

Jason C.H. Shih, a Bio-Narrative

Dr. Shih comes from a diverse background, both culturally and professionally. He was born in China, grew up and was educated in Taiwan, and earned his doctoral degree and developed his career in the United States and worldwide. He received both B.S. in botany and M.S. in biochemistry from National Taiwan University. In the U.S. he earned his Ph.D. in biochemistry/nutrition from Cornell University and was a post-doctoral researcher in protein chemistry at the University of Illinois. Starting in 1976, he worked his way from assistant professor to full professor at North Carolina State University (NCSU), complemented by sabbaticals at University of Wales, Cardiff (1983), Bowman Gray College of Medicine, Wake Forest University (1991) and Academia Sinica, Taiwan (1997). His research at NCSU has involved extensive collaboration with partners in Wales, The Netherlands, Taiwan, and Mainland China.

During his first half of his career at NCSU, Dr. Shih developed the Japanese quail as an animal model to study atherosclerosis and discovered the linkage between the disease and latent viral infection. At the same time, he pioneered the study of thermophilic anaerobic digestion (TAnD) of animal waste, first in the laboratory and then on research and commercial farms. Step-by-step, he established a holistic farming system to harvest biogas energy and nutrient resources from animal waste. In 1993, the first full-scale TAnD system was built in China, where it is still in operation today. In 1995, a U.S. patent for the TAnD system was awarded to Dr. Shih.

Following the operation of TAnD, Dr. Shih made another interesting discovery. He and his graduate student discovered and isolated a feather-degrading bacterium from the digester. The keratinase enzyme and gene encoding the enzyme were subsequently isolated, permitting cloning for over-expression of the enzyme and, most recently, the development of an asporogenic bacterial strain. Research into the applications of keratinase proved even more exciting. First, the enzyme was demonstrated to convert feathers into digestible protein; secondly, when used as a feed additive, the enzyme significantly improved feed digestibility and promoted young chicken growth. Both applications will have a strong economic impact on poultry industry. Recently, the keratinase enzyme was also demonstrated to be effective in degrading prion protein, the causative agent of a group of diseases called transmissible spongiform encephalopathies (TSE), which include the lethal neurodegenerative disease known as mad cow disease. It is therefore possible to develop an enzymatic process of prion inactivation to prevent mad cow disease. Dr. Shih and his Dutch colleagues published this pioneering discovery in 2003, which has been honorably cited in many scientific publications.

This series of studies and discoveries helped Dr. Shih earn ten more patents (seven issued, three pending). With an exclusive license agreement with NC State, Dr. Shih and his son, Dr. Giles Shih, co-founded a biotechnology company called BioResource International (BRI) for the commercial development of the keratinase technology. It is estimated that the enzyme as feed additive can have the potential of one billion dollar global market.

During Dr. Shih's career at NCSU, he has been honored with many awards, including the National Pew Fellowship, American Heart Association Fellowship, Visiting Fellowship in Wales, NSC Visiting Fellowship in Taiwan, Adjunct Chair Professorship of China Agricultural University, USDA International Fellowship, J. Rigney Award for Internatinal Services, and NTU Presidential Award. His research throughout the years has been supported by numerous grants from the NIH, DOE, USDA, FDA, US Poultry & Egg Association, and the National Cattlemen's Beef Association. Besides research, Dr. Shih is very active in promoting international relationship with China/Taiwan. He is the NCSU Coordinator of Chinese Affairs.

Jason C. H. Shih

Professor of Biotechnology

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Education

National Taiwan University	B.S., 1963	Botany
National Taiwan University	M.S., 1966	Biochemistry
Cornell University	Ph.D., 1973	Biochemistry/Nutrition
University of Illinois	Postdoctorate, 1975	Biochemistry

Professional Experience

- 1973-1975 Research Associate, Biochemistry, University of Illinois
- 1975-1976 Sr. Research Associate, Nutrition, Cornell University
- 1976-pres. Assistant, Associate and Full Professor, Poultry Science, Biotechnology, Microbiology and Nutrition, North Carolina State University
- 1986-pres. Coordinator, Chinese Affairs of NCSU International Programs
- 1999-pres. Founder and Chairman, BioResource International, Inc. (BRI)
- 2003-pres. Adjunct Chair Professor, China Agricultural University, Beijing

Visiting Professorship and Fellowship

- 1983 Visiting Fellow, University of Wales at Cardiff, Wales, UK
- 1986 Visiting Professor, National Taiwan University, Taiwan
- 1991 Visiting Professor, College of Medicine, Wake Forest University, NC
- 1994 Special Advisor to the President, National Taiwan University, Taiwan
- 1997 Visiting Fellow, Academia Sinica, Taiwan
- 2005. Visiting Scholar, Academia Sinica, Taiwan

Teaching Graduate course: Nutrition and Biotechnology

Inventions Inventor of 11 U.S. and international patents, 8 issued and 3 pending.

Research Interests

- Prion inactivation and prevention of TSE.
- Biodegradation and utilization of feather keratin.
- Genetics and biochemistry of keratinase
- Environmental Biotechnology: anaerobic digestion of animal waste

Honors

- Visiting Fellowship, University College, Cardiff, Wales, U.K., 1983.
- United Nations Development Program Specialist, China, 1987-1993.
- Pew Fellow, National Fellowship for Faculty Scholars, 1991.
- Elected Fellow, Arteriosclerosis Research Council, American Heart Association, 1992.
- J. Rigney Award, Sigma Iota Rho, Honor Society for International Studies, 1994.
- USDA International Exchange Fellowship, Holland and Denmark, 1994 and 1995.
- NSC Visiting Fellowship, Academia Sinica, Taiwan, 1997.
- NTU Presidential Award for Distinguished Alumnus in International Service, 2000.
- Adjunct Chair Professor, China Agricultural University, Beijing, 2003-2005.
- Recipient of a total of 37 competitive research grants and contracts, 1977-2005.

Publications: A total of more than 100 scientific publications.