

Acceptance of the Mineralogical Society of America Award for 1980

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Mr. Chairman, Colleagues of the MSA and Guests:

The MSA award is a truly magnificent gift—not only encouragement for one's work, but also a chance to say thank you to those who have supported and encouraged one in two decades of scientific life. I am embarrassed that in a year of time to ponder how to say "thank you," I have found few adequate words, and, whereas I can blame Mt. St. Helens for everything else that I have failed to do this year, I cannot lay the blame for my lack of words on the mountain.

Take, for example, the problem of how to thank my husband, Hugh. Expression of a warm feeling of gratitude for help in my work would seem inappropriate to him—every time he gets into my lab, computer program or field project (always with remarkable scientific success), warm feelings of gratitude are remarkably absent! We quickly learned that our personal happiness would be directly proportional to our professional distance, and so it is a measure of our happiness that we maintain a respectful disinterest in each other's work. Yet my professional evolution has been very much dependent on the relationship we have—it has been 15 years of adventure, security, love, trust, and freedom, for which mere words of appreciation seem inadequate. I can only hope that by sharing in my happiness with this award, he, as well as you, will also know my gratitude.

The festivities of the MSA today provide an excuse for a family reunion—for our son, Robert, who has been a wonderful and very understanding part of these years, to be with my mother, Helen Werner Summers, and my stepfather, Harry Summers, who have come from Pennsylvania to share in this occasion with us. My mother, and father, Glenn, who died in 1971, only a few months after happily seeing me receive my degree at Caltech, were determined that their three girls would have the educations that circumstances denied or made difficult for them, and they made many sacrifices for those educations.

Harry was the true Music Man of Warren, Pennsylvania, and gave me, from grade school through high school, my love of music. It was certainly this early direction and discipline in both music and science that allowed me to grow into the life I chose to follow.

Teachers have a profound influence on aspiring scientists and I have been blessed with more than my share of fine teachers: those, such as my first science teacher, who showed that science could be fun—probably the best lesson that could be taught; those,



such as my undergraduate physics, math and chemistry teachers at Allegheny, who showed that science is a meaningful basis for life; and those, such as Gene Shoemaker and Barclay Kamb with their very different styles and brilliances, who helped me to become an independent researcher, my dream from the age of 14. The MSA award acknowledges that these teachers have done their job well, and I hope that they will share my joy and thanks today.

However, all of the best teachers in the world are of no use to young scientists if they do not enter an environment where they can pursue their own intellectual choices. One's first years in research can be troubled by heavy teaching loads, lack of funding or knowledge of how to apply for it, conflicts and animosities from senior scientists, and discouragement at being a beginner in a world of established people and systems. Many people work especially hard against peer, governmental and institutional pressures, to provide an environment conducive to the creativity of our young, as well as older, scientists. It is fitting to acknowledge their help at this time of the MSA award, which is directed toward the work we have attempted in the early years of our careers. In my life, such people have given me the time for my work by holding back the requirements of teaching loads, committee meetings and paperwork; have given me the financial support for it, by a willingness to consider funding a young scientist without previous publications in the field of the proposal; and especially, have given me the moral support, by their sustained friendship and interest. I couldn't name all who have helped because so much is done without recognition—by the faculty colleague who covered an extra teaching load so that I had less; by the peer

reviewer who said to "take the risk;" or by the scientists and administrators in the funding agencies who did the paperwork extra fast because I missed the deadlines once again. The commitments of Gary Ernst of UCLA, Alan Gaines of NSF, and Dallas Peck of the USGS to fostering good environments of research for all of their scientists have deeply influenced my own career. I hope that my thanks to them will be taken as appreciation for those friends from UCLA, NSF, NASA and the USGS, who have made my work possible.

Finally, and most importantly, I thank you, my colleagues, for the intellectual challenges and encouragement you have given, and personal friendships that we have. I am basically a theoretician and, of course, hope that my ideas will hold true long enough to provide a basis for better theories and new directions in laboratory and field work. It is the perpetual burden of the theoretician to live in fear that there are mistakes in the theory and to wonder if the general trends of his own thoughts are productive for the scientific community. It is equally the burden of the scientific community not only to check for the small errors that are a theoretician's dread, but also to ensure that the trends and directions of new ideas will not send future generations down paths that bear no fruit. It was the critical thinking, enthusiastic response, and thoughtful conversations with so many members of the MSA over the years that showed me the direction to go in my thermodynamics work, and it is my belief that such interactions can keep errors, small or large, from being propagated very far into the future. I hope that these interactions and friendships continue intensely for many, many years.

I thank you again for this wonderful award.