BOOK REVIEWS

Albert Einstein: Four Commemorative Lectures: by Loyd S. Swenson, Jr., C. P. Snow, Howard Stein, and Ilya Prigogine. With an Introduction by Albert C. Lewis, 64 pp. Illustrated, Soft Cover. Price $3.50. Humanities Research Center, The University of Texas at Austin, P.O. Box 7219, Austin, Texas 78712.

I regret the undue delay, partly for unavoidable reasons, in reviewing this book. Ordinarily such delay would make a review hardly worthwhile. But it is different with this small, fascinating and profound book. Firstly, the book is not as widely known as it should be, and secondly even after many years it would remain a most enjoyable and valuable book for anyone interested in Einstein's life and work, and the impact of his ideas on the shaping of the modern world. As Prigogine says; "No doubt Einstein remains a living myth, by far the most celebrated scientist of the twentieth century. ....Thanks mainly to the works of Einstein, we see now a new world around us. We all have the impression that we are at the dawn of a new period, with all the excitement, the hopes, and also the risks which are inherent in a new start".

The four lectures were given at the University of Texas at Austin, USA. It is difficult to summarise the book. A few quotations would suffice to indicate the sweep and flavour. Unfortunately, the pages in the book are not numbered, but for reference to quotations, these have been indicated here. An index would also have been useful.

The first lecture on *Einstein in Context* is by Swenson, Professor of History at the University of Houston. It gives an account of Einstein's life, his intellectual development, and the genesis of his major achievements. The lecture is an extract from his book (since published) on *Genesis of Relativity: Einstein in Context.*

Einstein was born on 14 March 1879 (Germany). He died at Princeton (USA) on 18 April 1955. The sense of profound wonder that, as a child, Einstein experienced—the first vivid example being the invisible force which makes a compass needle point in a fixed direction—never left him. The simple and yet the deep philosophical questions which children ask their elders remained to haunt him. At the age of twelve Einstein came across Euclid's Geometry. The certainty of mathematical proof gripped him, intellectually and emotionally. Mathematics became the second abiding wonder (the first was the magnetic compass) of his young life. At the age of sixteen his famous 'thought experiment' of an observer travelling with the velocity of light—and the paradoxical nature of the electromagnetic field observed by him—occupied him totally. Ten years later this ceaseless occupation led to the special theory of relativity. The "happiest thought of my life", as recorded later by himself, came to Einstein in 1907, when he realized that the gravitational field, like the electromagnetic field, has only a *relative* existence. (A man carrying a big load on his head, falling freely, would

experience no weight of the load carried by him.) This led to the theory of general relativity a few years later. Incidentally, the date of the British Solar Expedition given in page 15 needs to be corrected.

"Einstein often relished the chance to say that he could work alone and anywhere, that the life of a lighthouse keeper should be ideal for a theoretical physicist, and that work as a cobbler or plumber while doing physics ought to prove salutary to the science as well as to the worker." As Swenson says: "Only Albert Einstein sought and found his personal identity in the context of a *series* of theories of relativity" (p. 16).

The second lecture *On Einstein the Man* is by C. P. Snow, the well known scientist-novelist. Einstein's prime motive in life was to find out "How God made the world". Though contrary statements are sometimes made, Einstein's exceptional talents were early manifest. To quote Snow: "....to anyone of the slightest perception, his great gift was probably obvious at the age of about two. There are very few of the great theoretical physicists whose talent or genius was not apparent almost as soon as they could talk and perhaps before. One of the things which seems to be common among such characters is that they discover the ideas of infinite numbers" (p. 23). The most fruitful year of Einstein's life was 1905 in which he published his special theory of relativity. The general theory of relativity came about a decade later. As is widely recognised, perhaps no other person than Einstein could have discovered the general theory of relativity. The theory is probably the most remarkable edifice of the human mind that has yet been constructed. The lecture also describes "the dramatic and entirely meaningless story about his (Einstein) involvement on the atom bomb" (p. 29). The lecture concludes with the tribute: "We've got people with supreme gifts, but we haven't got anyone with the combination of supreme gifts and extremely powerful ego, a real, benevolent, serene, unsentimental feeling for humankind and the courage not to give a damn and to express for the rest of us what we should like to say. In the last twenty years of his life, he was sometimes called "the conscience of the world". I believe we could do with another conscience of the world now, more than almost anything else" (p. 30).

