

Legends of Allergy and Immunology: From a curious mind to a world class scientist—A brief biography of Professor T.P. King

Te Piao King, or T.P. King, was born and raised in China. He describes his early family home as a very busy household—"...my father had three wives and 14 children. My mother had no chance for education, but very wisely she pushed her children to continuously study."

Throughout his childhood, T.P. King was exposed to the English language by reading magazines and attending social gatherings held by his father's business associates. "This exposure which was not a given at the time, sparked my interest to study abroad in the United States, and I asked my father if he would allow me to go for such opportunity. He agreed and at the same time, he coincidentally had a friend planning a trip to the USA who could bring me along." T.P. King left Shanghai on the converted troop transport ship USS General Gordon together with his uncle and his two friends, to arrive in San Francisco eleven days later, on January 10, 1947.

During that summer, he started to take a course in general chemistry: "A course I was very passionate about and wanted to major in, at Pasadena City College. Later in 1947, I signed up for a bachelor's degree at Berkeley University. The university was open three trimesters a year, which allowed me to study full time and to complete my college degree in less than three years. I continued to pursue my Master's in Chemistry at the same school."

In the fall of 1950, he was successfully admitted for doctoral studies into the Department of Chemistry at Columbia University in New York. T.P. King started to do research in Professor Robert C. Elderfield's group. When he moved his position to the University of Michigan shortly after, T.P. King decided to follow him.

By the late spring of 1953, he received his Ph.D. in organic chemistry after successfully defending his dissertation entitled "The condensation of acetophenone with itself in the presence of Lewis acids."

Following a recommendation by Dr. Elderfield to his former colleague Dr. Lyman C. Craig at the Rockefeller Institute, T.P. King was accepted as a research associate in Craig's laboratory.

His first project in the new group was to continue Dr. Craig's studies of peptide antibiotics, known as tyrocidines, which were discovered previously by a Rockefeller scientist named Dr. Rene Dubos, followed by several more projects in Dr. Craig's laboratory for almost 10 years. "Later on, he advised me to focus more on projects with medical importance. Hence, in the late 1950s, I started to identify the active chemical components (allergens) of ragweed pollen that cause autumn hay fever in susceptible people. That was a particularly exciting research field to me, as I suffered terrible spring allergies to multiple tree pollens myself." At that time, it was known that allergens

are proteins, but methods were not available to separate and identify which proteins are allergens. During the following years, T.P. King worked on the identification, purification, and characterization of ragweed pollen allergens and, in collaboration with Philip Norman, identified the major ragweed pollen allergen (Antigen E) by clinical studies. Because of this finding, antigen E was accepted by governmental agencies as a standard for potency of ragweed pollen extract for clinical use. Antigen E was also used by Dr. Kimishige Ishizaka to identify a new class of immunoglobulin named IgE. It should be pointed out that T.P. King's work on antigen E (now designated Amb a 1) in 1962 represents the first purification of a major allergen.¹

My first publication on ragweed pollen allergens (1) was co-authored by Dr. Norman and with that foundation, I gradually started to work more independently and chose my own projects. Later, in the 1970s, I expanded my research on allergens from bee and vespid venoms, trying to understand which properties of protein help to make an allergen, explains T.P. King.



Prof. Dr. Te Piao King. Photography: Robert Reichert/The Rockefeller University

In the eighties, T.P. King pioneered the use of molecular biology techniques to insect venom allergens. These techniques allowed the production of natural allergens and their mutants in the laboratory for further studies including solving their three-dimensional structure by X-ray crystallography. Due to his remarkable work on allergens, T.P. King was a key member of the group that in 1986 devised and established the nomenclature system for allergens.²

In 1957, T.P. King was promoted to assistant professor at The Rockefeller University and six years later in 1963, he became an associate professor with tenure.

On a personal note, I married Lydia in August 1962 and together we had two kids: Eloise and Douglas. We bought our first apartment where I still live to this very day, which is just a short walk to my work - the university.

Financially speaking during my entire career about half of my research expenses came from The Rockefeller University, and the other half from research grants and a contract from The National Institutes of Health (NIH). I also received some funding from a Danish company that specializes in allergenic products, T.P. King points out.

T.P. King officially retired in 2000 but continuously worked in the laboratory and research until 2010 and went to his office to read and write until 2016, when he suffered a stroke.

T.P. King joyfully concludes: "I am fortunate to have escaped the turmoil in China at the time and to have encountered so many kind people over my life. I am forever grateful to my parents for giving me the opportunity to study. I am equally indebted to the United States of America where my horizon was limited only by my imagination. When I came to the US in 1947, I never thought I would still be here after 70 years. Today, this place is my home, and this is where I want to remain."

T.P. King authored over 134 scientific publications (PubMed references: <https://www.ncbi.nlm.nih.gov/pubmed/?term=king-tp>). His major contributions to the field are:

- Isolating Amb a 1 from ragweed pollen, the first purification work of a major allergen.¹
- Identifying major allergens of stinging insect venoms and their clinical relevance for diagnosis and treatment.³⁻⁹
- Revealing the three-dimensional structures of venom allergens enabling structural-functional studies and modifications.¹⁰⁻¹³

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CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

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