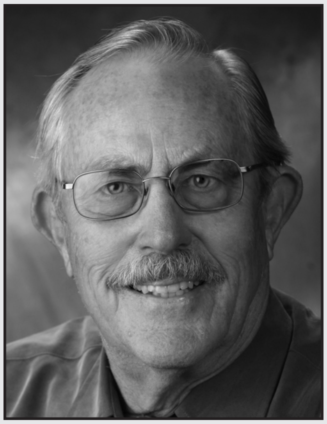
RIP RAPP ARCHAEOLOGICAL GEOLOGY AWARD

Presented to Peter J. Mehringer



Peter J. Mehringer
Washington State University

Citation by Gary Huckleberry and Vance Haynes

Studies in paleoecology have recently gained attention primarily due to concerns regarding climate change and its effects on ecosystems. To fully understand the nature of current global changes, we require a historical frame of reference that provides insight into the natural range and speed of ecological change. Whereas the relevance of paleoecology to modern society has only recently received publicity, its importance to the paleoanthropological and archaeological communities has long been recognized. To fully understand human evolution and behavior, one must consider the nature of past environmental changes. Thus it is no surprise that an important part of geoarchaeological research is environmental reconstruction, and one man who has contributed much to this endeavor is Peter J. Mehringer, winner of this year's Rip Rapp Archaeological Geology Award.

Pete is the classic interdisciplinary scientist. His bachelors and masters degrees are in zoology and botany, respectively, from California State College, Los Angeles, where he became involved in public health research focusing on disease transmission by rodents and insects. Research whetted his appetite for further learning, and in the early 1960s Pete came to the University of Arizona to pursue a Ph.D., this time in the Department of Geosciences. Under the tutelage of paleoecologist Paul Martin, vertebrate paleontologist John Lance, geochronologist Ted Smiley, and geochemist Paul Damon, Pete turned his energies towards solving "deep mysteries of the past". At Arizona, Pete specialized in pollen analysis of ancient deposits as a means of environmental reconstruction and worked in the Geochronology Laboratory where there was considerable interest in dating important archaeological sites. Thus, Pete soon began collaborating with archaeologists in trying to understand the environmental context of archaeological sites. Although pollen analysis was well established in archaeological research in northern Europe, it had been relatively uncommon in North America prior to the 1960s. However, it soon became clear that palynology had much to offer New World archaeologists, including the reconstruction of environment and human subsistence.

Many geologists and palynologists thought pollen records in alluvium of the Southwest were useless because of redeposition, but Paul Martin found he could get reproducible results. So Pete, with Vance Haynes, reopened the Lehner Clovis site in 1963 and produced a stratigraphically controlled pollen sequence through the Pleistocene-Holocene transition. This success led to work at other alluvial sites and eventually to Pete's remarkable success at the Tule Springs site in southern Nevada. He showed if adequate pollen is preserved in a properly defined alluvial sequence, it can provide useful evidence of climate change for environmental reconstruction. When Pete and Vance discovered the Murray Springs Clovis site it was going to provide the "rosetta stone" for unraveling late Quaternary paleoclimate change in southern Arizona. Probably Pete's greatest disappointment was the near total absence of pollen from all of the Murray Springs strata. Not giving up, Pete with David Adam and Paul Martin went on to produce a nearly complete paleoecological reconstruction for human occupation of the region.

After completing his Ph.D., Pete headed north and began his academic career in the Department of Anthropology at the University of Utah. This placed him on the margins of the Great Basin, an area where he had earlier worked as graduate student at Tule Springs in the Las Vegas Valley. Little did he know that the Great Basin would become the focus of his lifelong career in paleoecological and geoarchaeological research. Whereas some look at the Great Basin and see desolation and redundancy, Pete saw a big, varied landscape with abundant evidence of environmental change including glacial cirques, pluvial lake strandlines, and sand dunes. Pete became interested in understanding how and when these environmental changes occurred, and how they influenced past human settlement and behavior. Following in the footsteps of Henry P. Hansen, Ernst Antevs, and others, Pete searched nature's archives extracting pollen, charcoal, and other macrobotanical remains from a variety of geological and archaeological contexts including dunes, spring mounds, caves, lakes, and marshes. In many of these ecological repositories were layers of volcanic ash that Pete recognized as important chronostratigraphic markers that could be used to help correlate archaeological sites and date environmental changes. Pete became involved in several archaeological projects including the Steens Mountain Prehistory Project and excavations at Hidden Cave. When it came time for the Great Basin volume in the Smithsonian Handbook of North American Indians series to be written, Pete Mehringer would author the chapter on prehistoric environment.

In 1971 Pete moved to Pullman, Washington where he was hired as an Associate Professor in the Anthropology Department at Washington State University (WSU). The Department had recently created a Quaternary Studies Option and assembled an interdisciplinary faculty where students could receive training in geoarchaeology, zooarchaeology, and palynology. Pete found a home in the Palouse and for decades was a guiding force for the department's renowned environmental archaeology program. At WSU, Pete held a joint appointment with the Geology Department and taught a variety of classes ranging from palynology to the fundamentals of Western Civilization. Still legendary among his past students are the famous Mehringer marathon fieldtrips through the Intermountain West that stretched from Pullman to the Arizona-Mexican Border. While at WSU, Pete chaired six doctoral dissertations and 14 master theses, served on dozens of MA and Ph.D. committees, and survived hundreds of faculty meetings.

Pete expanded his research in the Pacific Northwest and northern Rocky Mountains working in a diversity of settings. At the Mannis Mastadon Site on the Olympic Peninsula, Pete helped to reconstruct climate and vegetation following the retreat of Cordilleran ice. In eastern Washington, the focus was on sediment cores from lakes and marshes and the reconstruction of vegetation following the last of the infamous Channeled Scablands floods. In 1987 when the East Wenatchee Clovis Cache was discovered in central Washington, Pete took the initiative to carefully excavate the site and establish stratigraphic age-control. A dearth of carbon suitable for 14C dating limited attempts to date the site. However, detailed granulometric analyses and Pete's keen eye led to the discovery of fine-sand pumice fragments in the soil matrix directly underneath the artifacts. These pumice fragments were chemically correlated to the 11,200 ^{14}C yr B.P. Glacier Peak event indicating that the cache was interred shortly after the eruption.

If Pete wasn't dating archaeological sites with tephra, then he was dating tephra with his lake cores. Indeed, Pete's has contributed much to understanding the age, distribution, and stratigraphy of numerous late-Quaternary volcanic eruptions in the Pacific Northwest and beyond. Not content with pollen, charcoal, and tephra, Pete considered detrital remnant magnetism of lake sediments and their variation through time. His paleomagnetic research on lake core sediments has helped reconstruct late-Quaternary secular variation in the Earth's geomagnetic field.

Although Pete is perhaps best known for his work in western North America, he has also worked in Asia, Africa, and Latin America. In the 1970s he made several trips to North Africa collaborating with the Egyptian Geological Survey in helping to reconstruct late Quaternary environments. Working with Fred Wendorf in 1973, Pete was captivated by the hyperarid eastern Sahara. He produced useful paleoecological reconstructions based upon pollen and stratigraphy at remote oases of Merga and Selima in northern Sudan and at Birqet Qarun in Egypt. In the process Pete became an expert driver of Volkswagen "Things" in negotiating the hyperarid desert. Many young scientists of the Egyptian Geological Survey profited from his instruction. Another great disappointment for Pete was the loss in transit of all of the stratigraphically controlled samples from the 1981 field season in Sudan and Egypt. Somewhere someone acquired a large crate in a ship's container filled with many bags of sediment. Containing no gold or silver, they were probably discarded in disgust.

Later, Pete traveled to China and collaborated with scientists as he visited the archaeological remains of past dynasties. Most recently, Pete has worked in Central America, extracting lake cores to help archaeologists reconstruct and understand past environmental dynamics and their role in the rise and fall of the Mayan Empire. In his recent *Quaternary Research* paper, Pete and his colleagues shed light on the timing and geographic extent of prehistoric volcanic eruptions, including the catastrophic Ilopango event that caused death and destruction in parts of El Salvador and adjacent Guatamala in the third century A.D.

It is impossible to adequately summarize the many accomplishments Pete Mehringer has made to the fields of geoarchaeology and paleoecology. His mark has been made in many ways, from his numerous publications to his cadre of students who today are doing their part to unravel "secrets of the past". Fortunately, Pete is still active and continues to do research from his outpost in southeastern Oregon. He is an international scholar whose work continues to represent the highest standards of science. Thus we are pleased to announce that Pete Mehringer is the 2006 recipient of the Rip Rapp Archaeological Geology Award.

Response by Peter J. Mehringer

Upon receiving the 1954 Nobel Prize for Literature Ernest Hemingway responded by deferring to others whom he felt should have been considered before him; they included Carl Sandberg and Karen Blixen. Never—in my wildest dreams—did I expect to receive the Rip Rapp Award, and my response mirrors that of Hemingway's.

