two claimed that the work as a whole was vitiated by the attempt to force psychology into Marxist categories. Criticisms of this type were, however, very few.

6. "Soviet psychologists firmly reject any attempt to 'psychologise' laws of social development; they clearly differentiate social and individual consciousness taking their complex interrelations into account." *Psychological Science in the U.S.S.R.*, 5.

7. This was the first such book published in the West, in England by Routledge, in the U.S.A. by Stanford University Press, in 1957.

More generally there were comments on the rejection of mental testing – some, of course, suggesting this was on ideological and not scientific grounds – the rejection of psycho-analysis and the absence of work resembling western social psychology and the concept of motivation. Others noted a lack of stress on emotional growth as compared with western child psychology and there were criticisms of the comparative lack of statistical treatment of results (that is, of a qualitative rather than quantitative approach in certain fields) and, on occasion, of the design of some experiments.

The aspect that most impresses western psychologists, on other hand, appears to be precisely the stress on the psychology of learning and intellectual development referred to frequently in this article. Several reviews singled out for comment the close concern with child psychology and the problems of intellectual formation. Soviet psychologists, wrote Professor Knight, have important things to say about the positive role of learning and of social factors in perception, motivation and the development of personality, matters only now receiving attention here. Writing in an American scientific journal Professor Boguslavsky, remarking on the great diversity of psychological endeavour, sees the main target of research as the relation of language to mental development ; he points also to the novel interpretations of psychological concepts and to original methods of tackling the problem of behaviour – interesting features which, he says, will certainly give rise to a demand for more translations of research work.

Dr. McKellar of Sheffield University, making the point that learning is now central in experimental psychology, points out with approval that Soviet psychologists tackle this in its educational context rather than through animal experiments as in the West, adding that Soviet work is heavily experimental. Commenting on the genetic (developmental) outlook of Soviet psychologists, another reviewer sees their approach to educational psychology as more realistic than ours: we see learning as an individual process, Soviet psychologists on the other hand stress the role of the teacher and the relation of methods of instruction to the process of learning itself – they lay much greater stress on social learning than innate endowment.

Finally, a member of the Cambridge research unit, in a perceptive review, interprets the approach of Soviet psychologists as forming part of a discussion, not yet ended, on the best way of approaching, scientifically, the human consciousness in its development and all its aspects. Remarking that we know very little about developmental processes in children, or indeed in animals, she sees here a vast field for detailed research presenting difficult methodological problems. Soviet psychologists, she concludes, “are making a well thought-out, well-organised and comprehensive attack on this complicated problem and a serious attempt to understand behaviour as a whole, in its individual development its interrelationships and in all its complexity”.

This fairly sums up one of the most significant aspects of Soviet psychology today. There can be no doubt that this work, which draws so much from the Marxist approach, will make an increasing impact in coming years. In particular, it has a profound theoretical significance for teaching and education.

P A S

A statistical test of astrology

Jayant V. Narlikar, Sudhakar Kunte, Narendra Dabholkar and Prakash Ghatpande

This paper describes a recent test conducted in Maharashtra to test the predictive power of natal astrology. It involved collecting 200 birth details of 100 bright school students (group A) and 100 mentally retarded school students (group B). These details were used to cast horoscopes or birth charts for these children. After recording these details the charts were mixed and randomized and astrologers were invited to participate in a test of their predictive ability. Fifty-one astrologers participated in the test. Each participant was sent a random set of 40 birth charts and asked to identify to which group each chart corresponded. Among the initial 51 participants, 27 sent back their assessment. Statistical analysis of the results showed a success rate marginally less than what would be achieved by tossing a coin. The full sample of 200 birth charts was given to the representatives of an astrology institute for identification. They also did not fare any better. The limited but unambiguous procedure of this test leaves no doubt that astrology does not have any predictive power as far as academic ability is concerned. Ways of extending the scope of this test are discussed for future experiments.

In the popular mind astrology is often confused with astronomy. Since both subjects talk about stars, constellations, planets and the sun and the moon, it is usually assumed that both are branches of science dealing with the cosmos. An example of this was the announcement by the University Grants Commission in 2001, that a subject called ‘Vedic astrology’ should be introduced in the science stream of the university syllabus.

