Capri presents an excellent account of Einstein, both about his personal quantities and the path-breaking ideas of relativity and quantum mechanics. This account is rich with quotations by Einstein himself and also on him by his colleagues. There is an equally fascinating account of Max Planck, the originator of the quantum hypothesis, who was much older than Einstein. Planck was undoubtedly the most respected German scientist of the time, who tried to protect the interests of the Jewish scientists against the Nazi onslaught.

The personal tragedy that clouded the last years of Planck is poignantly related in the book. He died in 1947. As a mark of appreciation, appropriately the Kaiser Wilhelm Gesselschaft was renamed as Max Planck Gesselschaft in 1948.

Capri then passes on to the next line of stalwarts in physics of the first decade of the 20th century – Rutherford and Bohr. Rutherford came to England all the way from Australia and did the most important work of identifying the 'nucleus' inside the atom. He came to the laboratory of Thomson in Cambridge, which acquired the reputation of producing several Nobel Laureates. Capri has given a nice account of what happened in this laboratory and on the scientists that gathered there. Some of the remarks made by the scientists in this wonderful atmosphere are delightful to read. About a pompous government official Rutherford was heard saying 'That man is like a Euclidean point. He has position without magnitude'. One of the strangest statements attributed to Rutherford, the discover of the nucleus is Å. Anyone who expects a source of power from the transformation of those atoms is talking moonshine'. There is a lot to read about the colourful personality of Bohr and his atomic theory, and the reactions among scientists. At the University of Göttingen, where later quantum mechanics was developed, Bohr's theory was not initially accepted. The quantum mechanical theory of the atom and the interpretation of quantum mechanics developed Bohr, Heisenberg, Schrödinger, Pauli and Dirac became highly contentious despite the remarkable success of the theory in explaining observations. The book naturally shifts to a discussion of the physics and the personalities involved in this extended debate which lasted for more than 30 years. The book is full of statements and quotations from these scientists. It also portrays the differences in their approach to scientific explanation itself. Though they were all trying to find answers to the same problems confronting physics, their personal reactions and views were diverse.

Through many of the quotations from the masters like Einstein, Schrödinger, Heisenberg, Bohr, Pauli, Max Born, Dirac and others, the author portrays the very different, perhaps illogical way that these two branches of science relativity and quantum mechanics progressed. While the mathematical tools they used helped in making predictions that were verified by experiments, it was realized that the interpretation of the concepts and parameters used for the purpose was not logically deducible.

I have desisted from reproducing too many quotations from the book, since I thought it more appropriate that these are read from the book itself in their proper context. While many of the quotations are available in some of the earlier books, the virtue of the present one is that all of them are in one place and easy to find. Of course, there are many in this book which are not there in the others.

While reading the book, I was reminded of several earlier ones which have a similar approach, but are different in extent and details. A few that come to mind readily are the two volumes of Bell entitled *Men of Mathematics*, published more than fifty years ago, which deal with the lives of eminent mathematicians of the past. There is another book entitled *The Second Creation* by Crease and Mann, which covers a similar theme, but is more concerned with the developments in physics after the Second World War years. More recently, there are the books by Abrahan Pais *Subtle is the Lord* and *Niels Bohr's Time*, which are based on Pais's own involvement in theoretical physics and his interactions with the masters, and are at higher professional level. While this book will be enjoyed most by those who are familiar with modern physics, it will certainly constitute delightful reading for students as well as discriminating public interested in modern science.

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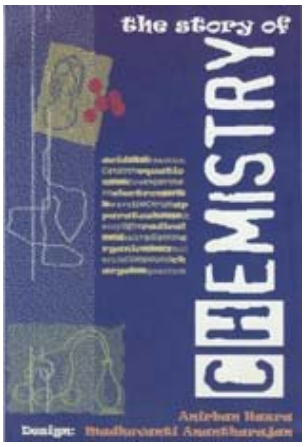

The Story of Chemistry. Anirban Hazra. Vigyan Prasar, A50, Institutional Area, Sector-62, Noida 201 307. 2007. 109 pp. Price: Rs 75.

Writing a book about the history of chemistry, especially for high-school students, and that too in about one hundred pages is a difficult task. However, the effort by the author is laudable and a first step towards making students aware of the rich history of chemistry. I liked reading this book, and the illustrations by Madhuvanti Anantharajan are nicely done.

The account of very early attempts to sort out the nature of matter by Anaxagoras, Democritus, Aristotle and others provides a nice backdrop for the rest of the book. It was interesting to know the contributions by Indian, Chinese and Muslim scholars – something that I was unaware of and, upon reading the book, searched the internet for more information. The vivid, and at times hilarious, description of alchemy ends by making an important point. Although alchemy was a failure, the attempts to convert various things to gold led to the development of useful tools and processes. Several names that one comes across in the book are now forgotten and certainly not mentioned in our high-school chemistry textbooks. Thus, the beautifully illustrated book on the art of distillation by Hieronymus (in AD 1500!) and Johann Glauber (of the Glauber's salt fame) being the first to produce hydrochloric acid (not mentioned in the book though) are important examples of systematic scientific practices. I particularly liked the bit about Boyle being a member of the 'Invisible college', which later on led to the formation of the now well-known Royal Society. Many such historical tidbits are present

throughout the book and make for an interesting read.

