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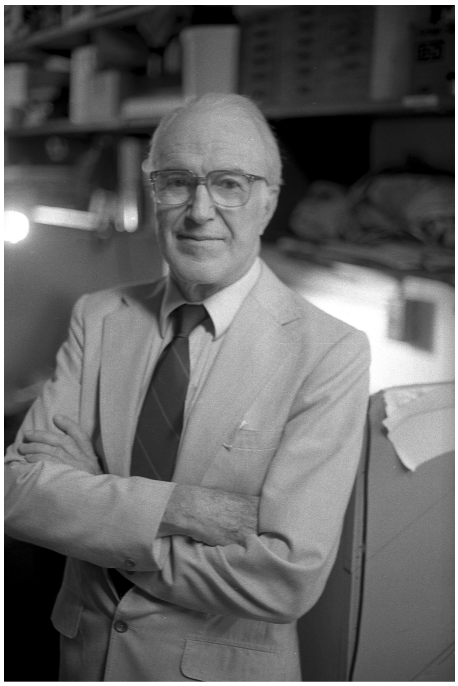
INTRODUCTION

SPECIAL ISSUE IN MEMORY OF PROFESSOR BRITTON CHANCE

Britton Chance: One of the Most Outstanding Scientists in the World



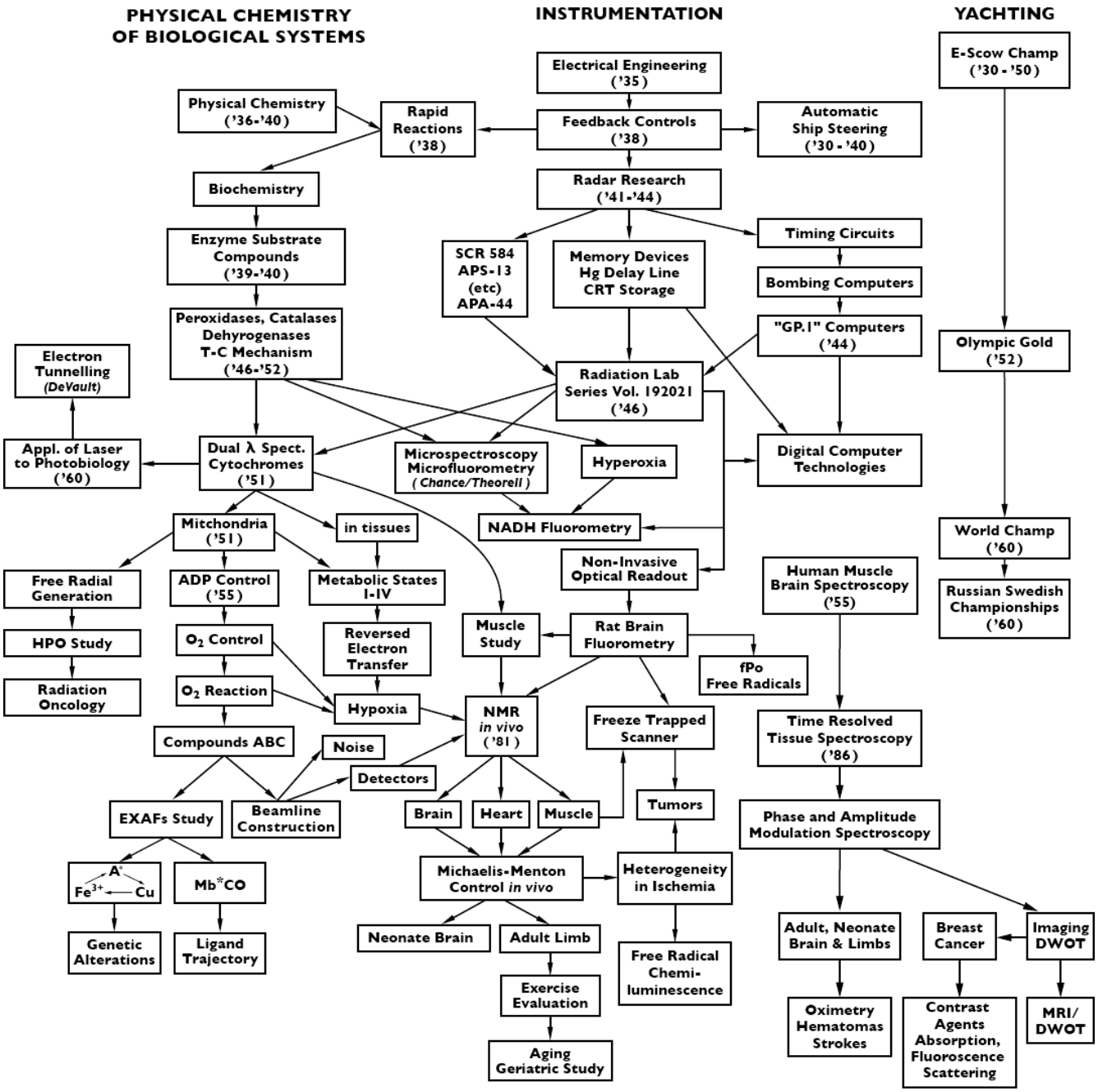
Photograph by Mark Cohen, courtesy of the Johnson Foundation