Is astrology a science? A closer examination suggests that the answer to this question is ‘no’. A subject claiming to be part of science needs to satisfy certain minimum criteria. First, it should be based on postulates or assumptions that are clearly defined and are unique so far as the practitioners of the subject are concerned. Secondly, from these postulates the subject should come up with testable and disprovable deductions, that do not depend on who makes them. Finally, there should be tests for deciding whether a particular deduction is validated or disproved.

Astrology, when subjected to these conditions, has always been found to be wanting. The basic tenets of the subject show considerable variation, such as the way a horoscope is to be cast. Even with a given horoscope two astrologers may differ in their interpretation or prediction. Finally, often the predictions are vague and not disprovable.

Nevertheless, in the West, tests have been conducted of astrological predictions, to the extent that they can be tied down to definitive statements. We mention two examples which will illustrate how one may proceed. The first relates to the belief (common in India) that unless the horoscopes of an eligible boy and girl match astrologically, they should not marry.

Bernie Silverman, a graduate student from the Michigan State University, USA, had the following experiment as part of his Ph D thesis (received in 1971). His study picked out (A) 2978 couples who were happily married and (B) 478 couples who were divorced or separated. Their horoscopes were cast and given to two astrologers who were asked to agree

between themselves as to whether the horoscopes belonging to a couple matched or not. The astrologers were not told to what class (A or B) each pair belonged. Accordingly, they made the classification using the astrological criteria they mutually agreed upon. Their classification was then compared with reality by applying statistical tests. These tests showed that there was no significant overlap between the two classification. Thus astrological compatibility of horoscopes did not correspond to compatibility in real life. Details of this study have been published elsewhere^{1,2}.

A double-blind approach was used in our second example of a test of astrology. Carlson³ used birth charts to test the astrological claim that the positions of the 'planets' (as assumed in astrology) at the moment of birth can be used to determine the subject's general personality traits and tendencies in temperament and behaviour, and to indicate the major issues the subject is likely to encounter. In this test astrologers were invited to make such interpretations for the birth charts of all the persons chosen for the study. Each person was given three such interpretations: the first being based on his/her real birth chart and two others chosen at random from this collection. The person was asked to rank them with marks out of ten depending on how accurate they were regarding their own self-assessment. A variation in this technique using California Personality Inventory (CPI) for the person was used instead in a second associated test. Here, the participating astrologers were each given a birth chart and three CPIs. One CPI corresponded to the birth chart given, while two others were randomly drawn from the sample. The astrologers were asked to rank the three CPIs according to how well they described the person with that birth chart.

If there is no correlation between the birth chart and personality, then, in the first experiment, one-third of the actual interpretations should be chosen as number 1. The astrologers claimed that if they are right at least half the actual interpretations should be correct. The experimenters allowed a 2.5 variation above the chance expectation: anything higher would support the astrological hypothesis. A double-blind procedure was used so that neither the participant nor the experimenter knew what they were looking at. All details of birth charts vis-a-vis the persons they corresponded to were coded. Details are given in the paper referred to above. We simply state that in the first analysis the correct interpretation was obtained with a probability of 0.337 and with an error 0.052, very close to the chance value of 1/3.

With this background we now come to our experiment.

The Pune experiment

While designing a suitable test we were conscious of the need that the outcome has to be beyond any ambiguity of interpretation. Thus in the Carlson experiment one could say that reading a person's personality may not be clear-cut. Indeed, as it was discovered in the course of the Carlson experiment, the CPI may not be recognized by the person to whom it belonged. The Silverman method of marriage compatibility is better, except that in the Indian context the rate of broken marriages is still rather low and collecting a large enough sample may pose difficulties. We will return to this point at the end of this paper.

For our experiments we chose a different but clear criterion, namely whether a person is intellectually bright or mentally handicapped. Astrologers claim to be able to tell this difference from the person's horoscope. So from amongst school children we collected a sample of 200 cases, with 100 each belonging to the above two classes. The intellectually bright children

constituting group A were known from their school records as certified by their teachers. The mentally retarded children making up group B came from special schools for such children. Certified information from the parents about the birth details of their wards, necessary for casting their horoscopes was obtained. This field work was done by the volunteers of the Andhashraddha Nirmulan Samiti, Satara.

The next job was to cast their horoscopes. This was done using standard software by one of us (PG) who possessed enough experience in astrology, having been a practising astrology, having been a practising astrologer a few years back.

