quantum structure) simultaneously displayed by radiation according to the Planck formula should not be considered as mutually incompatible.'

Volume 3 is somewhat different in character and content from volume 2. It covers the period 1909 to 1911 throughout which Einstein was at the University of Zurich. The major part of this volume is devoted to the lecture notes he prepared for three of his courses – mechanics taught during winter 1909–1910; kinetic theory of heat taught during summer 1910; and electromagnetism taught during winter 1910–1911. Elsewhere (in volume 5) Einstein writes that he enjoyed teaching a great deal. These lecture notes tend to be telegraphic and fragmentary, not in the style of his beautiful papers; yet they are valuable to see the organization of his thoughts and the way he conveyed them to students. Of the three sets of notes, the one on mechanics is relatively complete and coherent; while that on the kinetic theory of heat tends to be sketchy. Einstein goes to some effort to stress the nontrivial content of the principle of virtual work and d'Alembert's principle in dynamics, and many down-to-earth problems of mechanics are presented including rigid body kinematics and rotational motion. While the standard conservation laws are covered, the link to symmetry is not yet seen! The kinetic theory course emphasizes that molecular theoretic foundations can lead to all the basic statistical results for macroscopic systems. In the notes on electricity and magnetism, we see a sophistication in style and level of ideas, including this statement of the conception of a theoretical scheme as a totality and how it should be judged: 'We set up a conceptual system the individual parts of which do not correspond directly to empirical facts. Only a certain totality of theoretical material corresponds again to a certain totality of experimental facts.' These notes are also fairly well-organized, and have a practical feel about them. They go up to the Maxwell equations, but stop short of discussing the vector potential, the Lienard–Wiechert solutions, the gauge transformation idea, or a covariant formulation.

Aside from these three major items in this volume, there is a superlative 1910 review of special relativity, giving the historical origin of the ether concept, its problems, its demise, and then going on to his own work. A later 1911 Zurich lecture is equally superb, but this time highlighting the role of Galilean invariance in mechanics and the need to retain it in electrodynamics. In the discussion that follows the lecture, Einstein handles all the searching questions with complete confidence, and at the end points out that special relativity is a restrictive concept and not a specific model for any phenomenon: 'The principle of relativity is a principle that narrows the possibilities; it is not a model, just as the second law of thermodynamics is not a model.' Some papers go back to the ideas of the 1905 'photon' paper and pose questions which at that time were of the greatest import: are quanta intrinsic to radiation or are they only linked to matter? Inter alia he refers to his 1905 calculations, and says in effect, 'I have shown that the Maxwell field on its own "must be quantized"'. What bold declarations and deep insights into phenomena, and of the directions in which future progress would have to go! In so many of his papers we see his grasp and mastery of statistical concepts – the manifold and often startling uses of the Boltzmann connection $S = k \ln W$, the exploitation of fluctuations – to tease out the implications of experimental observations, the limitations of theory. We see the power of his arguments from first principles, an uncanny gift for seeing far in advance of others the need for fundamental conceptual advances in so many directions. He had the ability not only to lead but to point to others the most promising directions.

Towards the end of volume 3 are two papers written – one suspects in a leisurely style – from Prague, one on molecular motions in solids and another on his first insights into the influence of gravity on light. Another major document is the extended 1911 Solvay Congress lecture on the specific heat problem. Here again Einstein expresses his conviction that the foundations of both mechanics and electrodynamics would have to be profoundly altered to take account of the quantum; it is staggering to read these lines from one who had done so much for the understanding of space and time. And the 'paradox' of wave particle duality for radiation is expressed again.

The declared limitations notwithstanding, every professional physicist will find these volumes (and surely the succeeding ones) of abiding value and interest. To see how fundamental theories took shape and came into being, to perceive what led to them, to be face to face with documents which heralded the birth of many conceptions taken today for granted, to see that there was a time when they did not exist, and to view them condensing out of a mist and take on permanence after creation in Einstein's mind – these are experiences beyond value.

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Wild Edible Plants of India: Diversity, Conservation and Use. R. K. Arora and Anjula Pandey. National Bureau of Plant Genetic Resources, New Delhi. Price not stated.