On June 3rd and 4th, 2011, over 300 scientists and professionals from all over the world gathered at the Translational Research Center of the University of Pennsylvania to attend a memorial symposium on "Britton Chance: His Life, Times and Legacy" and a "Molecular Spectroscopy/Imaging Workshop: from bench top to bedside" dedicated to Britton Chance as well.

Britton Chance was one of the most outstanding scientists in the world as measured by the breadth, depth, and impact of his research and highly cited publications. The amazing research activities of Britton Chance (as shown below by the chart made by Chance himself) covered many areas ranging from instrumentation, basic sciences, to clinical translations.

His research innovations had advanced many frontier research fields at the time, with both the development of new methods/devices and the answers to key biological/biomedical questions. Some of his major scientific contributions include:

(1) *Study of enzyme–substrate kinetics by developing the micro stop-flow device*; *First experimental demonstration of the existence of enzyme-substrate complex.*



BRITTON CHANCE (1913-2010)

JOHNSON FOUNDATION / BIOCHEMISTRY & BIOPHYSICS
UNIVERSITY OF PENNSYLVANIA

Courtesy of the Johnson Research Foundation, Department of Biochemistry and Biophysics, University of Pennsylvania

(2) *Development of electronic analog calculators, precision targeting radar/computing systems in the World War II and the not well-known contribution to the world first general purpose computer ENIAC at the University of Pennsylvania.*
(3) *Development of dual beam (dual wavelength) spectrometer which is widely used for studying turbid biological samples.*
(4) *In-depth study of mitochondrial bioenergetics, redox state and electron transport chain in respiration.*
(5) *First discovery of the generation of reactive oxygen species (hydrogen peroxide) in mitochondria.*
(6) *First experimental discovery of electron tunneling phenomena in biological systems.*
(7) *Ground-breaking development of in vivo metabolic magnetic resonance spectroscopy and applications to perfused organs, animals, and human subjects (patients and athletes).*
(8) *Founding the field of biomedical photonics by developing near-infrared spectroscopy and imaging methods including time resolved spectroscopy (TRS), photon diffusion tomography (PDT) and biomedical applications to study brain function (fNIR) and various diseases including breast cancer, etc.*
(9) *Development of mitochondrial functional/redox state fluorescence imaging and its biomedical applications.*

He has invented scientific instruments which have been widely used in research and industry until today throughout the world, and made it possible for many key developments in biochemistry, biophysics, molecular biology, biomedical research and clinical practice. A couple of these instruments already mentioned above are the micro stop-flow device and the dual beam (dual wavelength) spectrometer. Other instruments include NADH fluorometer, redox scanner, RunMan, a handheld NIR breast cancer detector, and an optical metabolometer for measuring the nutritional status *in vivo*. In addition, he has inspired the development of multiple NMR technologies and made important contributions to the instrumentation development for simultaneous optical and multinuclear NMR spectroscopy/imaging studies.

According to ISI Science Citation Indexes (accessed on July 10, 2011), six of Chance's papers have been cited for more than 1000 times, including two papers on hydrogen peroxide, two on mitochondrial bioenergetics, one on the assay of catalases and peroxidases, one on the time-resolved noninvasive measurement of tissue optical properties. A paper on hydrogen peroxide metabolism published in 1979 has the highest citation of 3600 times. His H index is 123. His latest paper was published in 2011 and one more is published in this issue.

Thanks to the enthusiatic response of many investigators to the initial announcement of the JIOHS focus issue in memory of Britton Chance. We have already published 5 papers in a special section for Chance in the April issue. This July issue, fully dedicated to Britton Chance, includes 13 papers in total. There are three personal reflections on the life and work of Britton Chance, two research reviews and eight original research papers covering work on brain, heart, muscle, cancer, stem cells and technical development, all written by the former students, postdocs, friends, and collaborators of Chance. In particular, the paper by Xu NH *et al.* was co-authored by Britton Chance as one of his last few publications. The diversified content of these papers partially reflects the style and breadth of the interdisciplinary research conducted by Chance ranging from technical development to basic science and clincial applications. We will have more papers published in another special section for him in the October issue. With all these research papers and reflections, we cherish Britton Chance as one of the most outstanding scientists of our times.

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