produced from the hypocotyl epidermis of immature sexual embryos of *Trifolium repens* in the presence of the cytokinin BAP (6-benzyl aminopurine). In the present study, a few epidermal cells of the young leaf lamina were induced as embryogenic cells by the growth hormones. These embryogenically determined cells produced somatic embryos when transferred to hormone-free media. Production of plantlets through direct somatic embryogenesis, avoiding the intervening callus stage, holds the potential for 100% true-to-type progeny.

This perhaps is the first report on direct somatic embryogenesis on the leaf lamina of the date palm. Further research work on induction of a direct somatic embryogenesis pathway on various tissue explants of *Phoenix dactylifera* L. is in progress.

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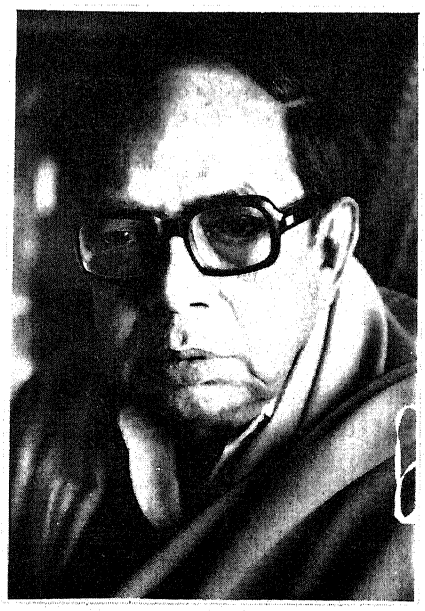
PERSONAL NEWS

Debiprasad Chattopadhyaya – The modern Indian sage

An obituary by S. K. Biswas

In the demise of Professor Debiprasad Chattopadhyaya on the eighth of May 1993 in Calcutta (born 19 November 1918) science in India has lost one of its staunchest supporters and ideologues. He was not a practitioner of science in the conventional sense but an ardent champion of the scientific method. He spent most of his life establishing that science in India has roots which go back to the dawn of civilization. He was neither a chauvinist nor a romantic. In his mission to explore the roots of science in India he never once moved out of the then contemporary cultural and technological framework. He looked for what was practically possible and what was actually there without any trimmings and romance. But again he was not just a chronicler of facts. He searched the records of societies to establish what was the motivation and need for a specific development of science and technology and what indeed were the social forces which, while reaping the material benefits, found the ideological implications of such development too dangerous for their own class hegemony. What indeed were the



social forces which encouraged or discouraged science and for what material, political and ideological ends – form the central core of Debiprasad's thesis.

Debiprasad Chattopadhyaya was a trained philosopher. His academic training in Calcutta was rigorous. He studied under able teachers such as Sarvapalli Radhakrishnan and S. N. Dasgupta. He stood first in philosophy of the Calcutta University both in B. A. (1939) and M. A. (1942) and went on to do post-graduate research work under the supervision of S. N. Dasgupta. Subsequently he taught philosophy in Calcutta for about twenty years before being appointed as UGC Visiting Professor of the universities of Andhra Pradesh, Calcutta and Poona. He developed wide interactions with serious intellectuals and especially the social science community of India. He had formal associations with the Indian Council of Historical Research (ICHR), Indian Council of Philosophical Research (ICPHR) and the National Institute of Science, Technology and Development Studies (NISTADS) of the

CSIR. His interaction with the political community of India was equally extensive. Having joined the Communist Party of India in 1944 he remained a life long Marxist and a member of CPI. His friends and associates however came from diverse backgrounds. He developed in the last few years of his life, an interesting rapport with a group of young but highly committed members of a extreme left organization. From the highest in the land to the rejects of the society he had friends everywhere. His totally non-sectarian political thoughts and action had profound effect on the Marxist movement in India and will continue to have lasting effect on many future generations of progressive movements the world over.

Wherever he was, whether on the roof of his second floor flat in middle class Calcutta, in the guest house of the Indian Institute of Science or on the green lawns of academic Cambridge, he and his erudite wife Alaka (a well-known Tibetologist) kept an open and informal house. In the true Bengali tradition people simply dropped in and gathered in his presence most evenings. The scholars, the activists mingled, debated and shared a laugh but always over many many cups of tea. The occasions were joyous but the likes of me always came away from these gatherings with a feeling of having understood my own heritage a little better.