From an initial phase of hunting and gathering to agricultural societies and finally to industrial economic societies, there has been progressive decline in the number of species on which human race has depended for food and other needs. In this process, while the biodiversity base became progressively smaller, bioproductivity per unit area and time increased dramatically. The chief reason was application of principles of genetics and plant/animal breeding. This resulted in the release of time for vocations other than growing food, and also led to increase in population in some parts of the world. However, there is now a realization that to make agriculture sustainable, wide genetic diversity base has to be combined with high bioproductivity. This is a major challenge before agricultural scientists and technologists.

Judging against this background, the book is both very timely and most welcome. This book is the sum total of life-long work of R. K. Arora on India's agri-biodiversity, its ancestors and the related species. Arora's special strength has been that he combines knowledge and experience of a professional botanist, ecologist and geneticist, all rolled into one. The authors, and NBPGR and ICAR deserve hearty congratulations for this

excellent and most unique work. In this venture Arora has been admirably assisted by Anjula Pandey. On all counts women, by their very nature and intuitively have been far more committed conservationists than men. In fact women as gatherers have played a very crucial role in domestication of crops/animals in the world at four nuclear centres of agricultural development in the Fertile Crescent, Southern Mexico, Andes and Huang Ho in China.

The book is a successor to an earlier book entitled *Wild Edible Plants of India* (1978) published jointly by the late H. B. Singh and R. K. Arora which was essentially a floristic enumeration of species diversity used for various plant parts. The present authors have not only vastly updated the earlier information base, but also added several altogether new and relevant material.

Part I of the book deals with the diversity of species, which have been enumerated on the basis of the useful plant parts namely, underground parts, leaves and shoots, buds and flowers, fruits, nuts and seeds. Species in each category have been listed alphabetically using their botanical name together with common names as far as possible. An account of each species includes its distributional range together with its use and floristic and ethnobotanical information of the edible plant part used. Wherever possible, information on actual nutritive value has also been provided. The authors have also included very valuable ethnobotanical information regarding the use by local communities. This use has been based on trial and error experiments carried over the years supplemented by conscious selection made by the communities. The results of such large scale trials are today available to the present generation free of cost. Regrettably such efforts are neither regarded as innovation nor are they patentable or awarded/rewarded.

The number of species included in this book is around 1000. These also include, foods used by local people (including the ecosystem people) in times of famine and excessive droughts in order to subsist in such conditions. In addition, over 150 wild edible lower plants (e.g. algae, fungi, lichens, pteridophytes and gymnosperms) have also been included.

Part II of the book deals with wild and domesticated diversity together with plants with future potential. In that sense, these are rather less known economic plants that have a potential to come into the mainstream of agriculture. Over 56 species have been listed and many of these species have definite potential for being used on a large scale. The broad categories are: roots and tubers, leaves, vegetable, flowers and buds, tropical–subtropical fruits, temperate fruits and seeds/nuts/kernels. This category also contains many unconventional plants. Most of these are already in use and have potential to be cultivated on a large scale. Special mention may be made of bamboos which have tremendous potential as a source of raw material for paper pulp and furniture industry and as building material.

Part III of the book is devoted to conservation concerns, involving both *in situ* and *ex situ* approaches. In addition, technology for cultivation of some of the important species needs to be developed so as to lessen the demand from the natural populations and thus help in their conservation. Some incipient domesticates are with tribals and other ecosystem people. More often, these are treasure troves of useful genes. All these need to be brought under a conservation plan because the concerned people may no longer cultivate these for long and they may abandon them for more productive varieties.

This is an excellent book and contains wealth of information in a consolidated form. With this as the base, there is need to build up a data base. Equally important is to take a total view of and plan for long term *in situ* and *ex situ* conservation of these species. The various user Departments/Ministries in Government of India and concerned States in India need to evolve a National Action Plan with a long-term perspective. I have no doubt this book would be extensively used by professional botanists, breeders, biotechnologists, experimental evolutionists as well as grass-root workers. It is indeed a trend-setting work which needs to be followed by all biodiversity-rich developing countries in tropics and sub-tropics. The authors deserve hearty congratulations for this exemplary work.

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