The third lecture on *Newton and Einstein* is by Stein, Professor of Philosophy at the Columbia University. It provides a thought-provoking, and stimulating comparative discussion of the scientific work of Newton and Einstein.

With Einstein's relativity theory, theoretical physics becomes *actual* philosophy. As Stein observes: "The genuine and deep importance of such considerations—which can well be called "ontological" or "metaphysical"—for physics itself seems to me to stand as a rebuke to those philosophies which have deprecated metaphysics entirely, and also to those which have sought to divorce metaphysics from a serious connection with natural science. The historical evidence of the tentativeness or instability of such metaphysical positions—of the degree to which they are subject to the kind of transmutation effected by Einstein upon Newton and Maxwell, as by Newton upon

Huygens—should, I think, give serious pause to philosophers who attempt to propound *definitive* ontological theories" (p. 43).

The fourth lecture *Einstein: Triumphs and Conflicts* is by Prigogine whose epochal work on nonreversible theromodynamics and its applications is a most far-reaching achievement of the post-Einstein era. He was awarded Nobel Prize in 1977. Prigogine deals in the lecture largely with the problem of time.

For Einstein, "the distinction between past, present and future is only an illusion however persistent". As Prigogine writes: "Einstein believed in the god of Spinoza, a god identified with nature, a god of supreme rationality. In this conception there is no place for free creation, for contingency, for human freedom. Any contingency, any randomness which may appear to exist, is only apparent. If we think that our actions are free, this is only because we are ignorant of their true causes" (p. 54).

The questions about the meaning of randomness and time—witness Einstein's great debates with Bohr on the incompleteness of quantum mechanics—are still the great unresolved problems of our time.

Prigogine concludes his lecture: "Albert Einstein deserves indeed our deep gratitude. He has led us to a point from whence we can contemplate this enchanted world. Perhaps the reality which Einstein wanted to grasp is neither in a world of appearances nor in the timeless world of Spinoza. Perhaps there is a more subtle form of reality which involves both laws and games, time and eternity. Our century is one of explorations, of new forms of art, of music, of literature, and of new forms of science. The growth of human population, the renewed social and economic conditions, make it necessary that we assess the position of man and his relation with nature. In science this assessment was begun by Einstein. Now, nearly at the end of the century, we can still not predict where this new chapter of human history will lead, but what is certain at this point is that it has generated a new dialogue between man and nature." (p. 59).

Einstein will not only rank as one of the greatest physicists of all time, he was more than that. He was a natural philosopher in its truest sense. It is worth noting that through the writings of Ernst Mach and Schopenhauer, Einstein was indirectly but significantly influenced in his ideas by Buddhist thought and philosophy. This important aspect of the history of modern physics is still largely an unexplored chapter.

When Einstein was asked during a serious illness whether he was at all afraid of death, he said (and despite his illness he was, as always, so serene): "I feel such a sense of solidarity with all living things that it does not matter to me where the individual begins and ends". And he added: "There is nothing in the world which I could not dispense with at a monent's notice" (Born—*Einstein Letters*, New York, 1971, p. 151). Such utter fearlessness of death, and total detachment, and liberation from the self,

and such complete dedication to ceaseless pursuit of truth, could be achieved only on the foundation of deepest spiritual convictions.

Einstein observed (1947): "To the sphere of religion belongs the faith that the regulations valid for the world of existence are rational, that it is comprehensible to reason. I cannot conceive of a genuine scientist without that profound faith. The situation may be expressed by an image; science without religion is lame, religion without science is blind."

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P. Rây, H. N. Gupta and M. Roy. *Suśruta Saṃhitā (A Scientific Synopsis)*, Indian National Science Academy, New Delhi, 1980, pp. VI+455. Price Rs. 108.00.