Though surprised—flabbergasted even—I am honored to join the illustrious list of those achieving this recognition. I am much inclined, however, to share the acclaim with those who supported me along the way. Foremost among them is Paul S. Martin. John Lance and Paul Damon, the other members of my University of Arizona Ph.D. committee, tolerated and encouraged me through those stimulating years when the cult of Antevs, the causes of arroyo cutting, and the intensity and timing of Holocene climate change were foremost on the minds of Southwestern archaeologists. The combination of advisors from biogeography, vertebrate paleontology and isotope geochemistry could not have come to pass without the vision of Ted Smiley who instigated and guided the fledgling multidisciplinary Program in Geochronology.

As graduate students, Vance Haynes and I spent fun-filled hours walking Southwestern arroyos seeking secrets of the past. We hit the jackpot at Murray Springs, Arizona. Vance's tutelage brought initial understandings of alluvial stratigraphy, chronology, and early man archaeology. Emil Haury sanctioned our renewed efforts at the Lehner Mammoth site (*American Antiquity* 1965). Dick Shutler encouraged me to cut interdisciplinary teeth on the search for the truth of earliest Americans at Tule Springs, Nevada.

Meanwhile at Washington State University, Dick Daugherty established an archaeology-based interdisciplinary Quaternary Studies Option. Certainly—for me—the University of Arizona had been the right place at the right time. Luck struck a second time when I joined Bob Ackerman, Henry Irwin, Frank Leonhardy, Roald Fryxell, and Carl Gustafson in professing holistic notions of human history. At WSU I learned from all of them, from ensuing WSU Anthropology Department geoarchaeologists (Fred Nials, Fekri Hassan and Gary Huckleberry), and from their students. Several colleagues remain generous with their knowledge and cooperative in research (Nick Foit, Ken Verosub, and Andrei Sarna-Wojcicki).

Broader horizons came through associations with Fred Wendorf 's projects in the eastern Sahara, Fekri Hassan's studies in northwestern Egypt, and Jay Hall's invitation to study past environments in Central American. Mel Aikens introduced me to archaeology in China.

From my first Ph.D. student (Ken Petersen, who studied changing Holocene environments of southwestern Colorado) to the last (Bill Lyons, who established sources of tool stone and pottery temper in southeastern Oregon), students brought varied views and enthusiasm to classes, fieldwork and research. They remain sources of pride, information and inspiration.

So, there you have it. Through serendipity of time and place, and the interdisciplinary visions of Ted Smiley and Dick Daugherty, I am privileged to share the Geological Society of America's 2006 Rip Rapp Award with mentors, colleagues and students of nearly five decades.

Thank you.

GILBERT H. CADY AWARD

Presented to James C. Hower

James C. Hower
University of Kentucky

Citation by Leslie F. Ruppert

The recipient of the 2006 Geological Society of America's Coal Geology Division Gilbert H. Cady Award is Dr. James C. Hower in recognition of his significant and lasting contributions to the field of coal geology through research, service, and teaching. With expertise in coal petrography and his current position as Editor-in-Chief of the *International Journal of Coal Geology*, Jim is regarded as one of coal geology's most forceful advocates.

Jim Hower has worked in almost every aspect of coal geology, including inorganic petrology, coal quality, coal combustion by-products, and environmental aspects of coal utilization. His work in applied coal and coal combustion by-product petrology is the benchmark in the U.S. coal research community. He is recognized as the expert in Kentucky coal quality variation and has broad field experience.

Jim and his co-workers have published extensively on just about every aspect of coal geology. Jim's bibliography lists 180 peer-reviewed technical articles out of a total of over 600 publications.

Jim Hower is a dedicated teacher. He is an Adjunct Professor at the Department of Earth and Environmental Sciences, University of Kentucky and serves on M.S. and PhD theses committees in geology departments at universities in the U.S., Australia, New Zealand, and South Africa. He also served as a mentor in the Center for Applied Energy Research's state-wide high school summer internship program.

Jim serves the coal geology community with distinction. He is the tireless Editor-in Chief of the *International Journal of Coal Geology*, and has successfully broadened the scope of the journal. He is a member of the Advisory Scientific Board of *Geologica Acta* and served as an Associate Editor of *Organic Geochemistry*.

Jim Hower's community service and research have been recognized by many organizations. He was Chair, Coal Geology Division (1995-1996), and received the Division's 1997 Distinguished Service Award. He was awarded the Reinhardt Thiessen Medal (ICCP), the Gordon H. Wood, Jr. Memorial Award (AAPG), and the Outstanding Kentucky Geologist Award (AMPG).

It is time for us to honor Dr. James C. Hower's numerous, significant, and ongoing contributions to the field of coal geology with our highest honor, the Gilbert H. Cady Award.

Response by James C. Hower

I am deeply honored to be receiving the Gilbert H. Cady Award. I never knew Gilbert Cady, but feel connected to him and to the award. My first supervisor in Kentucky was Gilbert Smith, who had been a graduate student working with Aureal Cross at West Virginia University and later was trained in thin-section coal petrography by Gilbert Cady at the Ohio Geological Survey. Of course, at Penn State, I was a student of Alan Davis and William Spackman served on my committee. Both gentlemen were previous recipients of this award. I was also influenced by Eugene Williams and Peter Given while at Penn State and Peter continued to give constructive advice at GSA meetings through the early 1980's.

I have been fortunate to have worked in a dynamic environment at the Center for Applied Energy Research. There are a few geologists at the CAER, but it is mostly populated by chemists and engineers. As the name implies, it is an applied laboratory, meaning that much of my work was in support of broader projects aimed at the proper utilization of Kentucky coals. In this context, I have been able to conduct continuing studies such as the relationship of coal petrology and grindability and the petrology and geochemistry of fly ashes with respect to the feed coals.

I have also been extremely fortunate to have worked with a number of talented scientists, not only at my institute and university, but throughout the world. The number of my refereed papers was noted; what was not mentioned was that the number of co-authors is almost as large as the number of papers. I would not be here without their collaboration. Time does not permit me to name every one of my collaborators, but I must mention Garry Wild, who worked with me at the CAER for 16 years until his retirement. Among the many others, I have been fortunate to collaborate with geochemists such as Jingle Ruppert and Bob Finkelman; palynologists such as Cortland Eble and Charles Helfrich; and petrographers such as Alan Davis, Maria Mastalerz, and Adrian Hutton. I also want to thank all of my students: graduate, undergraduate, and high school. Special thanks must go to my wife, Judy, for supporting my career.

Thanks again to the Coal Geology Division for recognizing my contributions to the profession with this, their highest honor.

E.B. BURWELL, JR. AWARD

Presented to Martin G. Culshaw

Martin G. Culshaw
British Geological Survey

Citation by Allen W. Hatheway

For the past 15, or so, years, Martin G. Culshaw has been in responsible charge of engineering geological activities at the British Geological Survey. During this time he has witnessed and dealt with profound changes in the functional direction of his agency as it has moved to more directly and more effectively serve the citizens of the United Kingdom. These changes were inevitable and there is much to be learned in North America about geology in government being oriented toward serving direct human needs. This Burwell Award takes special note of Professor Culshaw's artful summarization of *From Concept Towards Reality; Developing the Attributed 3D Geological Model of the Shallow Subsurface*, prepared as his statement for delivery of the 7th Glossop Lecture of The Geological Society (London).

Twenty years ago Martin Culshaw turned his attention grandly toward the spatial definition of the engineering properties and characteristics of rock and soil masses, and, in particular, their three-dimensional characterization in the "shallow subsurface." This was at a time when computer-based information technology began to achieve the capacity of storing vast amounts of geologist-generated field data, as reduced to numerical parameters. This was a fortunate selection of emphasis for Martin, as digitization of existing numerical data and advances in computer-based graphics have now become so fruitful as to provide near-instant arrays of three-dimensional (3D) physical models portraying visual associations, as enhanced by the use of selected coloring schemes.

Clearly, this new association of computational tools has unlimited potential, but only to the degree that experienced engineering geologists are detecting, evaluating, assessing, and interpreting the feedstock of the computer manipulation that creates the highly useful graphic end product. And, without the presence of those same experienced engineering geologists, the end-product models are without special merit or value.

And so, Culshaw's paper is a definitive guide to the existing qualities and to the great potential of our new ability to produce graphic 3D data assemblages. This is an essential step for all of us, as the technologies are new and rapidly changing, but the nature and direction, for perhaps several decades, will hardly change significantly. Culshaw's message is that of a menu of tools and a catalog of the existing and incoming banks of data that can, and must, be "mined." The "ore" of this resource will enable geologists to meet the expanding threats, not only of natural hazards, but of the stresses on the land and the triggering of some geologic processes by our intensified urbanization.

Martin's gross end-product, we see, is *Predictive Ground Modeling* by which we can and must move forward from the *Conceptual Geologic Model* (largely the fruit of independent work by Peter Fookes in the U.K. and the late (1946-2006) Martin N. Sara of the U.S.A.). With these "real" geologic models, we learned to embrace from the 1980s to today's "on-demand" graphical-physical models that can be built "in a moment" from information science geologic data banks. Culshaw cloaks the translation of data-bank geologic parameters into 3D models by following the three key engineering geologic elements set down by the late Sir John Knill (AEG Holdredge Awardee, 2003; *Core Values*) as: 1) *The Geological Model*; 2) *Geological Properties*; and 3) *Geological Processes*.