Not surprisingly, a good part of the book deals with famous names like Black, Priestley, Proust, Lavoisier, Dalton, Avogadro and others, which are familiar to high-school students. How appropriate that the textbook of chemistry by the Frenchmen Lavoisier contains the chemical process involved in the fermentation of grapes! I did not know that in 1813, Davy, 'discoverer of Faraday', had scientific immunity which allowed him to visit France despite the Napoleonic wars. Seems like the early 19th century displayed more enlightened times compared to the current visa practices for scientific visits. The last forty pages of the book provide a quick tour of the developments in organic chemistry and physical chemistry. Starting with Wöhler's synthesis of urea, Liebig's contributions to analytical organic chemistry, and ideas of a molecular structure due to Kekule, van't Hoff and Le Bel, one gets a good glimpse of the foundations of modern chemistry. It is of course entirely appropriate that several pages of the book are devoted to the work by Berzelius, Meyer and Mendeleev that led to the formulation of the periodic table. I must, however, point out that the author's statement that Lothar Meyer and Mendeleev simultaneously proposed the periodic table is not very accurate (see, Gordin, M. on periodicity, priority, pedagogy: Mendeleev and Lothar Meyer, at http://osulibrary.oregonstate.edu/specialcollections/events/2007paulingconference). At the same time I am glad that the author has wisely chosen not to go into the details of priority in a book of this nature. There is also a plausible connection between Mendeleev's usage of the *eka*, *dvi* and *tri* suffixes to the then unknown elements and sanskrit grammar. An interesting account is given by Subhash Kak, which can be found at the Los Alamos preprint server (http://uk.arxiv.org/abs/physics/0411080).

The development of physical chemistry due to Wilhelmy, Arrhenius, Ostwald, Clausius, Nernst, Gibbs and Boltzmann among others, has been described in a succinct fashion. However, certain facts, perhaps in the interest of space, have not been mentioned. For example, Ostwald is credited with the introduction of the mole concept and Arrhenius had studied the greenhouse effect due to CO_2 gas as early as 1896! The last part of the book deals with the creation of quantum mechanics, radioactivity, Pauli's exclusion principle, bonding and spectroscopy. The last few pages provide a glimpse of the relatively recent work on buckminsterfullerene (unaware that Smalley died in 2005), scanning tunnelling microscope and femtosecond spectroscopy. It would only be fitting, in my opinion, to show the vitamin B12 structure, since it is an example of the most complex natural compound synthesized in the laboratory and a tribute to the wizardry of Woodward.

There are a few points that could lead to an improvement of the book. For example, I was surprised that the Avogadro number was not shown while discussing Avogadro's work. The blurb about Arrhenius is misplaced by several pages. The figure of Berzelius is also on the wrong page. The picture of Max Born is shown but his name is not mentioned! The author states that C. V. Raman studied the phenomenon of Raman spectroscopy – an unfortunate choice of the word. Raman discovered the phenomenon and got the Nobel prize (not mentioned). In the description of the Maxwell–Boltzmann velocity distribution, it is perhaps apt to mention that Miller and Kusch provided experimental verification in 1955. Infrared and ultraviolet spectroscopies, which have their own applications, have not even been mentioned. There are also typographical errors that need to be corrected – Schrödinger seems to have died in 9161!

Certain features of the book are particularly troubling to me and I will also mention a few glaring mistakes. It was disturbing to see that the names of Emil Fischer and Alfred Werner are nowhere to be found in the book. There is little doubt that the pioneering works by both should have appeared with those of van't Hoff, Kekule and Le Bel. The absence of Fritz Haber, pioneer of ammonia synthesis and motivator for the recent Nobel Prize-winner Gerhard Ertl, is equally surprising. Along the same lines, there is no mention of the names associated with the development of transition state theory – Eyring, Wigner, Polanyi and others. After all, the great triumph of Zewail's femtochemistry experiments had to do with observing the elusive transition state. Transition state theory is a cornerstone of chemistry and a look at the Faraday discussions of 1938 will convince anyone of the intense activity that led to its formulation. Similarly, in the part on bonding and quantum chemistry, there is no mention of Heitler and London. This, in my opinion, is unfortunate since their names should be mentioned along with those of Hund, Mulliken, Hartree and Fock. Indeed Pauling and Wilson in their celebrated book state that the work by Heitler and London is the greatest single contribution to the chemist's conception of valence. One cannot help but think if there were any chemists of Indian origin who made significant contributions. The name P. C. Ray immediately comes to my mind, but the book does not mention about him.

There are also other errors that need to be corrected. The second law of Clausius is stated as 'entropy tends to a maximum', whereas it is the entropy of the universe that tends to a maximum. A statement like 'much of kinetic theory of gases followed from statistical thermodynamics' is misleading. The field of kinetic theory of gases started much before, with Daniel Bernoulli (1738) being one of the chief architects. Extreme care should be taken to make sure that such erroneous statements do not appear in a scientific book (popular or technical). Despite the criticisms made above, I did enjoy reading the book and hope that the high-school students would read it as well. A lot of effort must have gone into writing and providing illustrations for the book. Perhaps the next version would take care of some of the shortcomings and become a must-read for all students of chemistry.

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Annual Review of Physiology, 2007. D. Julius (ed.), Annual Reviews Inc, 4139 El Camino Way, P.O. Box 10139, Palo Alto, California 94303, USA. vol. 69. 591 pp. Price not mentioned.

For a membrane biologist, the 2007 *Annual Reviews of Physiology* is bound to become a classic – so go and get your copy today. This is the last volume organized by David Garbers, who died in September 2006. It forms a fitting tribute with excellent reviews covering a variety of transporters, respiratory physiology and hypoxia responses, and introduces the spe-