In the Foreword Dr. V. Ramalingaswami, Director General of Indian Council of Medical Research, rightly maintains that the "History of medicine is both medicine and its history". Now what constitutes history, according to Sir William Osler, "in the continued remembrance of a glorious past, individuals and nations find their noblest aspirations". Caraka and Suśruta illuminate Indian medicine perhaps even more than what Hippocrates and Galen have done for that of Greece. We are therefore induced to believe this when we realize that when Arabs came to build their medical science they had the works of both these Indian Masters translated into Arabic. Since we are here concerned with Suśruta we offer the relative information concerning him. Fuat Sezgin, in his *History of Arabic Literature*, Vol. IV, Leiden 1971, pp. 269-70, informs that "Yahya bin Khalid Al-Barmaki, 738-805 A.D. became the tutor of Khalifa Harun-ar-Rashid. As Ibnan-Nadim reports, Yahya deputed an expert to India to bring the standard drugs of that country. Moreover, the translation of the medical work of Suśruta was assigned to Mankah"—Text condensed. With such recognition of Suśruta any patriotic Indian national should feel duly inspired. This however would be dealing with the historical aspect of the subject.

We now turn to its medical or the scientific aspect. Here I can recall the observation of Prof. G. B. Forbes, the great Dutch historian of science. He writes, "Unfortunately many modern chemists still believe that history is bunk and have no time for the achievements of their ancestors....even those who seek after utility"—quoted by Martin Levy in his Chemistry and Chemical Technology in ancient Mesopotamia, P. X. 1959. Enthusiastic historians of science fail to realize the intrinsic defects in such literature so that a reader has to become a research worker before he can appreciate anything like useful information. Taking the history of alchemy, which is the early history of chemistry, it is presented as a science that tried to make gold. In as much as no one ever succeeded in doing it, alchemy becomes a *history of the*

claims to make gold, which means nonsense. Further alchemy assumes that all metals are composed of sulphur and mercury which to-day sounds absurd. Above all the illustrations which decorate alchemy literature present it as any mythology so that no lover of science would care to look at them again. We now come to medicine. It recognizes four elements in the universe and their corresponding four humours as constituting human life. On this hypothesis are built other corollaries one more fantastic than the other. Nevertheless of what does persist of ancient medicine is the empirical fact that certain drugs have cured certain ailments. Then what appeals to us today is the answer to the question, how did the ancients succeed in curing the sick. When we now consider Suśruta he comes as the first surgeon to have practised plastic surgery. This fact alone suffices to assign him a high position among the healers of repute. The book under review gives a proper account by Suśruta of "Surgical grafting" on pp. 94-96. Attention having been thus directed it would have been better to see some sketches of the surgical instruments used by him. I remember having seen such an exhibit years ago at Calcutta where Kaviraj G. Sen had arranged a demonstration of ancient Indian pharmacy and medical sciences. Such illustrations based on ancient literature would have greatly increased the value of the present publication.

Now there can be no surgery without some kind of antibiotic. Many decoctions of plants were used and have been duly recorded in the publication under review. The subject had long interested me and one I am able to name in particular is old conserved ghee from cow-milk. In medieval times feuds were very common and a Rajput family would keep in leather bag old ghee which would go as the dowry which a bride may use for her valiant husband as required and thus prolong his life. Now ghee is mentioned by Suśruta for dressing surgical wounds. It is possible that ghee itself was first treated with some plant decoction. A list of medicinal plants and their uses is given as the longest appendix covering pp. 136-227, which should inspire some to screen them as antibiotics. Honey I know is antibiotic but differs from case to case depending upon the flowers from which the bees have collected it. This in turn directs u s to the sources from which the honey is derived. Probably its theraperutic properties are increased when it passes through the system of the bee. This portion of the publication appears to be the most valuable at least potentially. On p. 104 we read that sutured wounds are dusted, "with ashes of burnt hemp and silk". I know personally that carbonized hemp is styptic so that burnt hemp more than its ashes should have been popular. Now *nāḍi* or pulse was a recognized system of diagnosis. I know Chinese were pioneers in this art but diagonosis by pulse had been recognized long before by Suśruta. The entire omission to pulse by Suśruta does seem unexplainable. As minor omissions I can point to the designation of *madhuka* flowers as *Brassica latifolia* on p. 130 which I feel should be *Bassia latifolia*. Then the *kuśa* grass according to its latest identification is *Desmostachya bipinnata*, while *darbha*, according to Prof. P. V. Sharma of Banaras Hindu University, is *Imperata cylindrica* but the text equates both *kuśa* on p. 181 and *darbha* on p. 154 as *Eragrotis* or *Poa cyanosuroides*. The book has added much to my information and I am sure it will do the same to any reader who is interested in the

subject. The book is obviously the result of much labour and erudition which required the cooperation of three well known authorities in the field. I for once have to express my gratitude for what they have offered.

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