The Culshaw contribution becomes fundamentally most useful when viewed as a summarization, by methodology and example, of the geologic data sources now at hand and of the tribulations centering on their sustenance and integration. In other words, computer science has already, in a way, advanced beyond our capacities, as nations and agencies, to take full advantage of today's digital capacities for manipulation and presentation of actual ("real," as detected, observed, measured and recorded by geologists in the field.

Inherent to the value of Martin's presentation is his recognition of the special requirements for assessment of existing and incoming subsurface geological data so that its inherent nature will stand the rigors of the expected evolution of computer storage, retrieval and manipulation. Here he reminds us to take special recognition of the limitations of the "scale" at which our future 3D representations are to be made and of the special controls that are represented by the Digital Terrain Models (DTM) that will, of necessity, govern the practicality of our future 3D presentations.

There is an element of practical projection to the Culshaw treatment, as well. That is, he anticipates a continued need to assess the particular degree of variance of reported engineering properties of earth material units treated in the 3D representations. For these considerations, he sets the stage for needed research and also for formal standardization of property-input data.

After dealing with the ongoing problem of property variance, Culshaw rightfully moves into the matter of representation of time-dependent change in the character of ground to be subjected to 3D characterization modeling. This plays into a further area of indicated research and standardization of 3D methodology. That is, to employ the graphic models as an improvement in various aspects of hazards assessment and of their associated risks. Again, Culshaw injects the profound need to consider scale effects for individual sites.

The overall Culshaw presentation is a carefully assembled assemblage of published examples identify key geologic situations demanding their own forms of attention, each to respect the natural and repeatable anomalies and heterogeneities of geologic character that must be understood in setting up not only our subsurface databases, but in specifying the boundary conditions of the models that will so easily be produced by computer manipulation of our databanks. These examples constitute at once both key parameters and caveats for their computer manipulation. Among the caveats, he particularly stresses the need to evaluate uncertainty.

In summary, Martin Culshaw has forged a comprehensive methodology for 21st century 3D geologic data modeling; a set of geologic considerations and circumstances essential to accurate applications of 3D modeling. These fundamental controls likely will not change and therefore will serve to guide us in this respect for this entire century.

Response by Martin G. Culshaw

I am surprised, delighted and honoured to be the recipient of the Edward Burwell, Jr. Award for 2006. I should like to thank the Award Committee and the Engineering Geology Division of the Geological Society of America for making the Award to me. I also particularly want to thank Allen Hatheway for his kind words in his citation.

I wrote the paper that enabled me to win the Award for a reason. Engineering geology in the United Kingdom is struggling to maintain a meaningful presence in our universities. There has been an increased emphasis over the last decade, or so, on 'excellent blue skies' research. This has made it more difficult to obtain funding for applied geoscience research, including in engineering geology. As a result, it has come to be believed that there are few engineering geological research needs to fulfil and that engineering geology is a purely practical activity that takes place only in the commercial world of building, construction and remediation. I believe that this view is misplaced and that engineering geology is embarking on an exciting new era in its development.

In 2003, I was invited to become the Geological Society of London's 7th Glossop Lecturer. This invitation placed on me a dual obligation: to present a keynote lecture and to publish, in the Quarterly Journal of Engineering Geology and Hydrogeology, a paper based upon the content of the lecture. Sometimes, lectures of this type can be seen to be a description of the lecturer's career achievements; in other words, such lectures can be rather backward looking. I did not want to do this; I wanted to look forwards. I found my inspiration in the work of two very eminent British engineering geologists, Professor Peter Fookes and the late Sir John Knill. Peter Fookes gave the 1st Glossop Lecture, published in 1997, in which he developed and formalised the idea of the conceptual engineering geological model. He developed this idea further in a subsequent keynote paper with Fred Baynes and John Hutchinson at Geo2000 in Melbourne, Australia. John Knill presented the 1st Hans Cloos Lecture at the 9th IAEG Congress in Durban in 2002. He attempted to identify engineering geology's 'core values' and described what engineering geology had achieved and what still needed to be done.

Another key influence on the paper was work carried out by a number of colleagues at the British Geological Survey (BGS), particularly Holger Kessler, Dave Bridge and Simon Price. In about 2001, they began 3D modelling of the shallow subsurface using software recently developed by Hans-Georg Sobisch (of INSIGHT Geological Software Systems GmbH). This software enabled the BGS to use its large-scale, 2D digital geological maps and its extensive borehole log database to produce 3D geological models of the central areas of the twin cities of Manchester and Salford. Whilst 3D geological modelling is common in the oil industry, the lack of appropriate, easy to use software and adequate data has restricted similar spatial modelling in the shallow subsurface. It soon became apparent that, not only would we be able to produce realistic 3D spatial models, but that we could attribute them with real geotechnical data which could then be statistically modelled to show potential variation at the city scale.

In addition, colleagues and I had completed a series of 2D digital maps showing geohazard susceptibility for six geohazards across the whole of Britain, at a scale of 1:50,000. These maps were derived using understanding of the geological processes that cause the hazards and digital datasets that enabled the modelling of hazard susceptibility. So, the models have the potential to be used to determine how hazard susceptibility will alter with changes in climate, particularly rainfall. I stress that these maps were based on process drivers, not previous hazard occurrence.

I realised that these two broad areas of applied research together provided the basis for what engineering geology should be about. So, I suggested that Peter Fookes' conceptual models now could be taken towards reality in areas with adequate subsurface data and that the engineering geological model was more than a part of John Knill's engineering geological core values but was at the heart of those values. In the new world of digital data and modelling, the engineering geological model is a significant part of what engineering geologists do. Furthermore, that model has five dimensions to it: 3D interpretation of geological surfaces and the variability of geotechnical properties, the effect of geological processes in changing the 3D model over time (the fourth dimension) and the many uncertainties associated with the data and the modelling process (the fifth dimension). We have barely begun to apply the fourth and fifth dimensions to the developing three dimensional engineering geological models; also, the models being developed need exposing to the hard test of site investigation to determine their place in helping us to understand the ground for development and regeneration. So, there is plenty for the next few generations of engineering geologists to do!

Finally, as well as repeating my sincere thanks to the Engineering Geology Division for this prestigious award, I should like to acknowledge the contribution of my many colleagues at the BGS and elsewhere, who have played significant parts in the development of the work honoured by the GSA.

GEORGE P. WOOLLARD AWARD

Presented to Kenneth P. Kodama

Kenneth P. Kodama
Lehigh University

Citation by Lisa Tauxe

The Woollard Award was named after a man known for his warmth and generosity who was dedicated to the use of geophysics to solve geological problems. It is therefore fitting that this year's recipient, Kenneth P. Kodama is not only a creative practitioner of geophysical applications to geology, but is also a warm and generous colleague, a loving husband and father of three wonderful children. It is my pleasure to introduce you to him.

Ken Kodama's first publication co-authored with his thesis advisor Alan Cox, concerned the effects of deformation on the magnetization of sediment, a theme to which he has returned many times over the years. He has by now written dozens of articles on the general subject of deformation and the reliability of the paleomagnetic record.

Why is this theme worthy of such sustained interest? The assumption that rocks retain a faithful record of the magnetic field allows a tremendous variety of applications to geology from tectonic reconstructions, to characterization of the secular variation of the geomagnetic field. Without this assumption, many avenues of paleomagnetic research lead to the embarrassment of erroneous results. Kodama's focus on the effect of deformation on the paleomagnetic record therefore sheds light on the very foundations of paleomagnetism and its utility to geology.

After the first, seminal publication of deformation in sedimentary rocks in 1978, nearly a decade passed before Ken returned to the subject. During this time, he published on a variety of topics including seismology, tectonics and paleo-geomagnetism. But starting in 1987 came a series of hard hitting papers written in collaboration with his many students that established first the experimental basis for compaction induced shallowing of the paleomagnetic inclination recorded in sediments, and then perfected a clever technique (first proposed by Mike Jackson) for actually FIXING the problem.

The ability to diagnose and then cure inclination shallowing is incredibly useful because shallow paleomagnetic directions have led to such hypotheses as the Baja British Columbia hypothesis whereby large chunks of western Canada are supposed to have originated at the latitude of Baja California, or that there was something very wrong with reconstructions of central China. Which of these many tectonic interpretations are REAL and which are artifacts of unreliable magnetic recording requires an independent means of assessing the paleomagnetic record and Ken has become the champion of an elegant rock magnetic approach. He has developed the idea into a robust and practical technique and applied it to a number of different debates involving unexpectedly shallow inclinations. Some studies have supported the claims of far traveled terranes (as in the Baja British Columbia debate) and some have been refuted (as in the Tarim basin of China), but the really nice thing about this approach is that the results are pretty much irrefutable. Kodama's conclusions have stood the test of time and several have been confirmed using entirely independent methods since.

I don't want to suggest that Ken is a one trick cowboy by dwelling on the single theme of deformation and the reliability of paleomagnetic records—far from it. Ken has also written papers on a wide variety of topics including seismology, geochronology and most recently, limnology. But I do think that the persistence, concentration and tenacious focus on this issue is his greatest achievement and makes him an excellent choice for this year's George P. Woollard Award.