The data were then codified with a code number assigned to each case. By deciphering the code number the concerned case could be fully identified; otherwise it remained an unknown entity. This was therefore a double-blind procedure since neither the experimenter nor the participant of the experiment could identify the case from the code number only. The data thus obtained and codified were stored in safe custody with the Statistics Department, Pune University.

Meanwhile, through public announcements and a press conference in Pune on 12 May 2008, practising astrologers were invited to participate in the experiment, the procedure for which was also explained. Of the 200 cases in our sample, each participant would be given a randomly drawn set of 40 birth charts along with the birth records. The participants had then a stipulated time limit by which they would have to identify each case as belonging to group (A) or (B), and send us their conclusions. For the initial set, the participants were asked to send a stamped registered envelope. Additionally, we also invited established astrological organizations to participate as institutions. In such cases we offered to make the entire sample of 200 cases available.

The nature of the statistical test is simple. We have two hypotheses to compare. The chance hypothesis H_0 is that the selection between groups A and B is like tossing a coin with probability 0.5 attached to each mode. The alternative hypothesis H_1 is that the classification using astrological prediction has success probability more than 0.5. For such a testing hypothesis problem, in order to reject H_0 in favour of H_1 , the success rate has to exceed the mean expectation on the basis of H_0 by an amount equivalent to 2.32. This procedure ensures that the probability of wrongly rejecting H_0 is not more than 1%. For a binomial distribution with success probability $p=0.5$, the mean for a sample size N is $0.5N$ and $\sigma = (N/4)^{1/2}$. For a sample size $N=40$, we get the mean as 20 and $\sigma = 3.16$; so $2.32 \times 3.16 = 7.3$. In short, for our typical sample size the success rate of the astrologers to reject H_0 had to be at least 28. In the institutional case, the corresponding figures were mean = 100 and the required success rate for H_1 to hold was 117 or more.

Response of the astrologers

When this framework was announced, the response of the astrologers was varied. Some agreed to take up the challenge, others asked for additional conditions which had no relevance to the nature of the test being conducted, while some called upon the astrological community to boycott the test. We met several astrologers individually and also participated in a seminar where we explained the nature of the test, its objective and the precautions we were taking to prevent any rigging. We also pointed out that if the astrologers wished to claim that their subject was a science, then they need to face such tests. While on the whole the response

was positive, some leading astrologers distanced themselves from the test.

In the end, 51 astrologers sent stamped envelopes as asked for and the sets were sent to them. Only 27 replied, sending their answers. These were then examined in the light of the data. The best performance was 24 out of 40, achieved by one astrologer only and this fell below the stipulated minimum for H_0 to be rejected in favour of H_1 . The overall average success per sample for all 27 participants was 17.25, less than but consistent with the average of 20 predicted by H_0 . So far as institutional participation was concerned, two organizations had agreed to participate. Eventually only one responded with answers. Its success rate was 102 out of 200, again well below the stipulated minimum of 117.

Thus we find on the basis of this test that the predictions given by the astrologers did not fare better than pure chance toss of a coin.

Concluding remarks

We feel that our test asked a well-focused question and the astrologers could not point to any ambiguity of interpretation. Many astrologers looked upon the success they had achieved (even though at a rate less than 50% expected by tossing a coin) as a testimonial to their predictive ability. We had to explain to them that real predictive success could be claimed only at 70% level for their sample size.

The test clearly demonstrated the hollowness of the basic claim of astrology as stated earlier. Diehard believers, of course, would not change their mind. However, it would be worthwhile conducting a similar double-blind test to check other aspects of astrological predictions. One important aspect has been the one tested by Silverman. Since a large fraction of marriages is arranged (or forbidden) on the basis of matching of horoscopes, a statistical study of this aspect will be useful. There may be several difficulties in gathering these data, but the effort would be well worth it.

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From the Desk of the Mind-Painter

Know life in the new light

"I don't know how to begin, the problem is such . . .", Mrs. Roy Chowdhury abruptly stopped and heaved a sigh and started fidgeting her nails. Assuring her I said, "I think one can only open up freely to a doctor. So, you can speak out. What seems a horrible situation to you, is something we are used to hear."

"The problem is with my husband who has been behaving very peculiarly since some days. There is distrust in his eyes and is constantly vigilant about my whereabouts in a very irritating manner. I am a school teacher. When I leave for school, I find him at the door. Near my school, looking back I find him hiding near the turning of the road. The same thing happens when I go for shopping also. He constantly follows me.

