

Acceptance Speech

**Prof. M. Frederick Hawthorne**

Co-Winner of King Faisal International Prize

For medicine 2003/1423H.

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The King Faisal International Prize is one of the most prestigious honors in the field of Science presented by any organization anywhere in the world today. I am honored and delighted to accept the 2003 Prize in Science for myself and on behalf of my many former coworkers. I do so with humility and sincere thanks. Of great importance to me is the fact that Science is but one of five fields of human endeavor honored by the King Faisal International Prize. The additional fields to which I refer are Medicine, Arabic Language and Literature, Islamic Studies and Service to Islam. When taken together it is clear that these disciplines succeed in strengthening our knowledge and understanding of humanitarian, religious, cultural and scientific subjects on an international level and for the betterment of all mankind. In addition to these remarkable features of the King Faisal International Prize, it is apparent that the extraordinary achievements and integrity which characterize previous Prize recipients amply validates the selection process for this honorific enterprise.

The opportunity to participate in the 2003 King Faisal Prize is much more than an academic honor for me. This occasion fulfills my long-held wish to visit the Kingdom of Saudi Arabia to learn more about its culture, religion and ongoing projects in science, and in particular, chemistry.

My career in chemistry which has brought me to Riyadh at this time began in 1954 when I became a research chemist with the Redstone Arsenal Research Division of the Rohm and Haas Company. Our laboratory mission was basic research in the chemistry of rocket propulsion. In 1956 my superior, Dr. Warren Niederhauser, later the President of the American

Chemical Society, decided to investigate a then unknown family of rocket propellants based upon boron hydride (borane) fuels. When asked if I wished to lead this new effort I agreed without knowing what awaited me.

The fact was that borane chemistry was largely undiscovered at that time. It became my good fortune to remove much of this obstacle over the course of my career.

Aside from the ongoing discovery of basic knowledge regarding the nuances of borane chemistry, I encountered the new field of boron neutron capture therapy for cancer in 1962, soon after beginning my academic career in the University of California. This therapeutic method is based upon the fact that slow neutrons from a nuclear reactor may be captured by a boron-10 target nucleus and immediately fission to produce lithium-7 and helium-4 nuclei having very short trajectories along with about 2.4 million electronvolts of kinetic energy and a gamma photon. In principle, if the boron-10 target nucleus is selectively placed in a cancer cell, the capture of a non-toxic slow neutron sets off an infinitesimal nuclear reaction which kills only the targeted cell while sparing normal cells nearby. Current research is focused upon two topics; the development of new boron compounds for selective cancer cell targeting and securing a more accessible source of neutrons. Boron chemistry plays a major role in this developing medical enterprise and I am pleased to have made contributions to this effort. Other aspects of my research in borane chemistry involve new catalysts for organic reactions, molecular motors for nanotechnology, new molecular carriers for drug delivery, novel molecules for the delivery of drugs and genes to the cell nucleus and others.

At this juncture I wish to thank the following groups of people and organizations for making this great honor possible for me. First of all, I thank the Rohm and Haas Company for setting my career in motion by providing the opportunity to carry out research in borane chemistry beginning in 1954. I next wish to thank the approximately two-hundred coworkers who over the years have empowered my research through their dedicated intellectual and physical contributions. Many of these individuals

now occupy academic positions throughout the world and one of them, Anna Lee Fisher, became a U.S. Astronaut in the space shuttle program. The support of my research group with public funds obtained from U.S. granting agencies is warmly acknowledged. Most importantly it should be noted that this trip to Riyadh would not have been possible without the continuous support provided me throughout the years by my wife, Diana.

Finally, I wish to thank the King Faisal Foundation for this great honor and the extraordinary hospitality they have extended to me and my family. I hope that I may be able to repay their kindness by carrying their vital humanitarian messages abroad.