He was a philosopher by profession but never an abstract philosopher. In a sense his was a philosophy of action. Looking into contemporary and past history he found science to have become a political tool. On one side there were the historians of imperialism who strove to establish that the white dawn of science could only have commenced in Greece. A colonial ideology draws on science to augment the argument that any civilized activity such as science can have only one beginning and that is which took place in Greece in about the 8th century BC. On the other side there are those who choose to establish the superior wisdom of religion by assigning impossible scientific feats to the sages of a mythological golden age. To Debiprasad both such trends are falsification of history and do incalculable damage to science and society. He was implicitly and explicitly committed to the building of a humane and equitable society. For the growth of such a society he felt that science has to play a paramount role in human welfare. He firmly believed that hounded by such falsification science cannot possibly play its legitimate role. Only when unfettered, he felt, can science in India reestablish its genius and play its full part in the development of the nation.

It is the same principled persuasion which runs through his philosophic writings. In the preface to the third edition of what some consider to be his most seminal work *Lokayata* (Peoples Publishing House, 1973), he sets out his project and that is to establish the continuity of Indian philosophical tradition over 2500 years; from the Upanishads to the writings of Gadadhara of the 17th century AD, whom he called the last great representative of Indian logic and atomism. In this most original book he meticulously establishes the beginning of a primitive proto-materialist view, reflecting the consciousness of a pre-class society as expressed in the primordial complex of ritual practice and theories. He completes the project in *What is Living and What is Dead in Indian Philosophy* (Peoples Publishing House, New Delhi, 1976) within a framework of continuous but complex conflict between the '... materialist trend ... always committed to secularism, rationalism and science orientation and the idealist trend which had for its main correspondents mysticism, obscurantism and scripture orientation' (*Lokayata*, third edition preface, 1973).

Debiprasad will long be remembered for his immaculate and uncompromising scholarship. He conducted meticulous research in whatever field he chose to explore, be it philosophy, history of science or archaeology. It was imperative that he did so as he had virtually to stand alone, being perpetually attacked and ridiculed by contemporary orthodox circles of scholarship. The latter were infuriated by these forays of Debiprasad into ancient India. To establish the legitimacy and credentials of his ideas and inferences he had to check and double check facts and data related to events which more often than not had little written evidence. Even if there was written evidence the actual facts were often hidden underneath a lot of obscure and twisted interpretations collected over the ages. It took Debiprasad years of dedicated work to extract what is living and discard what is dead in the ancient writing as they have come down to us today.

The most characteristic of such an approach is perhaps found in the two volumes *History of Science and Technology in Ancient India* (FIRMA KLM Pub., 1986, 1991, c CSIR/NISTADS). In one of these volumes, Debiprasad strove to establish Uddalaka Aruni as the first 'nature scientist' in the intellectual history of mankind. It is generally believed that the 7th century (BC) Greek, Thales was the founder of the atomic theory. A careful study of *Chandogya* Upanisad convinced Debiprasad that a much more convincing theory about the ultimate stuff of the universe was being formulated by Aruni at a date preceeding that of Thales. Further, unlike in the case of speculative Thales, Aruni's theory was based on observation of nature and material events. This brought out in a most delightful dialogue between Aruni and his son Svetaketu provides the theoretical basis for the powerful stream of Indian thought 'Samkhya'. The reason that this golden beginning of Indian science remains obscure and unknown to us today is the centuries of obscurantist refutation of Aruni's thought by the orthodox intellectual giants such as Sankara and Ramanuja who realized the potential danger, such thoughts evoked to the established order of society and the orthodox hegemony. Debiprasad wrote: 'Uddalaka ... collected observations as far as his historical conditions permitted him and even went on diligently to make experiments to understand nature and man, but the conditions that eventually developed in the country in which the law-makers decreed the Brahman-atman metaphysics as the only legitimate one prevent even the modern scholars from seeing Uddalaka's real contributions to the making of natural science.'

It is in this vein that Debiprasad looked for what is positive and what is scientific in the vast map of ancient Indian history and sought to establish our genuine scientific heritage and the causes of distortion and debasement of such a heritage. In *Science and Society in Ancient India* (Research India Pub. Calcutta and K. P. Bagchi & Co, 1977) he discussed the world view of our ancient doctors Caraka and Susruta. These roving doctors promulgated a few centuries before Hippocrates that 'physician as a physician is interested in only one thing and that is the cure of the patient. If therefore, it is essential for the patient to eat some flesh, the physician has to work out some tactics to evade the patient's religious or aesthetic revulsion against these. When necessary such a tactical method may

include deliberate deception or sheer bluff...'! These authors of Ayurvedic medicine whose only source of knowledge and whose only method of practice are derived from direct and meticulous observation of nature were on the way to a materialist world view. They thus come up against the solid wall of orthodox ideology which in the words of Yajnavalkya pronounces 'the gods are fond of the obscure and they detest direct observation'. This group of highly innovative practitioners of medicine disappear by about 3rd century AD and Indian medicine which had this brilliant dawn runs aground within a few centuries of its beginning. Aryabhatta's (*Studies in History of Science in India*, Vol. II, Editorial Enterprises, 1990) heliocentric cosmology meets with a similar fate. Within a few centuries of its origin this cosmology is distorted into a geocentric one by his followers, under social and religious pressure.