"One day I directly asked him - 'What's the matter with you?' - Holding my hands he started sobbing and said - 'Why are you neglecting me now - why have you changed so much?' - I was taken aback and asked him curtly to speak out clearly what he intended to say. Suddenly all sobbing disappeared - a complete changed man stood in front of me with a firm chin. Anger seemed pouring out his eyes. Excitedly he said - 'What do you think, I don't understand anything why you deck up so much now-a-days? Going out with your paramour Pradipda everyday! Don't think I am unaware of the fact why you have arranged a rented house for him so close by! Don't try to act too smart with me. Our kitchen window directly overlooks the window of that house! Now I understand why you spend so much time in the kitchen, showing as if you have a lot of work in there! You also return so late from school now!' - I replied - 'Do you know why I am late? It is only to buy things from the market for our family.' - At this he got over excited and came forward to hit me. He stopped when I protested. Then only I realised that he was mentally ailing."

I said, "How did it start? What were the primary symptoms? Was there any reality behind his doubt?"

"No, no doctor, I can't remember any such reason. In the beginning he appeared to be a bit quiet, melancholic and unmindful. He is a college lecturer. He was supposed to be the head of the department which he did not become, may be there was some manipulation at the back. I thought this was one of the reasons behind his moroseness and also he has three more years for his retirement.

"He has the reputation of being very honest and responsible. He has never given any private tuitions. He was a very busy person with the responsibility of his students and at the same time shouldering the responsibility of the teacher's forum and various other social organisations also. Late he has lost his interest in the organisational activities also in which he found pleasure. What a drastic change!"

"It seems he is suffering from a delusion. But it is difficult to start his treatment before talking to him personally."

"But he does not think he is ill. So how can I bring him?"

1. Silverman, B., *J. Psychol.*, 1971, 77, 141-149.

2. Silverman, B., *J. Psychol.* 1974, 87, 89-95.

3. Carlson, S., *Nature*, 1985, 318, 419-425.

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"Yes, that's true. In such cases it is a very difficult task. But if you place the matter in such a way, as if you are suffering from undue tension, and you need a treatment, for which I have asked you to bring your husband along with you, then I think it will work. Leave the rest on me to tackle."

After this there was no news from them for a long time. One day she suddenly came in and shut the door swiftly. She surveyed if the door and the window was properly closed. Then she came in front of me signalling me to be quiet and then almost whispered - "I have brought him doctor, I have brought him."

I too whispered, "How did you manage?"

"The way you suggested. At first he opposed saying - 'You want to prove that I am insane by giving me medicines and then put me into an asylum so that you can safely go along with your ...!' - Somehow he agreed, but why I don't know.

"Now he is crossing his limits doctor. He now often goes to my school with lame excuses, as if to fetch the keys and so on. Everyone now can guess the real intention, that is to see, if I really have gone to school. He also suddenly returns home before time if I am at home, probably to see if anybody has come to visit me.

"One day I found him peeping through the doors and windows after one such sudden return. Now we often get excited and fall out. Our daughter is growing up and he bullies me with such abusive languages that it is beyond dignity to hear. Our daughter can't tolerate him now. It seems he remains awake whole night, and sometimes he goes from one room to another. That day only he suddenly shouted at midnight and started looking for someone under the bed, in the kitchen, in the bathroom with a torch breathlessly, and then directly charged me huskily - 'Where is Pradipbabu?' - "

The lady almost whispered the whole incident at a stretch and then said, "I am bringing him here. He will smell some foul play if I delay anymore."

The serious, thick spectacled lecturer gave me a surveying glance while entering my chamber with tensed Mrs. Roy Chowdhury by his side.

I said, "Your wife is suffering from tension and insomnia. So I wanted to have a discussion with you."

"Yes, I too have something to say."

"Then, Mrs. Roy Chowdhury, please wait outside. I want to talk to your husband."

The lecturer surveyed if the door and the window was properly closed. Then looking sharply at me he started - "It is quite obvious for her to suffer from tension - doing illegal activities - she won't suffer?"