Response by Kenneth P. Kodama

Thank you, Lisa, for your kind words and to the rest of the committee for nominating me for the George P. Woollard Award. I am truly honored to receive this award from the Geophysics Division of the Geological Society of America. We all do science because of our passion for its creative outlet, but to be recognized by our colleagues in this way is quite wonderful. I am particularly happy to have won this award, honoring contributions of geophysics to geology, because I fervently believe that good paleomagnetic results will be in harmony with good geologic results. That belief has been an important motivation throughout my career.

As Lisa mentioned in her citation, I've worked on the effects of deformation on the accuracy of sedimentary rock paleomagnetism over the years, but when I first came to Lehigh University in 1978, I didn't yet have a paleomagnetics lab. The first course I taught and some of my first research papers were about gravity and magnetics surveys. It's particularly interesting that George P. Woollard's 1943 *GSA Bulletin* paper on a large gravity and magnetics survey of New Jersey and vicinity reached to Bethlehem, PA where Lehigh is located. And in that paper he pointed out that gravity lows in the area resulted from Precambrian gneiss thrust over lower Paleozoic limestones. That was the first field exercise I ran with my geophysics students, a gravity survey over a Precambrian gneiss thrust sheet outlier north of Bethlehem, so from the start of my career as a teacher and a researcher I have been indebted to George P. Woollard without realizing it, until now. My advisor, Allan Cox, was also important to me early on, not just because he lent me the spinner magnetometer that got my first lab going, but for his infectious enthusiasm for research.

As anyone knows who does scientific research, we all depend on our colleagues and our graduate students for the inspiration and feedback we need to do our work, to keep us going. As I think back to the work I've done over the years, the most enjoyable and exciting part has been working with many different people, and sharing the joy of discovery, even the setbacks that inevitably occur, with people who have similar values, who love to find out new things about the Earth.

Of course, I didn't get to this point working in a vacuum, I have worked with many great graduate students and colleagues, more than I can name here. I would like to mention, in particular, Gwen Anson, John Stamatakos, Gay Deamer, Wei Wei Sun, Xioadang Tan, and Yeon Kim, as contributing significantly to the work we did on inclination shallowing, and colleagues Bob Butler and Lisa Tauxe for their encouragement through the years. Finally, my family has been a great source of support, particularly my wife, Anna.

Thank you again, for this wonderful honor.

MARY C. RABBITT HISTORY OF GEOLOGY AWARD

Presented to Sandra Herbert

Sandra Herbert
University of Maryland, Baltimore County

Citation by Michelle L. Aldrich

Professor Sandra Herbert has received the Mary C. Rabbitt History of Geology Award on the basis of her scholarly work on Charles Darwin as a geologist.

Dr. Herbert is a professional historian (BA in Interdisciplinary Studies, Wiitenberg University; MA and Ph.D., History of Ideas, Brandeis University). She started research on a dissertation on Darwin's evolutionary ideas when she discovered that his field notes were full of geological material that she needed to understand before she could treat fully his development as a scientist. As she details in her response, she asked for help from colleagues in geologists in Boston and Washington DC, meeting with unfailing and widespread guidance and enthusiasm. She has also enriched her understanding of Darwin's geology by traveling to the sites he visited within the United Kingdom and South America.

Her first two books were editions of notes that Darwin kept before he composed *Origin of Species*. Darwin's handwriting is neat but often difficult to read (although not as bad as Lyell's). In addition to making the transcripts available, Herbert (solo in 1980 for the Red Notebook, with others in 1987 for other notes) extensively annotated the material and provided thoughtful introductions. The Red Notebook contains Darwin's most sweeping geological statement (that the geology of the world would turn out to be simple) and includes his first jottings on transmutation. The 1987 collection *(Charles Darwin's Notebooks, 1836-1844: Geology, Transmutation of Species, Metaphysical Enquiries)* is strong on geology precisely because she was part of the project. It presents his thoughts on the species question, geology, scientific methods, and human nature under one cover.

Herbert's master work *Charles Darwin, Geologist* appeared in 2005 from Cornell University Press. It engendered considerable discussion at the History of Science Society meeting last year, praised by historians of biology (who regard Darwin as "their guy") and historians of geology. Sally Newcomb calls the book as "superb". The book argues that Darwin's evolutionary thinking was greatly influenced by his field work and writing as a geologist. Herbert also deals with Darwin's geological writings on their own terms, placing him in the context of other English and continental geologists of his time. Some have stated that Herbert's book is the last word on the subject, but I think it will stimulate more research and writing about Darwin and geology by geologists and historians, and will invigorate the study of other 19th century geologists. This is a rich book, heavily illustrated (something she learned from geologists).

Charles Darwin, Geologist, while published only a year ago, has already met widespread acclaim in scientific, historical, and popular journals. Historians (Michael Ruse, Paul Lucier, and Sheila Ann Dean) and geologists (Leo Laporte, Martin Rudwick and David Oldroyd), some of whom are among the toughest critics in the history of science, have published favorable reviews. *Metascience* devoted a forum to the book, with three reviewers and a response by Herbert.

Before the book came out, Herbert published a number of articles on various aspects of Darwin's geological thought in peer-reviewed journals. This gave her valuable feedback that enhanced the analysis in the book. She has presented numerous papers at scholarly meetings, including GSA. She has been active in the History of Science Society, HESS, and the history of science section of the AAAS. Herbert has had a distinguished teaching career at the University of Maryland (Baltimore County), moving through the ranks from Lecturer to Professor in the History Department. She has accomplished much of her scholarly work through visiting appointments and research grants at the Smithsonian, Princeton, and abroad, including a Guggenheim Fellowship. She integrates history of geology in her courses and has directed student theses on the subject., and was the Founding Director of the Program in the Human Context of Science and Technology (2001-2006) at UMBC..

What of the future? During academic year 2006-2007, Herbert will be resident at Cambridge University, working on two major projects involving in part a detailed study of Darwin's 4,000 specimen geological collection at the Sedgwick Museum. First, she will serve as a consultant on an exhibition planned to commemorate the 200th anniversary of Darwin's birth and the 800th anniversary of Cambridge University Second, she will be extending her work on Darwin as a geologist past 1860. This year will be supported by the University of Maryland (Baltimore County), Cambridge University, and the National Science Foundation. In addition, Herbert plans to join an expedition to the Galapagos that will resurvey the James Island site that Darwin visited. We eagerly await the results of these studies, confident they will be as insightful as her scholarly contributions to the history of geology to date.

Response by Sandra Herbert

Thank you for giving me the Mary C. Rabbitt award for 2006.

I would like to begin by saying how important it is important for historians of geology to recognize Charles Darwin's work as a geologist. Geology as a discipline is often not credited for its role as a fundamental science. We are more used to casting biology, chemistry, and physics in that role. However, if one looks at the role played by geology as providing a foundation for natural history, and for Darwin's working on the theory of evolution, geology has served historically as a fundamental science.

Just how much Darwin was involved with the then-young science of geology was a fact that pressed itself on me while I was a graduate student reading my way through his manuscripts from his service as naturalist—and geologist—on H.M.S. Beagle in 1831-1836. Geology seemed central to him, even within the realm of his dreamiest imagination. Here he is in a notebook entry written in 1838 of the heading "Analysis of pleasure of scenery."

> *I a geologist have illdefined notion of land covered with ocean, former animals, slow force cracking surface &c truly poetical.....*

In 1838 Darwin had already committed himself to the idea of evolution but still he identified himself as "I a geologist." And geology was his primary affiliation professionally. He served as secretary to the Geological Society of London.

Another intriguing feature of Darwin's identity as a young scientist is that he did not succeed at everything he touched: his early theory of a "simple" geology went unrealized. It was an honest over-reaching, and corrected by the work of other geologists at the time. This is science in action: sometimes ideas succeed, sometimes they fail. Darwin may seem more ordinary as a geologist than as a biologist: his impact on the two sciences was not of equal magnitude. But that aspect, to me, emphasizes the human side of science, as well as the resilient nature of disciplines. Many people make an effort, and proper effort and method eventually yields good results.

What's next? I would emphasize that there is still more to do on Darwin as geologist. For example, his complete geological notes from the "Beagle" voyage, which are extensive and coherent, have not yet been transcribed and published, and the actual specimens from the voyage await adequate treatment

As to potential new researchers, may I call on the group assembled here: historians of geology. Ideally it is general historians, historians of science, and geologists working together who are best suited for identifying and analyzing Darwin's contributions as a geologist

In my own studies, I have looked for partners. I would particularly like to thank professors of geology from Boston University, George Washington University, the Smithsonian Institution, and the University of Maryland College Park who allowed me to audit their courses. Tony Coates, Nicholas Hotton III, and Eileen McLellan welcomed a newcomer to their field. And what was doing geology like for an historian? An intellectual and aesthetic pleasure. "To the field" the nineteenth-century giants of geology cried, and I heartily echo their sentiment. It has been a pleasure to explore the natural world in the company of geologists.

On the writing side I wish to credit David Oldroyd for encouraging me as he has done so many historians of geology, and Michele Aldrich, Jim Fleming, and Ellis Yochelson for setting an encouraging example close to home. This summer Ellis and I were working on an exhibit proposal on "Darwin as Geologist" for the National Museum of Natural History on the Mall. His enthusiasm—phone calls, e-mailing, meetings—kept me at the task. I was looking forward to putting in his hand the photographic material for the exhibit the week he passed away. I hope someone at the Smithsonian will continue his interest in doing an exhibit on Darwin and geology. The public deserves to know about Darwin's work on reefs and volcanoes as well on pigeons.