The ideological and technical aspects of Debiprasad's writings are always connected dialectically. He used to say that there are two interconnected aspects of science; the ideology and the technique. Any divorce of one from the other spells disaster. One of the most important methodological aspects of Debiprasads writings which sets him apart from other contemporary historians is the epistemological autonomy he accorded to technology, engineering and manual work. He maintained that science and technology are interlinked but technologists who were craftsmen and manual workers make major innovations which are often the fountainhead of new ideas of enormous social relevance. His in-depth discussions of the role played by the masons in the development of ancient Indian mathematics (Sulva sutra) or the role of surgeon/technologist (Susruta) in developing tools for surgery are examples of the importance he attached to the people who do practical work with their own hands. To him any debasement of or indifference to the value of practical work has deleterious ideological implications.

The work of Debiprasad is widely known outside India. Fellow of the German and the USSR academies of sciences, he worked and corresponded with some of the outstanding thinkers of this century such as Joseph Needham, George Thomson, Bongard Levin and Walter Ruben. While his work has been translated in virtually every major language in India and abroad recognition came slowly and tardily to him in his home country. Joseph Needham when requested to referee the nomination of Debiprasad for D. Litt of Calcutta University, wrote back to the vice chancellor of the university '... Sir, it is not a question of whether the man deserves the award, it is a question of why he has not been given the award so far...'. For a man who has fought and struggled his whole life against almost insurmountable odds, to establish a principle or a set of principles singlehandedly, awards and honours meant little. A man of brilliant wit and mischievous humour he found formal recognition or lack of it amusing. Humane to a fault a letter from a new reader of his books filled him with almost childish joy, hope and optimism. In speech and writing his Bengali was impeccable. He wrote a large number books in Bengali on a variety of subjects ranging from philosophy to psychology to science. What however is amazing is that a number of these books by this very serious and reputed scholar were actually written for children. He never wrote for honour or career. Whichever audience needed to be addressed on a particular day or whatever subject needed to be clarified and worked upon that day for the benefit and progress of a small section of the society or the society as a whole, Debiprasad buckled down to it and addressed that audience and clarified that doubt to the best of his ability. The fact that this most committed intellectual is relatively little known in the Indian intellectual community and especially in the scientific community deterred him little but signifies a serious lapse of the community itself.

The brief period spanning from J. C. Bose to C. V. Raman and Meghnad Saha was a period of rare brilliance where the community itself shone in terms of its national commitment and global contribution. It is of interest to note that it is the only period in contemporary history when the community was in search of a national scientific heritage to establish an identity for itself. Within the mainstream of the struggle for independence the community found the identity and heritage and prospered. Debiprasad realized the enormous importance of this period and popularized the works of P. C. Ray, Meghnad Saha, Satyen Bose and others to underline the fact that to establish a humane and just society in India it is of utmost importance that the genuine scientific heritage of India is reestablished and the present scientific community become a conscious successor of such tradition. Any contact with a professional scientist or an engineer used to make Debiprasad very happy. On those rare occasions he has been invited by a scientific institution to give a talk, Debiprasad used to take enormous pains to prepare his talk. It is of some pride to the present writer that the Indian Institute of Science to which the writer belongs is the only scientific institution which over the years kept in touch with this philosopher and provided the forum where his ideas and works could be discussed publicly.

Debiprasad believed in 'science' in India not just because he realized that it has enormous potential to make national and global contribution but because he was convinced that it is the practice of science which evokes a positive ideology. Such an ideology is the only possible permanent bulwark which will protect this country and her people from the forces of communalism, obscurantism and other dark and fissiparous tendencies which are tearing apart this country that he loved so dearly. To this country, her people and science he dedicated his life, an interesting colourful and fruitful life. With his demise he passes into history but his life, ideas and more than anything else his committment will always be a beacon to light the path of every lone and buffetted seeker of truth for generations to come.

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