Being enquired, the grave lecturer carried on in an imposing, soft but rough tone - "Have you watched her demeanour? Have you watched the dark patch of waywardness under her eyes? She has started dressing up in such indecent clothes since sometime. Her appearance has become so ugly! She is spoiling our daughter also." - He got more excited and almost whispered - "Doctor, she has become a prostitute - a real whore I have been trying to catch her red-handed for a long time. Now!"

"Is it? you have caught her red-handed!"

"That day I feigned sleep till midnight. I saw her stealing out of the room. In the next room there was Pradipbabu, Mitali's colleague. I jumped to catch him, but the rascal has escaped narrowly."

"That means you have seen Pradipbabu clearly?"

"If I had seen him I would have caught him. As soon as I jumped, I heard his escaping footsteps. When I opened the door, I found the rascal had fled. They have become experts in such hide and seek games."

"Somenathbabu, are you sure there is no mistake anywhere?"

"Mistake! you must come over to our place one day doctor, and then you will understand the special arrangements Mitali has made for her paramour. You must come, I am giving you a call, and see the things for yourself."

I had to visit on call to their place one day. It was a well planned professor's quarter inside the college campus. The room was decorated decently with curtains and furniture. At a corner of the room there was a tape-recorder from where soft notes of Rabindrasangeet was coming out. The drawing-room tea-table was covered with a lovely embroidered table-cloth. The wall-side book-shelf displayed Kafka, Sartre, Bertrand Russel and what not! All these speaks of their culture and education. It was beyond imagination that such decent walls and curtains of that room could be full of such anxiety and disturbance.

Courteously with folded hands Somenathbabu entered the room - "Giving call to a busy man like you ... I am really feeling very bad." - We started talking quite normally on various topics. Mrs. Roy Chowdhury came in with two cups of tea. No sooner did she serve, than Somenathbabu swiftly exchanged his cup with mine. I couldn't follow the reason and looked at him questioningly. He gestured to tell me later. He then softly said, "Come, let me show you the house, then only you will understand. Mitali, I am taking doctorbabu to show our house."

He pointed at the kitchen windows from outside the house and said - "Can you see! This kitchen window and the window of that house - it gives a direct vision. It is in that house that my wife has brought that culprit on rent. I hope you can guess why in that house only! A saree is hung here at the backyard of the house as a signal - and see, a saree is there today also - it means there will be a love tryst tonight. That day also this saree was hung during day and the incident took place at night. Have you seen the colour of the saree? Now-a-days she wears such gaudy sarees. What a shame doctor! What to say! And she has hung the saree this side only. I will stay awake tonight, and surely catch them red-handed, you'll see! you'll come to know of it later." Hopelessly Somenathbabu strated pacing around the house.

I said - "Why did you chnge the tea?"

"One day she had mixed something in my food for which I had severe vomitting. I had survived as I had vomitted it out. She thought to kill me and lead an amorous life with Pradipbabu. Doctor, my father was a freedom fighter. He escaped the eyes of the British, and I am his son - then onwards I have stopped eating at home."

"But if anything was mixed in the tea, then I would have been in danger that means you wanted me to be in danger?"

"No, No! doctor. How would you say that! Actually she has noticed me exchanging. If anything was really mixed in it, she would have changed it by giving an excuse that something had fallen in it. Then everything would have become evident!"

"It means it is not yet proven, isn't it?"

"No, just because today you are here, she hasn't dared to mix anything for fear of being caught."

Ultimately somehow he agreed to take medicine, may be out of faith in me, or to get rid of the mental stress, tension and restlessness from which he had been suffering. As soon as medication started, the intensity of his false belief and delusion became minimised. In his next sitting he said - "Though such incidents are not taking place now, I can't get rid of the thought." In the next sitting, when he was almost normal, he realised - "It is difficult to say what had happened then." Smilingly he said, "Everything of that phase seems like a riddle."

Mrs. Roy Chowdhury informed - "He is dozing a bit more, reluctant to work and prefers lying down." Somenathbabu agreed to it and requested to see if his working energy could be revived.

The disease from which Somenathbabu was suffering is known as delusional disorder. Previously it was known as Paranoia or Paranoid disorder. It means false and firm belief impervious to reasoning. All his life he had been a successful careerist and he was quite proud of it. As the brightness of his career was gradually fading out, when the chances of his becoming a departmental head was almost nil, when the final limit of his honourable lecturership career started becoming visible, the knell of retirement started ringing, leading to end of his days in the teacher's organisation - he became depressed. He had failed to adapt himself in this new sphere of his life. His shattered pride gradually encroached into their conjugal relationship also, and he started feeling insecure about his importance as a husband.