Students are also one's colleagues. I'd like to thank Drew Alfgren, who is receiving the award in my stead. Drew's thesis (under the direction of my UMBC colleague Joe Tatarewicz) was entitled "From Continental Drift to Plate Tectonics: The Great Debate in Geology, A Selective Review of the Literature." My student Cathy Barton worked with the Marie Tharp papers at the Library Congress. A portion of her thesis entitled "Marie Tharp, Oceanographic Cartographer, and Her Contributions to the Revolution in the Earth Sciences" was published in The Earth Inside and Out: Some Major Contributions to Geology in the Twentieth Century (2002). Another student Eric Brown graduated from UMBC and is now writing his Ph.D. dissertation at Princeton University. The working title of his dissertation—very much in the spirit of Mary C. Rabbit's work—is "Making Mining Scientific: Epistemology and Practice in 19th Century Economic Geology."

Last I want to thank my family. My husband Jim Herbert put on his hiking boots and has gone with me on geological excursions, and our daughters Kristen and Sonja Herbert grew up surrounded by photocopies of manuscripts and were known on occasion to annotate Darwin's texts with crayoned drawings of their own.

Thank you all.

O.E. MEINZER AWARD

Presented to Karsten Pruess

Karsten Pruess
Lawrence Berkeley National Laboratory

Citation by Michael Celia

Today I have the honor, and pleasure, to introduce Karsten Pruess of Lawrence Berkeley Laboratory, winner of the 2006 O.E. Meinzer Award. For more than 25 years, Karsten has been at the forefront of scientific studies of complex problems involving fluid flow in natural porous media. His research tool of choice has been advanced numerical simulation, using computer codes that he himself has developed, and which he has generously shared with others. Karsten's work has strong scientific content, important practical value, and has impacted and involved many other researchers. His choice as this year's recipient of the Meinzer Award adds prestige to an already very prestigious award.

Karsten earned his PhD in Theoretical Physics in 1972. I guess this explains why he knows so much physics—and thermodynamics! Karsten arrived at LBL in 1975 as a Research Fellow in the Nuclear Theory Group, where he spent the next two years. Then in 1977, he joined the Earth Sciences Division at LBL, and much to our benefit, he has remained in Earth Sciences ever since, working on the "hard" problems in hydrogeology for more than 25 years, producing more than 125 journal papers across a range of important topics, and leading the field of applied scientific computing.

As I have already mentioned, Karsten is the author of the TOUGH2 family of computer codes. TOUGH2 is among the most widely used simulator in the world. At a recent workshop that focused on applications of TOUGH2, the following application areas had entire sessions devoted to them: Geothermal Reservoir Engineering, Fracture Flow, Vadose Zone Hydrology, Nuclear Waste, Mining Engineering, Reactive Transport, Environmental Remediation, and Gas Transport. These topics represent virtually all of the important problems in hydrogeology that involve complex fluid flows, and all are being addressed by users of this software. For this contribution alone, I could easily argue that Karsten is deserving of the Meinzer Award. However, even though the TOUGH2 family of codes has certainly been an enormously important contribution, it is only part of what brings us here today. In fact, to me, even more impressive are the scientific studies that Karsten has produced. These studies have provided fundamental scientific insights into the most difficult and important problems that we face in hydrogeology.

Karsten's first hydrogeology research focused on geothermal systems, which was a natural extension of his background in physics. After working on this problem for the better part of a decade, Karsten began to work on other problems involving non-isothermal and multi-phase flow in porous media. These included high-level radioactive waste disposal, steam injection to remove non-aqueous-phase liquid (NAPL) contaminants, multi-phase flow in fractures, the role of preferential flow in unsaturated soils, fundamental numerical simulation methods for multi-phase and unsaturated-zone flow systems, and the incorporation of geochemistry into non-isothermal multi-phase simulations. And most recently, he has been working on the problem of injection of supercritical CO_2 for the purpose of carbon mitigation, where the idea is to capture CO_2 before it is emitted to the atmosphere, and inject it into deep subsurface formations so that it remains out of the atmosphere for hundreds to thousands of years, or more. Karsten has taken a leading role in the scientific investigations of the hydrogeological aspects of this strategy. He and his coworkers have looked particularly at storage capacities and the influence of subsurface heterogeneities, at possible leakage pathways and their impact on the efficacy of the approach, at geochemical responses of the system and the overall long-term fate of the injected carbon, and at the complex role of phase-change and thermodynamics on possible catastrophic releases to the land surface. It is largely due to the scientific strength of Karsten, and the accumulated body of work that is imbedded in the TOUGH family of codes, that Berkeley has been able to assume a leadership position in the emerging field of geological storage for carbon mitigation. Karsten's is, by far, the best simulation work being done in this field, and it will certainly be used to inform important policy decisions related to climate change.

I will end by commenting that I have had students, postdocs, and even colleagues at Princeton who have contacted Karsten with questions about TOUGH2, and with more general questions about thermodynamics, multi-phase flow, and numerical methods, and Karsten has always taken the time to answer all of their questions, doing so in his usual quiet and unassuming way. I am sure that many others across the country, and across the world, have had the same experience. To me, Karsten embodies the best in research and scientific study: he produces outstanding science, he works on problems that have tremendous societal impacts, and he does so with humility, grace, and quiet confidence. It really is my honor to introduce this year's winner of the O.E. Meinzer Award, Karsten Pruess.

Response from Karsten Pruess

Thank you, Mike, for this very generous citation. Looking over the list of past recipients, I am greatly humbled to be selected for the Meinzer award. I have always felt that the work I was doing offered its own rewards, plenty of them, nothing more needed, really. When Kip Solomon called me last May about the Meinzer award, this came as a big surprise. Being appreciated by ones professional peers is very gratifying. I am delighted and humbled by this expression of appreciation.

It may come as a shock to this audience, but I never took a class or seminar in any segment of the Earth Sciences. My degree was in physics, with some math and chemistry thrown in, and it was as a young nuclear theorist that I first came to Berkeley in 1975. A couple years later I made a career change. I decided that I wanted to involve myself in a more applied scientific-technical field, and looked around for opportunities at the Lawrence Berkeley Lab. During these explorations I ran into Paul Witherspoon, and the rest, as they say, is history. Paul was professor of geological engineering at Berkeley and head of the newly formed Earth Sciences Division. He presided over an operation that at the time was almost exclusively focused on geothermal energy, it was the aftermath of the 1973 oil shock, and what he told me about the challenges and opportunities in this area sounded very seductive. Being trained in a rigorous field of science I did have some concerns, however, about what I might be getting into. These concerns were laid to rest when I met Chin-Fu Tsang, a nuclear physicist like myself, who had made the switch to Earth sciences about a year earlier. Wondering out loud whether Earth sciences was more-or-less driven by “seat of the pants” intuition, Chin-Fu responded with “oh no, we solve differential equations too.” This was rather reassuring to me. So I plunged into geothermal reservoir studies, and I can truthfully say, I never looked back. I continue to be amazed by the intricacy, complexity, and—yes!—beauty of fluid flow, heat transfer, and chemical and mechanical processes in these systems, and the subtlety with which mother nature is going about her business. Geothermal systems have remained a passion of mine to this day. In addition to what’s interesting and useful about them in their own right, they provide a rich laboratory to expose you to just about anything that can happen in different contexts underground. I also found that geothermal systems tend to be located in beautiful places, and their study attracts interesting personalities.

There are a great many colleagues, in Berkeley, throughout the U.S. and indeed the world, who have freely given me advice and challenged me throughout my professional life. I would like to especially thank two of my Berkeley colleagues who became my Earth sciences mentors, Paul Witherspoon and Nari Narasimhan. Both happen to be past recipients of the Meinzer award, and I am greatly indebted to them for their patient and cheerful guidance.

Let me conclude with a few brief comments on computer modeling and simulation, my tool and field of choice. I am aware that modeling is viewed with considerable skepticism by some, be they technical people or in some managerial role. I have made a career out of modeling, but please count me in among the skeptics. Computer modeling has often been oversold. It is a powerful tool, but it is only through keen awareness of its limitations and pitfalls that we can distill worthwhile insights and benefits from it. Thank you very much.

INTERNATIONAL DIVISION DISTINGUISHED CAREER AWARD

Presented to Eldridge M. Moores

Eldridge M. Moores
University of California, Davis

Citation by Yildirim Dilek

It is a privilege to present Eldridge Moores as the recipient of the GSA International Division's Distinguished Career Award. During more than 40 years of accomplished research and tireless service to our profession he has established himself as a remarkable leader in our profession.

