

Short Biography about the life and work of Professor Kyriakos C. Nicolaou

Synthetic organic chemists have the power to change one substance to another and thus create natural and designed materials in the laboratory for all intents and purposes. They do this by understanding the architectural structure of the molecules (which are made from atoms) that make up everything we can touch, smell and taste and then assemble them from smaller and simpler molecules by attaching onto them additional atoms or groups of atoms often through ingenious ways. From these molecules are discovered miracle drugs, cosmetics, vitamins, fibers, dyes, pesticides, polymers and plastics and high tech materials that benefit society in myriad ways. These discoveries shaped our civilization as we know it today and continue to impact our world as chemists continue their quest for new scientific knowledge and its translation into useful products for our everyday lives. Professor KC Nicolaou is one of those chemists whose work has had a major impact on science and society in general, and chemistry, biology and medicine in particular.

Nicolaou's forte is total synthesis, a specialized field of organic synthesis that aims to replicate the molecules of living nature from scratch in the laboratory. Often called a precise science and a fine art, total synthesis has reached impressive levels of performance possessing the power to deliver almost any molecule no matter its complexity. Through it, rare biologically active molecules found in nature can be made in the laboratory in large quantities for thorough investigations as potential drugs. Variations of these molecules can also be produced through the same process in efforts to fine-tune the pharmacological properties as part of the effort to discover better drugs than the naturally occurring ones. Nicolaou is recognized as a world leader in this important field, having distinguished himself with his pioneering discoveries of new synthetic methods and strategies toward complex molecules of biological and medical importance. Among his numerous successes, his most well-known are the syntheses of the anticancer drugs taxol and calicheamicin. The former is perhaps the most widely used anticancer drug today whereas the latter is the first drug to be attached as a cytotoxic payload onto an antibody drug conjugate (ADC) for targeted cancer chemotherapy. Other accomplishments from his laboratory include the syntheses of vancomycin, known as the last line of defense of humanity against bacteria, and several highly complex marine neurotoxins such as brevetoxins A and B, which are associated with the "red tide" phenomena. Nicolaou is known for his daring attempts to synthesize the seemingly impossible to synthesize molecules. He often succeeds through relentless campaigns that involve complex synthetic strategies and method development. His methods have enriched the toolbox used by synthetic organic and medicinal chemists to synthesize molecules of all kinds, thereby impacting the work of others in their quests for new medicines and other useful products. His latest research focuses on the molecular design and synthesis of selective anticancer drugs targeting cancer stem cells and antibody drug conjugates (ADCs) for targeted personalized chemotherapy. Carried out in collaboration with pharmaceutical and biotechnology companies, these efforts are expected to lead to new paradigms for cancer chemotherapy and the treatment of other diseases. His scientific contributions are described in over 760 publications and more than 60 patents.

Besides being a highly decorated and cited scientist, Nicolaou is a gifted teacher who has inspired students around the world and informed the public about the impact of science through his popular books and informative articles. His impact on science and society is also exerted through the legions of students from all over the world who have studied with him. Among his most famous books are his series of *Classics in Total Synthesis* which are used by advanced

students and practitioners of organic synthesis around the world and his colorfully illustrated book *Molecules That Changed the World* that conveys the excitement and importance of his work and the work of others in the field of chemistry, biology and medicine to the general public.

KC Nicolaou was born in Karavas, Cyprus in 1946 where he attended primary school and the Gymnasium of Lapithos. At the age of 13, he moved away from his family to attend the Pancyprian Gymnasium in Nicosia where he lived with his uncle. Upon graduating from there in 1964, he emigrated to England where he attended Bedford College and then University College London for his BSc and Ph.D degrees, respectively. He then moved to the United States where he carried out postdoctoral studies, first at Columbia University and then Harvard University before becoming a faculty member at the University of Pennsylvania in 1976. In 1989, he moved to California to become the Founding Chairman of the Department of Chemistry at The Scripps Research Institute and Distinguished Professor of Chemistry at the University of California, San Diego. He held these positions simultaneously until 2013, when he moved to Rice University in Houston, Texas as the Harry C. and Olga K. Wiess Professor of Chemistry. In 2004, he established the Chemical Synthesis Laboratory at A*STAR, Singapore, and served as its Director concurrently with his other positions until 2010. He served as an advisor to several academic institutions and pharmaceutical and biotechnology companies around the world. With his Cypriot origin wife Georgette, they have four children, Despina Colette, Alex, Christopher and Paul, and two grandchildren, Nicolas and Georgia.