Edward M. Stolper

Citation

I can think of few things more pleasurable than introducing a young scientist whose research has enhanced his visibility to such an extent that his or her image is clearly distinguishable from among the large number of young scientists publishing excellent research these days.

Normally, the recipient of a young scientist award is in a state approaching shock, with mixed feelings of pride and humility and appreciation for all those who guided him or her on the way. For Ed Stolper, however, the situation is different, and he is sitting here quite calmly. Although he is only 33 years old, his image shines brightly enough that it has received attention previously—He was awarded the Clarke Medal of the Geochemical Society in 1985, and he shared the Newcomb Cleveland Prize in 1985 with Sally Rigden and Tom Ahrens for the best 1984 paper in Science. Today it is the Macelwane Award of the American Geophysical Union, and there are still several tomorrows before his age disqualifies him as a young scientist, making it necessary for him to start getting down to serious, mature research.

Before I say any more about his research, permit me to outline a few historical developments. After graduation from Harvard with an A.B. summa cum laude in 1974, with coauthorship on four lunar science papers already to his credit, he won a Marshall Scholarship (some of you know that these are very competitive) and spent 2 years at the University of Edinburgh. Most Marshall Scholars elect to study at Cambridge or Oxford, but Ed went to Edinburgh because he felt that he could learn something from Professor Mike O'Hara, having heard about O'Hara's contributions to the lunar program. This desire to learn has characterized his research career. He returned to Harvard as a Master of Philosophy, became a Doctor of Philosophy by 1979, and was then appointed to a position as an assistant professor without an interval as postdoctoral fellow to organize himself for the real world. But he did not join the real world anyway, because the appointment was at Caltech (the California Institute of Technology, Pasadena).

I first met Ed Stolper in 1976, when I was persuaded, in a weak moment, to become a team leader for experimental petrology in the 3-year Basaltic Volcanism Project, an experiment in group planetary science launched by the Lunar and Planetary Science Institute. I had been aghast when Apollo 12, and when I inquired about good candidates for the team, I was advised that I should consid­er Ed Stolper. When I expressed doubts that he, as a graduate student, would surely be too busy with other things to be able to attend workshops and to generate manuscripts on demand, I was then told that my team would not be considered viable without Ed Stolper. It turned out that his presence was one of the brightest aspects of my time on this project.

I moved to Caltech in 1983 and found that he was well installed. He had a flourishing laboratory, a group of students, and several programs under way. To his research on nu­clear reactions, he added his bold experiments using, for the first time, a mol­ten target instead of solid material. From the results, they determined the density of molten basalt at high pressures and temperatures, which is no easy task, but Tom Ahrens has a big gun at Caltech. Sally Rigden picked up the problem for her thesis, and they devised shock wave experiments, for the first time, a mol­ten target instead of solid material. From the results, they determined the density of a silicate melt up to pressures equivalent to those about 700 km deep in the earth. The results provide support for the concept of a sunken komatiite ocean in early earth history.

When I arrived at Caltech, I was told that Ed Stolper was known to some as “Young Wasserburg.” This is an indication of his in­tellectual quality, his determination, and his ability to get things done as he thinks best. If he keeps up the way he is going, his string of awards may one day match even that of “Old Wasserburg.” The product of this approach to research by the right individual is certainly good science, and I proudly present my colleague Ed Stolper for this year’s Macelwane Award.

Peter J. Wyllie

Response

Thank you, Peter, for that generous introduction. There will, however, I think be little
doubt given my shaky voice and hands, that I am nervous, humbled, and deeply honored to receive this award.

I would like to do in the few minutes I have up here is to describe briefly the path that my colleagues and I have followed in the work cited by Peter Wyllie on the densities of silicate melts at high pressures. This will give me an opportunity to demonstrate how serendipitous my presence up here really is and to publicly acknowledge debts to friends and colleagues.

In the fall of 1978, I was a graduate student at Harvard in charge of a course called Scientific Writing. The tutorial things done by all students majoring in geology who wanted to graduate with honors. The classroom part of this ungraded course consisted of a series of guest lectures by faculty members to introduce them to the students. One Thursday evening, Rick O'Connell talked to us about how phase changes could be responsible for substantial, long-lived plateau uplifts. During his talk, the idea occurred to me that igneous differentiation of the upper mantle could lead to uplift. I went away and tried to see if this would work. In the process, I found that I needed to be able to estimate the density of basaltic melt at about 30 kbar. I looked up the little that was known about the compressibility of basaltic melt, guessed at its pressure dependence, and did some calculations. I never have pursued the question of uplift related to differentiation, though I think it would be effective, because I noticed something that I thought was far more interesting: According to this simple calculation, the density of basaltic melts diminishes and perhaps even exceeds that of coexisting mantle phases at relatively low pressures. At the time, Jim Hays, Dave Walker, and I were thinking about the migration of melt in the mantle: in particular, struggling with how, given our particular, struggling with how, given our uncertainty, widespread among the Caltech seniors, that one of the greatest pleasures of his career and deserves the recognition provided by the James B. Macelwane Award as a "young geophysicist of outstanding ability and promise."

Fourth, my colleagues at Caltech have been essential to the success that I have achieved there. I do not know where I would be in my work were it not for Tom Ahrens' enthusiasm, support, and encouragement; to collaborate and share with me. These qualities are, in my opinion, widespread among the Caltech seniors, faculty, and Sam Epstein, George Rossman, Lee Silver, and Gerry Wasserburg have had equally large impacts on my work.

Finally, I want to tell something to my wife, Lauren, with whom I've spent nearly half my life and with whom I have shared both our successes and failures. The point of this award, according to its originators, is to recognize scientists while they are still young so as to offer them encouragement. Lauren, I know that it doesn't seem like it at the end of a long day or when the children wake us up in the middle of the night, but it has now been certified by an august association, the American Geophysical Union, with all of its experience and national and international influence, that we are still young, so it must be so.

Ladies and gentlemen, thank you very much.

Edward Stolper

Robert A. Weller
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Citation

Robert A. Weller is a seagoing experimentalist or observational oceanographer who has made in his short career several truly outstanding contributions to understanding how the upper ocean responds to atmospheric forcing. He is without doubt one of the most capable and creative oceanographers of his age and deserves the recognition provided by the James B. Macelwane Award as a "young geophysicist of outstanding ability and promise."

After receiving his undergraduate degree in engineering and applied physics from Harvard, Bob Weller entered graduate school in physical oceanography at Scripps Institution of Oceanography and worked with Russ Davis on the development of a new mechanical current meter to be used in upper ocean studies. While several current meter designs then in use worked well on subsurface moorings in the deep ocean, no existing current meter performed well in the upper ocean. After considerable experimental effort, Bob developed a mechanical flow sensor (using two coupled propellers) with nearly perfect cosine response and then used two of these sensors mounted at right angles with associated electronics to build the vector-measuring current meter (or VMCM). By mechanically filtering out the usually very large oscillatory flows with periods less than a minute associated with surface wave and wave-induced