Eldridge has been a true pioneer in tectonics through his original and often thought-provoking work, and his ideas have prompted many generations of earth scientists to search for the truth in the field. His seminal papers on the Troodos and Vourinos ophiolites played a significant role in the advancement of plate tectonics as a revolutionary theory throughout the early 1970's. The ideas and the tectonic model presented in his 1970 *Nature* paper on "Ultramafics as keys to orogeny, with models for the US Cordillera and Tethys" were so different from the 'ruling theory' of that time that they prompted many scientists to undertake field-based structural, petrological, and geochronological studies in northern California for the next 15 years. His SWEAT hypothesis (*Geology*, 1991), suggesting a probable Southwest U.S. and East Antarctic connection in the late Proterozoic, was so unique and overarching that it had significant ramifications for the geodynamic evolution and global change in the early history of the Earth. It provided a new paradigm in which to test the then available and new models on tectonic reconstructions of North America and the evolution of the Antarctic continent.

Eldridge's service to the Geological Society of America surpasses that of many distinguished geologists. He made Geology as one of the most important, high-impact journals in earth sciences through his innovative editorial leadership during the period of 1981-1988, he was the founding Science Editor of *GSA Today* (1990-1995), and he served on the GSA Council (1988-1991) and many other GSA Committees. He served as the President of GSA in 1996 and then as the President of the International Division in 2002. Throughout his long service to our beloved Society, Eldridge promoted the implementation of many initiatives, ideas, and projects, which served GSA so well.

Eldridge has also made other significant contributions in the broad field of structural geology and tectonics through his distinguished international service. He was the Chair of the Ocean Drilling Program Tectonics Panel (1989-1993) prompting marine geologists and geophysicists to collaborate with land geologists in investigating the basement tectonics of complex divergent, convergent, and transform fault plate boundaries in the oceans through deep drilling. His ideas for the site selection of the Consortium for Continental Reflection Profiling during 1980-1987 were extremely helpful for the success of this large-scale continental geodynamics project. He was a founding member of the Continental Drilling Project in Cyprus (1984-1987) to examine frozen magma chambers and fossil MOHO in ancient oceanic lithosphere through deep drilling. He also played a major role in assessing the objectives and implementation planning of the Earth Scope Science and Resources as a committee member of the National Research Council (2001). He is currently serving as the Vice President of the International Union of Geological Sciences, representing the USA and the voice of the US earth scientists in this important international organization.

Eldridge has shaped our scientific thinking through his multi-faceted international contributions during his brilliant career. On a personal note, I am pleased to state that I have interacted with Eldridge as his student, as a colleague, and as his friend for 25 years. It gives me a great pleasure to present to you Eldridge Moores, the 2006 winner of the Distinguished Career Award of the GSA International Division.

Response by Eldridge M. Moores

I am deeply honored to receive this Award. I thank the International Division and the GSA Council. In addition to being an officer in the International Division and the Cordilleran Section, I have had the opportunity to serve as *Geology* editor, a Councilor, Science Editor of *GSA Today*, and as an officer. While GSA President, I was fortunate to travel to Venezuela and Australia at the invitation of their geological societies. Overall I have benefited enormously from my association with GSA, and I have many friends in the GSA family.

In thinking over how my career developed, I owe much to GSA Presidents Harry Hess and John Maxwell, and the entire Princeton Geology faculty, who treated students like adult colleagues, and had a genuinely global view of geology. We graduate students spent hours staring at the 8-foot revolving globe in the Geology museum, discussing burning questions, such as (in those pre-plate tectonic years) where modern geosynclines might be. We learned that Earth's geology is united; and we can't learn adequately about one piece without a view of the whole. This holistic view necessarily involved travel abroad, especially for someone like myself interested in structure and tectonics.

My first trip abroad was to Haiti and Jamaica in 1960. A tremendous geological and cultural education for me, it radically revised my understanding of other cultures and the US's relations with them; and it whetted my appetite for seeing the world.

Through my career, I have had the opportunity to work many times in Greece and Cyprus, and to a lesser extent in Pakistan and Argentina. Altogether, I have been privileged to do field work, go on field trips, attend meetings, and visit in about 50 countries. Always, I have been impressed by the open, generous hospitality and willingness of local geologists to share their insights and to facilitate my own work. For my part, I have studied local languages and customs, learned to eat most anything, and appreciated to opportunity to interact with people of many nationalities. Even so, it has not always been easy to deal with lightning strikes, unmapped mine fields, ceasefire lines, border guards, rifle-pointing American Embassy Marine guards, tribal unrest, or more recently, the Transportation Security Administration Watch List. But looking back, I cherish all my experiences, and I'm not done yet!.

We live in a multicultural world with many environmental challenges, including global warming, peak oil, and resource limits. We geologists have a special responsibility to use our knowledge and skills to work toward sustainable development for all people, for all Earth and life. When we work internationally, we become diplomats for our countries and our science. It is increasingly important to be respectful and sensitive to cultural issues. Wherever we go, it is essential to reach out to local geologists and include them in our work in mutually beneficial ways. And those of us who are North Americans need to be especially aware of our overly large ”ecological footprint”, and do our best to minimize our own personal impact.

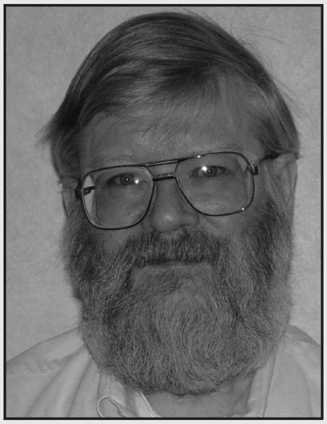
Wherever you are in your career, I challenge you to make the world a better place than you found it. There is only one Earth--it’s our only practical home in the Solar System. We have a responsibility to live ourselves the changes we want to see in the world.

In closing I would like to thank my former students, with whom I’ve shared may good times and learned much; also my colleagues at UCD and other institutions around the world, with whom I’ve had the privilege of working. Finally, I’d like to thank my wife of over 41 years. Marrying her was just about the best thing that I ever did. My career has been a 2-person career. Without Judy, and my kids and grandkids, I would never have made it.

Thank you.

G. K. GILBERT AWARD

Presented to Michael J. Gaffey



Michael J. Gaffey
University of North Dakota

Citation by Michael S. Kelley

Bridging interplanetary gaps: Thirty years of combining laboratory measurements and telescopic observations

The Planetary Geology Division of GSA presents the G. K. Gilbert Award annually "to an individual who has contributed in an outstanding manner to the solution of a fundamental problem of planetary geology." The Award is presented for either "a single outstanding publication or a series of publications that have had great influence in the field." Dr. Michael J. Gaffey qualifies on both criteria. His individual papers on the spectroscopy of meteorite chemical groups, the connection between at least four different meteorite classes and their original main-belt asteroid parent body locations, and the surficial mapping of 4 Vesta all qualify as single outstanding contributions. Three decades of fundamentally important contributions further justifies the presentation of this Award to him.

It has been said among Mike Gaffey's former graduate students that Mike does not publish as often as many of his colleagues, but what he publishes is usually seminal. This has been true since his first publications (e.g., McCord & Gaffey 1974; Gaffey 1976), still referenced today as seminal works in reflectance spectroscopy and their use in relating meteorite compositions to asteroid spectral classes. Mike's graduate work in meteorite and asteroid spectroscopy was a precursor and an introduction to what has become a Gaffey process trademark: comprehensive data collection, followed by exacting data calibration and reduction, concluded by putting the results of the data analysis into multiple perspectives, large and small, long-term and short-term, as well as an insistence on harnessing the extant geological knowledge of mineralogy, petrology, and thermodynamics to give his extended conclusions a firm basis.

Mike Gaffey's greatest philosophical contribution to asteroid studies is to treat every asteroid as an individual planet, an object that also has relationships and interactions with other objects, both similar and dissimilar, yet still retains a uniqueness that makes it worthy of study on its own. This philosophy has lead to Mike developing an observational technique that is unique: sub-hemispheric spectral reflectance mapping. The technique is complicated, but not complex, in that it requires long hours, perhaps even many nights, observing a single object at a telescope, along with the necessary observations of calibration standard stars, reducing the raw data to usable, high-quality reflectance spectra, then using extant or deriving new rotational parameters and relating each individual reflectance spectrum to a point on the asteroid's surface. These data are then used in an analysis of the mineralogical and petrologic relationships on the surface of the asteroid, which are in turn used in a geological and thermodynamic context to draw conclusions regarding the current compositional state of the asteroid as well as its possible provenance.

He has used this technique of rotational spectral variations on a number of asteroids, the first of which to be published was an analysis of 8 Flora (Gaffey 1984). His results indicated that, of all the S-type asteroids known at that time, and thought to be parent bodies of the ordinary chondrites, this particular S-type asteroid could not have been such a parent body. The analysis related the oxidation state of 8 Flora's composition, through variation in surface modal abundances of olivines, pyroxenes, and Fe-Ni metal, to that of all classes of ordinary chondrites and found that there was no thermodynamic way in which the asteroid could be mineralogically related to any member of those meteorite classes.

Adverse reaction to his conclusions in the 8 Flora paper caused him to investigate more deeply the spectral behavior of the Fe-Ni metal component in ordinary chondrites and found (Gaffey 1986) that the spectral behavior of the metal component in ordinary chondrites meteorites was remarkably different from the spectral behavior of the Fe-Ni metal component in asteroids. This work lead to a complete re-evaluation of the use of terrestrial spectral analogs in trying to analyze asteroid surface compositions from reflectance spectra. Through these results, it is now taken as a given that when terrestrial spectral analogs are used in analyzing and relating asteroid surface compositions through reflectance spectra, great care must be taken to make sure that the analogs used are accurate to the conditions of the body.

