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SIXTH INTERNATIONAL CONGRESS OF BIORHEOLOGY

POISEUILLE GOLD MEDAL AWARD CEREMONY

Laudatio: Poiseuille Awardee Yuan-Cheng Fung

H.L. Goldsmith

McGill University Medical Clinic, Montreal General Hospital
Montreal, Québec, CANADA

In his book "Biomechanics", our Poiseuille Medal Awardee quotes Aristotle in his work on Parts of Animals:

"But of a truth every realm of nature is marvellous. It is told that strangers visiting Heracleitus and finding him by the kitchen fire hesitated to enter. "Come in, come in," he cried, "the gods are here too." So we should venture on the study of every kind of creature without horror, for each and all will reveal something that is natural and beautiful."

The gods are here too this afternoon to bear witness to the honoring of a great scientist, one who has ventured on the study of creatures, inanimate and animate, and has communicated to us, with an infectious enthusiasm, the nature and the beauty of their workings. With much joy therefore, and convinced that he embodies all that is best in the tradition of the Poiseuille Medal and the science of Biorheology, I have the honor to present to you Yuan-Cheng (Bert) Fung, Professor of Bioengineering at the University of California at San Diego.

Born in China at Wutzin in the Province of Kiangsu in 1919, Dr. Fung received both his bachelor of science and master of science degrees at the Central University in Chungking and began work as a Research Fellow at the Bureau of Aeronautical Research in China in the latter years of the war. Fortunately for us, he came to the California Institute of Technology in 1945 to do a doctorate in aeronautical engineering, awarded Summa Cum Laude in 1948. His Ph.D. thesis on the "Theoretical and experimental effect of sweep upon the stress and deflection distribution in aircraft wings of high solidity", seems far removed from papers such as the "Effect of velocity distribution on red cell distribution in capillary blood vessels" or the "Mechanical properties of arteries as a function of topography and age" published 30 years later. In fact, it represents the tremendous creativity of a scientist with a rich background in mathematics who, having attained international recognition through his research on solid mechanics, aeroelasticity in particular, in the 1950's and 1960's, then applied his talents to the investigation of the mechanics and the flow and deformation of tissues and biological fluids.

For the science of Biorheology, Dr. Fung's move in 1966 from the California Institute of Technology to the new campus of the University of California at San Diego in the department of Applied Mechanics and Engineering Science - Bioengineering proved to be a tremendous gain. There, in the presence of a kindred spirit, Dr. Ben Zweifach, who was recruited to UCSD at the same time, Dr. Fung courageously resolved to teach himself Biology as he entered new fields of research, working in a medical school. He embarked on a study of rheological processes and mechanisms in many biological systems, applying his profound knowledge of mechanics, his elegant mathematical analysis and penetrating insight to the world of living matter.

Thus, he studied the elastic environment of the capillary bed and introduced the "tunnel-in-gel" concept; he elucidated the fundamental relationship between geometric factors and material properties of the red blood cells; he established the basic principles governing the elastic properties of arteries and veins; he investigated the hemodynamics of the pulmonary microcirculation and introduced the "sheet flow" concept; he analyzed the dynamics of blood flow at vessel entrances and demonstrated that the interaction between the conditions of flow and the particulate nature of blood exerts profound influence on cell distribution at bifurcations; he made a detailed analysis of the motion of the bolus of plasma carried between red blood cells in narrow capillaries and clarified the role of blood cell deformability in capillary flow; he investigated the interactions between blood cells and vascular endothelium and determined for the first time the force involved in white cell sticking to the walls of venules; he provided new insights into the mechanics of contraction of heart muscle and smooth muscle in the passive and active states; he studied peristaltic transport and contributed importantly to the understanding of ureter physiology, and he established the fundamental principles governing the mechanics of the skin, lung, cardiac chambers and pericardium.

In every area studied, Dr. Fung has significantly altered and shaped our thinking, and through the elegance and simplicity of his approach, has given others the incentive to further explore the marvels of nature as revealed in the application of the laws of mechanics and motion to biological systems. Indeed, his role as a teacher and communicator of ideas has been and continues to be as important a contribution to our science as his publications. Those of us who have heard him lecture at national and international meetings, including those of our Society, know how brilliantly, and with what disarming simplicity, he imparts important new perspectives and directions. His superbly written books on Biomechanics and Biodynamics are eloquent testimony to his stature as a great teacher.

Not only as lecturer and in his books does he excel as teacher, but also as supervisor of graduate students, where his kindness and generosity and his self-giving spirit are well known to the young who have worked with him.

Our Society owes Dr. Fung a special debt of gratitude for organizing, at short notice, the Third International Congress of Biorheology on the campus of UCSD in 1978. We are not the first to honor Yuan-Cheng Fung. The Microcirculatory Society bestowed upon him the Eugene M. Landis Award in 1975, the first time that an Engineer was given this honor. The American Society of Civil Engineers awarded him the Theodore von Karman Medal in 1976. He obtained the Lissner Award for Bioengineering of the American

Society of Mechanical Engineers in 1978 and its Centennial Medal in 1981.

His father was a man of letters and an accomplished water colorist, and Yuan-Cheng has a deep love of, and a keen interest in Chinese literature, giving him a sense of the beauty of nature and of the things of the spirit. Dr. Fung is honored in his native China where he has been very active teaching as well as promoting scientific exchanges. In recognition of this work, as well as of his scientific achievements, he was recently awarded an honorary degree in China on the occasion of the 35th anniversary of the Institute of Mechanics of the Chinese Academy of Sciences.

Today, we honor him in the Poiseuille Medal of the International Society of Biorheology, as token of an outstanding contribution to a science pioneered by Dr. A.L. Copley, a science that the Medallist has done so much to shape and to advance, as researcher, as teacher and as a humanist who has seen revealed in creatures, things natural and beautiful.

It is with great pleasure that I ask Professor Alex Silberberg, Poiseuille Medallist at the 4th International Congress in Tokyo, to present the medal to Dr. Fung.



Photo: Nancy Hamilton