

FROM THE BANKS OF THE NILE TO STOCKHOLM

"VOYAGE THROUGH TIME: WALKS OF LIFE TO THE NOBEL PRIZE," by Ahmed Zewail, *American University in Cairo Press, 2002, 287 pages, \$22.95 (ISBN 977-424-677-2)*

REVIEWED BY B. VINCENT MCKOY AND CHRISTOPHER A. MCKOY

AHMED ZEWAIL IS AMONG THOSE few individuals whose pioneering contributions have left an indelible mark on chemistry. His book, "Voyage through Time: Walks of Life to the Nobel Prize," describes the fascinating journey of a young Egyptian who grew up on the banks of the Nile, came to America, and, in less than two decades, made scientific contributions that would constitute a revolution in chemistry and adjacent sciences.

Zewail's book covers a far wider range of subjects than most autobiographies. "Voyage Through Time" also provides an engaging tour through the history of science; gives a close-up, yet highly accessible, account of Zewail's own remarkable contributions to chemistry; and sets out his views on political and social matters, with a special emphasis on the future of Egypt and the U.S. Throughout, Zewail offers a very readable mosaic that juxtaposes the human dimension of his experiences with the magnitude of his scientific contributions. "Voyage through Time" is a unique tale of scientific achievement and indomitable human spirit.

The early chapters offer an endearing and refreshingly open portrayal of Zewail's childhood and early years in Egypt; of the strong family, educational, and cultural values that were imbued in him; and the early awakening of his interest in chemistry. Zewail was born in Egypt only six years prior to the major revolution of 1952 and raised in Rosetta, site of one of the most significant archaeological breakthroughs of recent centuries.

Zewail's narrative is crisp and lively and conveys a very real sense of his life in Egypt at the time. He speaks of his early childhood, its emphasis on study and the importance of knowledge, and how well this grounding has served him throughout his life. The extensive inclusion of family pho-

tographs here and throughout the book is a warm and personal feature of "Voyage Through Time."

In chapters titled "The American Encounter" and "California Gold," Zewail recounts his journey from Alexandria, where he obtained his bachelor's and master's degrees, to the University of Pennsylvania for his Ph.D., and on to the University of California, Berkeley, for postgraduate work. His fond recollections of his experiences as a graduate student arriving from a foreign culture and slowly acclimating to his new environment in Philadelphia will surely strike a familiar chord for many. His colorful description of his first impressions of the city of Berkeley—in particular, Telegraph Avenue—contrasts amusingly with his appreciation of the scale and quality of science at the university and the opportunities afforded him there.

The next stride in his walk brought Zewail to California Institute of Technology as a young assistant professor in 1976. The chapters "The Invisible Atom" and "The Race against Time" witness the embryonic stage and subsequent evolution of some of his groundbreaking ideas. As a young assistant professor at Caltech, Zewail was captivated by the idea of coherence, both

These early observations evoked skepticism bordering on hostility in some of chemistry's luminaries. Physicists were more receptive, realizing that molecules represent a very high level of complexity compared with atoms. Yet within a decade, the concept of coherent excitation, now using femtosecond pulses, made possible the first real-time observations of the actual movements of atoms in molecules to make and break bonds. In 1999, Zewail was honored for this work by being named the sole recipient of the Nobel

Prize in Chemistry.

In these two chapters and the one that follows, "Time and Matter," Zewail provides the scientist and layperson alike with a description of the underpinning ideas of his scientific contributions and insights that is accessible, educational, and quite free of technical jargon. His enthusiasm for his scientific voyage permeates this discussion. Zewail recounts how his experimental results

gradually overcame the belief initially held by many that either quantum uncertainty or quantum dephasing would limit the value of femtochemistry. The story offers a splendid example of the value of conviction to one's ideas.

Zewail also gives a personal glimpse of the new and exciting directions for femtosecond studies he is currently pursuing in both chemical and biological sciences. He describes recent successes in his studies of ultrafast electron diffraction, a technique that provides direct snapshots of molecules as they undergo structural tran-



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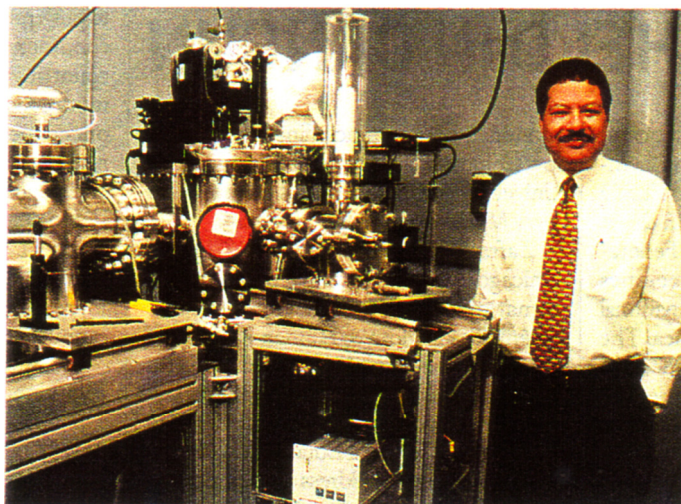
within individual isolated molecules with their millions of quantum states and among assemblies of billions of molecules. This coherence, he saw, offered possibilities for providing insight into molecular dynamics on the atomic scale. The concept, which offered the potential for looking closely at molecules "in action," was soon demonstrated with his landmark observation of coherent motion following excitation of isolated anthracene molecules with picosecond laser pulses.

His ineffable enthusiasm for this most recent scientific adventure is clear and makes one wonder whether another crowning achievement is in the making.

Throughout the book, Zewail shows a deep and abiding interest in the history and culture of Islamic civilization. He brings great enthusiasm to his discussion of the scientific renaissance that occurred in the Islamic world during what we in the West refer to as the Middle Ages. Of particular interest is Zewail's discussion of the

medieval Muslim scientist Abu Ali al-Hassan ibn al-Haytham (Alhazen). Not widely known in the West, Alhazen was the greatest scientist of the Middle Ages, and his achievements in the field of optics were groundbreaking. He was the conceptual pioneer of the camera obscura, and his early ideas about light and vision were revolutionary. The discussion is an inspiring reminder that many in the West readily embrace a Eurocentric view of scientific achievement.

Finally, Zewail shares his thoughts on future relations between the developing and the developed world, particularly on the future of Egypt and the U.S. In chapters titled "A Personal Vision: The World of the Have-Nots" and "Walks to the Future: My Hope for Egypt and America," Zewail demonstrates his concern and sets out his hopes, along with a number of concrete proposals. As one who has spent



CALIFORNIA DREAMER Zewail poses in his laboratory at Caltech after being named to receive the 1999 Nobel Prize.

a good deal of time in both countries, Zewail has the advantage of knowing each society intimately. This provides a broadened perspective and a distinctive vantage point from which to critique both societies. While he recognizes and appreciates the strengths of both Egyptian and American

society, Zewail points to a number of shortcomings in each and offers thoughtful recommendations. His frank assessment and recommendations for changing the scientific landscape in his native Egypt is neither hesitant nor condescending. Zewail speaks to these matters with clarity and courage.

"Voyage through Time" is a candid story of a remarkable journey that began on the banks of the Nile some 50 years ago. It is a captivating and inspiring account of the personal, humanistic, and scientific vision of a truly brilliant and illustrious scientist. This is a book well worth reading.

Father and son Vincent and Christopher McKoy have known Ahmed Zewail for more than two decades. Vincent is a professor of chemistry at California Institute of Technology; Christopher is a graduate student in political science at the University of California, Santa Barbara.

PHOTO BY ROBERT PAZ