When one starts losing the glorious aspects of life, though quite naturally, one starts feeling insecure at the glorious career of his wife also. During the working days they had drifted apart due to the pressure of their career. Their mutual relationship and understanding had weakened. Each had become busy in their own sphere of work. But when he turned homewards losing all interest in his workfield, he felt himself very lonely there, because his wife was still working happily. If she was happy, then it ought to be her work and job satisfaction. But his loneliness made him jealous about Pradipbabu, who was her companion in the working arena only.

This delusion was able to hide the sense of insecurity and loneliness in him. The problem in his mind about his wife gradually intensified and the other real problems of his life became valueless. The recurrent doubt against his wife gradually drifted him from practical reasoning. When he became totally aloof from practical reasoning, his doubt against his wife became so strong, that he started believing it to be real - and this phase is called delusion. Usually counselling is ineffective at this phase as suggestions cannot penetrate the hard core of false belief. Medication is inevitable, but it cannot heal completely. Thus I suggested both of them to share a close understanding relationship in the days to come, forgetting all differences.

And to Somenathbabu I suggested that his past career is not in ruins. It is a part of life that one leave space to the next generation to continue his pending work, and this is the law of life which goes on. From here begins a new life for him. So nothing is lost. Only we have to know and accept life as it comes.

Dr. Goutam Badyopadhyay P A S

Review

Forward from Darwin

NEW BOTTLES FOR NEW WINE, by Julian Huxley. Harper & Brothers : \$. 4.50

This volume brings together a noteworthy collection of thirteen lectures and essays by a distinguished biologist. Written during the last eight years, they range over biological, social and philosophical subjects. The most persistent topic is that of the relation of science and a scientific approach to theories of progress, the nature of a free society, ethics and ideology generally. At the same time there is an essay: "What Do We Know about Love?" that definitely belongs here and another one, entitled "Natural History in Iceland," the inclusion of which is questionable.

Fundamentally, the essays fit together and cover different aspects of closely related themes. Unfortunately, separate essays rarely make a good volume for the simple reason that they remain essays and as such cannot become a unified book. There is an enormous amount of repetition here, of over-lapping, and the return in many places to a few pet themes - something almost inevitable in a compilation of addresses prepared for delivery at particular times for specific occasions. There seems little doubt that Thomas Henry Huxley succeeded better in the publication of collections of essays than has his grandson, the present author. It would be good to have Julian Huxley's his key themes thought out and organized at full book length.

The central focus of Huxley's thought and outlook is his belief in science and scientific method as the sole dependable means for securing human progress. He is thus at once a scientist and a humanist in the tradition of the best of the Victorians. If there is one subordinate theme that runs through his writings it is his belief in the excitement, beauty and wonder of the universe as science increasingly reveals it to us. This is worlds removed from the sad cry of the Existentialists: "Isn't it terrible? There is no God!" In these pages there is ably and beautifully presented a world of nature of which man is a part and to which he contributes values which are *his* but which are nevertheless natural. Man is a wonderful creature, Huxley believes, with infinite potentialities and wonderful too is the nature that has produced and sustained him.

In his basic philosophy Huxley resists using the terms "matter" and "materialism." His reasons are twofold. First, that for modern physics matter and energy are revealed as inseparable and interchangeable. Second, that matter is commonly opposed to "mind," whereas it is now apparent that "when organized in certain ways - as, for instance, in the form of human bodies and brains - it is capable of mental as well as material activities." (p. 290) Any argument with this, from a materialist standpoint is largely semantic. The central question is whether we are going to make words serve our purposes in accordance with historically evolved usages, or are to be governed by popular misuses, abuses and misconceptions. That Huxley's position is a purely materialist one - and dialectical, to boot - is revealed in the following paragraph quoted in its entirety.