Skeptics have said that Mike Gaffey "looks too deeply into the data," meaning that his interpretations go far beyond what can reasonably be determined from the data. I'd like to briefly point out two examples that show this is not the case. Mike has used his rotational spectral variation study technique on a number of asteroids since 8 Flora, including 15 Eunomia (Gaffey and Ostro 1987), 3103 Eger (then known as 1982BB in Gaffey et al. 1992), 9 Metis and 113 Amalthea (Kelley and Gaffey 2000; Gaffey 2002). Perhaps his two most famous efforts are for asteroids 4 Vesta and 6 Hebe (Gaffey 1983; Gaffey 1997; Gaffey and Gilbert 1997).

His early analysis of Vesta indicated the likely presence of large impact craters as well as large basaltic flows that probably were relatively pristine. These conclusions were confirmed when the Hubble Space Telescope acquired imagery of 4 Vesta in late 1994 and showed an extraordinarily large impact crater near Vesta's south pole (e.g., Thomas et al. 1997, Binzel et al. 1997) and large areas covered in basalt. It is still considered amazing that such surface features could be found through careful and comprehensive analysis of ground-based, non-imagery data.

One Mike's most valuable and initially controversial contributions using this technique has been in relating the asteroid 6 Hebe to the H-type ordinary chondrites and Type IIE metal meteorites through mineralogical and petrologic analyses of rotational variations in spectral reflectance. Putting his spectral data into a 3-dimensional context allowed him to hypothesize the presence of a new type of ordinary chondrite, one not in any of the collections at the time. This hypothesis opened Mike up to some vehement attacks from both the meteorite community and the asteroid observing community. Due to a deep streak of Irish luck, however, Mike was vindicated when a new type of ordinary chondrite was found, Portales Valley, which had just the composition and petrology suggested in the paper (McHone et al. 1999). Whether Portales

Valley actually comes from 6 Hebe remains to be seen, but it was a vindication of Mike's spectral technique that a meteorite could actually have the "impossible" composition of his hypothesis. It is now appears likely that 6 Hebe is the probable source for at least some of the H-type ordinary chondrites and Type IIE irons.

When Mike Gaffey wants to step back and look at asteroids in general, as apart from these looks at specific bodies, he also produces seminal scientific work. In generalizing about S-type asteroids (Gaffey et al. 1993a) and the spectral reflectance observations produced, he found that it would be mineralogically and petrologically impossible for many of the S-types to be the parents of any of the ordinary chondrites. Through deft use of compositional information from spectroscopy related to geologic thermodynamic knowledge he was able to deduce that only a small number of S-types are mineralogically "least unlike" (his terms) any ordinary chondrite class. As it turns out, 6 Hebe belongs to this group and thus Mike Gaffey is able to place his detailed observations of Hebe into a broader context using his own work, built upon his comprehensive knowledge of geology, mineralogy, and petrology.

All of these successes were born from an insistence upon using the extant data in a comprehensive and collaborative way with an emphasis on not over-interpreting any particular piece of data. In this insistence, Mike Gaffey has become a vociferous advocate of the proper and careful use of spectral reflectance observations. His occasional reviews on the subject (Gaffey et al. 1989; Gaffey et al. 1993b; Gaffey et al. 2002) have provided increasingly detailed knowledge regarding the use and avoidance of the abuse of spectral reflectance data, both for asteroids and other solar system bodies. He has successfully passed on this knowledge and its concomitant philosophy to a number of graduate students, each of whom have gone on to careers in planetary science and industry effectively utilizing these skills.

Mike Gaffey views his life in science and education not as a job or career, but rather a calling. He has only one true goal in his work, to produce the best science possible. He has proven superbly capable of this goal, both in his past achievements and his ongoing work. He has never shirked responsibility for errors he has produced and has always been gracious in his acceptance of his scientific successes. He has always maintained a philosophical attitude that the data should be the basis for all conclusions and all speculation should be obviously marked as such.

Fortunately, for the Planetary Science community, Mike Gaffey shows little sign of slowing down in his research pursuits. He is an active participant in many ongoing projects in addition to his own research. These include rotational studies of M-class asteroids with Paul Hardersen, laboratory calibration and analysis with Ed Cloutis, near-Earth asteroid studies with Paul Abell, asteroid family studies with me, and a variety of projects with his present graduate students, just to name a few.

I am pleased to point out that Gilbert Award Recipient Mike Gaffey is receiving double honors this year. At the annual meeting of the Meteoritical Society in Zurich in early August Mike was presented with that society's highest honor, The Leonard Medal. It is only the second time in the history of the two awards that the same person received both in the same year. So we should take this as confirmation that Dr. Michael J. Gaffey

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successfully bridges the gaps between geology and astronomy, and between laboratory meteoritics and asteroid spectroscopic remote sensing.

When his paper entitled "The Early Solar System" was published, it was rumored that Mike was asked to write it because he had actually been around to witness the early solar system. However, I have it on good authority that Mike was born well after the formation of the asteroids. He did begin his critical observations of planetary bodies at a much earlier age than most of his colleagues. When I met Mike's mother a number of years ago, she told me that Mike's very first word was "shiny." She said that he was looking up at the Moon at the time. So maybe it's not too surprising that we're honoring him today as a leading contributor to the field of Planetary Science.

I would like to thank Dr. Kevin L Reed, another former Gaffey student, for his help in writing this citation.

Response by Michael J. Gaffey

I am very honored to have been selected for the Gilbert Award by the Planetary Geology Division of GSA. Reading the list of previous recipients is a humbling experience. And it leaves me with a more than passing concern that some administrative error has resulted in my inclusion in such an august company. And that pretty soon I'll get an "Opps, our mistake …" memo from the Division.

Any such honor is seldom the result of work solely by the recipient. In my case it is the result of contributions from many people: mentors, teachers and students. I have been exceptionally fortunate with respect to mentors and teachers. I received an excellent start from Miss Grace McKenna who taught in the one-room country school house where I attended kindergarten through eighth grade. She encouraged curiosity and a love of learning. I was similarly fortunate in High School with several teachers who encouraged innovative and supportive learning environments for "sports allergic" nerds such as myself. In college my mentor was Dr. James Van Allen who exemplified what it meant to be both a world-class scientist and an outstanding human being. To all of them I owe a vast debt of gratitude.

But perhaps even above those individuals, I owe an almost immeasurable debt to my students. More than anything that I can think of, having a steady cadre of highly intelligent and motivated students has contributed to the success that the Gilbert Award signifies. Especially when they have the self confidence to require that you to prove your case rather than simply accepting is as the word from on high. I've been lucky in having many "old hairy" students who haven't been shy about challenging my ideas and pronouncements. Those interactions have often been more colleague-to-colleague collaborations than advisor-to-student instruction. And I've often gained at least as much as I've given in those efforts. I owe a great debt to past and present students such as Jeff Bell, Lucy McFadden, Trudie King, Chuck Farrall, Ed Cloutis, Ted Roush, Andy Lazarewicz, Pete Holden, Kevin Reed, Mike Kelley, Cathleen Donovan, John Hancher, Paul Hardersen, Paul Abell, Vishnu Reddy, and Sherry Fieber-Beyer—just to name a few.

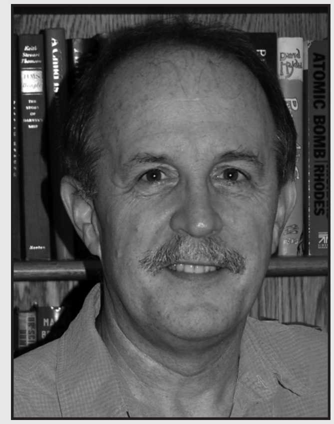
I must also thank my colleagues in planetary science for putting up with my ignorance. Being cross-disciplinary necessitates that my knowledge in any given discipline is less than that of the specialists in those disciplines. I've often said that "I tell the geologists that I'm an astronomer and the astronomers that I'm a geologist and they leave me alone". That's not entirely a joke, and I thank my professional colleagues for their understanding and corrections and for not calling my bluff too often.

I am most grateful to the Planetary Geology Division of the Geological Society of America for this honor. And when you finally discover that it was all a clerical error, you're going to have to come all the way to North Dakota to wrest it from my hands.

KIRK BRYAN AWARD

Presented to
David R. Montgomery and Mark T. Brandon

David R. Montgomery
University of Washington



Mark T. Brandon
Yale University

Citation by Glenn David Thackray

David Montgomery and Mark Brandon have been awarded the 2006 Kirk Bryan Award for their 2002 paper entitled "Topographic controls on erosion rates in tectonically active mountain ranges" (*Earth and Planetary Science Letters*, v. 201, p. 481-489). This an elegant paper that tests long-held ideas regarding topographic controls on erosion rates and advances our understanding of the evolution of mountain ranges.

Montgomery and Brandon explored the relationship between local relief and erosion rates. In considering several tectonically active ranges from across the globe, they found a non-linear relationship between mean local relief and erosion rates, challenging long-held assumptions about the linearity of that relationship. They concluded that mountain landscapes adjust to high rates of rock uplift through increased incidence of landsliding, itself governed by rock strength.