In the essay entitled "Evolutionary Humanism," he writes:

I submit that the discoveries of physiology, general biology, and psychology not only make possible, but necessitate, a naturalistic hypothesis, in which there is no room for the supernatural, and the spiritual forces at work in the cosmos are seen as a part of nature just as much as the material forces. What is more, these spiritual forces are one particular product of mental activity in the broad sense, and mental activities in general are seen to have increased in intensity and importance during the course of cosmic time. Our basic hypothesis is thus not merely naturalistic as opposed to supernaturalist, but monistic or unitary as opposed to dualistic, and evolutionary as opposed to static. (p. 286)

It is a little sad to reflect that a third generation Huxley still has to defend Darwin and Darwinism. One might wonder why and if this is necessary were it not for the recent re-issue in a popular paper edition of Jacques Barzun's 1941 work, *Darwin, Marx, Wagner*. Barzun makes natural selection "a poetic metaphor."

Huxley, in one beautiful essay, "Life's Improbable Likenesses," strikingly reveals the role of natural selection in a delightful survey of mimicry, protective coloration and other protective characteristics of a wide assortment of animals and plants, beginning with the Japanese crab that is not eaten because it bears on its shell the face of a medieval Samurai. This essay shows beautifully the wonders of nature and how scientific explanation serves only to make them more wonderful. It concludes with the sentence: "Nature is indeed orderly, but its order transcends our most disorderly imaginations: that is the lesson to be learnt from life's improbable resemblances." (p. 154)

This essay, together with the one, "New Light on Heredity," sufficiently suggests why Huxley was awarded a special prize by UNESCO in 1953 for Distinguished Popular Writing in Science. Here there is an incredible lot of material packed into nine pages and yet with extraordinary clarity. And with his typical sense for the dramatic Huxley opens this brief discussion with the statement that when Darwin published *The Origin of Species* in 1859, practically nothing was known scientifically about either heredity or reproduction.

The greater part of the volume is given over to an interesting and challenging series of essays and addresses that can best be described as philosophical-social. They deal, under various titles, with the meaning of a scientific or naturalistic humanism for man's social life at the present stage of history. They contain much that is significant and vital and reveal either the pervasive influence of Marxist thought or the independent development of many of Marx's and Engels' key ideas. It is unfortunate that they suffer from conscious or unconscious misreading or mis-understanding of Marxism. Marx is never referred to without rather sharp criticism and the meaning of dialectical and historical materialism is always distorted. Sigmund Freud, on the contrary, always comes off with honours and without the slightest trace of any critical judgment. Huxley completely ignores political economy and throughout the volume society and its problems of poverty and productivity are treated without any reference to capitalism, imperialism and colonialism or the challenge of socialism. He has learned only that the world's population must be limited. Time after time the world's pressing social and economic problems are stated but overpopulation, not a scientific-social analysis, supplies the explanation.

The essay, "Population and Human Fulfilment," contains much that is of value. It is soberly written and the case for world-wide birth control is well argued. Certainly a problem confronts us in the present leap in population growth due to the rapid and radical lowering of the death

rate in most of the world. Simply to brush aside the raising of the question as "Malthusianism," and deny that there is any possible problem, is to act like the proverbial ostrich. On the other hand, to seek world action to counteract the present rate of population increase without consideration of poverty, ignorance, superstition and Catholicism; and without reference to economic organization and the base of political power, is to treat the question in a vacuum. China today illustrates how a socialist world can readily handle the population question. An imperialist world never can. Huxley has the whole problem upsidedown. Only a rationally organized world can solve the problem; a predatory one can only aggravate it and "solve" it along racist lines. One sometimes suspects that those who make "over-population" the world's most pressing problem and ignore virtually all others are thus covering up their desire to avoid facing the basic problem of capitalism and imperialism.

Putting the population question aside, together with the all-too-frequent gratuitous and false statements on Marx and Marxism, Huxley has many valuable contributions to make. He is excellent on the unity of man and nature. He has a dialectical understanding of the different levels of science, as with chemistry, biology and anthropology and he makes a valuable analysis of the differences between biological and cultural evolution. He manifests a real understanding of the unity of biology and anthropology while never minimizing the difference. His work suggests some of the rich and as yet unexplored possibilities of a genuine fusion of Darwinism and Marxism. Marx believed he was doing for social forms and institutions something similar to what Darwin did for biological species. An invaluable contribution to thought could be made by a person thoroughly trained and equally at home in both areas. Julian Huxley suggests what some of the fruits of this might be. His anti-Marxist bias and his apparent ignorance of political economy unfortunately prevent him from achieving an all-embracing science of life that would include man and his whole social-historical development.

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Howard Selsam

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