Why is this eight-page paper without original data deserving of this prestigious award? First, the paper reveals important relationships between topography (namely local relief) and erosion rates that are important for understanding the evolution of mountain ranges. Secondly, this seemingly simple, yet elegant paper advances knowledge in a one of the most exciting areas of geomorphology, namely the interrelationship between tectonic activity and surficial processes. The burgeoning literature in this area demonstrates both rapidly advancing knowledge and a need for detailed analysis of Earth surface processes at a variety of scales. Montgomery and Brandon utilize recently available topographic data and analytical tools, coupled with published data on rock uplift, to fill the need for this analysis at a relevant scale. Thirdly, this paper reflects a movement of geomorphology back to the broader scale of landscapes. Landscape-scale geomorphology was moved to the back shelf decades ago, in favor of greater focus on understanding and quantification of surficial processes at much smaller temporal and spatial scales. While that shift has made geomorphology a much stronger field in many ways, it is exciting to see efforts once again aimed at the "big picture." There remains much exciting debate about interrelationships of erosion and tectonism. Through this and other papers David Montgomery and Mark Brandon have helped advance this area of inquiry and their efforts are richly deserving of this year's Kirk Bryan Award.

Response by David R. Montgomery

Thank you Glenn, for such kind words. I was taken very much by surprise when I learned that we had won an award for a paper that grew out of pursuing a point that came up in some now-forgotten argument. It is a singular pleasure to be honored with the 2006 Kirk Bryan Award by so many good friends and great colleagues. So it is with sincere appreciation to the Division and the Society that I accept, along with my friend Mark Brandon, an award given previously to many people whom I hold in high regard.

Despite the rapid growth in geomorphology over my career, I continue to be amazed at how small our community can seem. As I was looking at the list of previous Kirk Bryan Award winners I noticed that many have influenced my career. Dick Iverson (2001) taught the first geomorphology class I took at Stanford in 1982. I shared an office with Clyde Wahrhaftig (1967) at Berkeley when as an emeritus faculty member he was relegated to a graduate student office. Steve Porter (2003) and Link Washburn (1971) were my predecessors as Director's of UW's Quaternary Research Center. And I remember the first words that Luna Leopold, the first Kirk Bryan Award winner (1958), spoke to me at a UC Berkeley departmental holiday party: *"What kind of amp is that you're playing through?"*

Like a nice vintage guitar, great collaborators are hard to find and I thank my co-author Mark Brandon for challenging and engaging discussions along the way in writing our paper. I also want to thank Frank Ahnert for the initial inspiration to think about the relationship between relief and erosion rates in his classic paper on the subject, and Josh Roering, Bill Dietrich, and Jim Kirchner for their groundbreaking

Response by Mark T. Brandon

Like Dave, I am surprised and honored by this award. I am grateful to Glenn Thackray for the nomination and a thoughtful citation. I thank my co-author and friend Dave Montgomery for initiating this project and doing the heavy lifting that comes with being the first author. There were several different threads that lead to the ideas in our paper. Frank Ahnert was first to show a strong correlation between local relief and basin-scale erosion rates in his 1970 paper in American Journal of Science, but that correlation was limited to tectonically quiet landscapes. While working in the Olympic Mountains in the 1990's, Frank Pazzaglia and I spent much time puzzling as to why Ahnert's relationship did not work in that tectonically active setting. A partial solution was the 1996 Nature paper by Doug Burbank and others, which called attention to the role of threshold slopes in tectonically active landscapes. But, as Dave has already noted, the 1999 paper by Josh Roering, Jim Kirchner, and Bill Dietrich on nonlinear diffusive transport on hillslopes provided the inspiration for how one might generalize Ahnert's empirical relationship. Our interpretation is that in slowly uplifting landscapes, erosion is limited by soil production and diffusive transport on the hillslopes, as represented by Ahnert's relationship, but in well-drained landscapes with fast uplift, erosion becomes slave to uplift. These ideas are conceptual and only loosely tied to the actual processes that erode the landscape at a local scale. That said, perhaps they will help guide future work on resolving how local surface processes interact with tectonics and climate at the regional scale.

Response by David R. Montgomery *(continued)*

work on non-linear hillslope diffusion that directly informed the approach Mark and I took in our paper. Finally, I can think of nothing more fitting to say than a simple, heartfelt thank you for honoring us with this distinguished award.

Response by Mark T. Brandon *(continued)*

As some of you know, my research career began with my graduate work in structural geology and tectonics at University of Washington. So you might wonder why a structural geologist would be interested in erosion. One reason is that the competition between uplift and erosion determines how a mountain range is exhumed. The other is that spatial gradients in erosion will cause rocks to shear. In other words, erosion may be responsible, at least in part, for some of the deformation fabrics that we see in the exhumed cores of mountain belts. Of course, these ideas and many others have been spawned by a renaissance in tectonics and geomorphology over the last 15 years, for which the broad goal is to understand the interactions between tectonics, climate, and crustal geodynamics. I have enjoyed watching over the many years the important role that University of Washington has had in the development of integrative research in surface processes, geomorphology and tectonics. Dave Montgomery and his colleagues continued to maintain a high profile in this area.

In closing, I would like to acknowledge Frank Pazzaglia for his early work with me on Ahnert's relationship. I am also indebted to those who I have collaborated with over the years on tectonics and geomorphology research in the Olympics Mountains. Frank had a strong hand in that work, as recognized by the Kirk Bryan Award that we shared in 2002. Others include Joe Vance, Mary Roden-Tice, John Garver, Geoff Batt, Ken Farley, Jon Tomkin, Sean Willett, Dick Stewart, Karl Wegmann, and John Gosse, to name a few. Finally, I thank my wife Susan and son Alec for putting up with all of this foolishness about erosion and mountains.

LAURENCE L. SLOSS AWARD

Presented to Gerald M. Friedman

Gerald M. Friedman
Brooklyn College and Northeastern Science Foundation

Citation by Larry D. Woodfork

"The Sloss Award is given annually to a sedimentary geologist whose lifetime achievements best exemplify those of Larry Sloss—i.e., achievements that contribute widely to the field of sedimentary geology and through service to GSA." So reads the page concerning the Sloss Award at the GSA web site. To have been judged to meet that extremely high standard is a great honor indeed and I know of no one who merits it more than this year's Sloss Award recipient—Gerry Friedman.

In the limited time available to me this evening, let me cite but a few of the many similarities between the nature and magnitude of Larry Sloss' contributions to and achievements in the field of sedimentary geology and those of Gerry Friedman.

Both Sloss and Friedman are among the most gifted, engaging, highly respected, indeed revered, modern educators to have ever taught courses in sedimentary geology—Sloss at Northwestern and Friedman at RPI, Brooklyn College and the Graduate School of CUNY. In recognition of the high regard in which both were held, in 1996 AAPG presented both Larry and Gerry with its Distinguished Educator Award (now named the Grover E. Murray Distinguished Educator Award) at its annual convention in San Diego. (It is also worthy of note that Bob Weimer, a previous Sloss Award recipient, also received the AAPG distinguished educator award at that same ceremony.) Both Sloss and Friedman have authored landmark textbooks in sedimentary geology. In 1953, Sloss and Krumbein co-authored *Stratigraphy and Sedimentation*, which is now regarded as a classic in the field. In 1978, Friedman and Sanders co-authored *Principles of Sedimentology*, a well received, widely used, modern compendium that is destined to become a classic. Both of these textbooks have influenced countless students of sedimentary geology over several generations and continue to do so today.

Both Sloss and Friedman have been prolific researchers of the highest caliber. Their journal publications, like their textbooks, have been very influential and provided new insights and ideas concerning the nature and origin of sedimentary rocks, their depositional environments, diagenetic processes, etc., that have had profound implications for exploration and development of mineral and energy resources. In one of Gerry's papers, he credits Sloss as being "the father of sequence stratigraphy." Michael Rampino, professor of geology at New York University and one of Gerry's former Ph.D. students, commenting in a recent article in *Geotimes*, stated, "I think Gerry is one of the people who has invented modern sedimentology." Although probably best known for his work on carbonates, Gerry's 50-page CV lists 500 publications on an astonishingly wide range of topics. For their outstanding contributions in sedimentary geology, SEPM has bestowed on both Sloss and Friedman its highest award in that area, the prestigious Twenhofel Medal. Other Sloss Award recipients who have also received the Twenhofel Medal are James Lee Wilson, Bob Weimer and William Dickinson.

Both Sloss and Friedman have had many former students who have gone on to outstanding careers and high positions in industry, academia and government throughout the world. Teresa Jordan, current chair of the Department of Earth and Atmospheric Sciences at Cornell and last year's recipient of the Sloss Award, is but one example. She was one of Gerry's undergraduate students at RPI in the early 70s.

I could go on and on citing many more examples and similarities supporting my view that Larry Sloss and Gerry Friedman are sedimentary geologists "cast from the same mold" and "cut from the same cloth," but I think I've made my point. I would be, however, remiss if I failed to include in my citation at least a bit about Gerry the man in addition to Gerry the scientist. Gerry is a devoted husband and family man. He is the father of five married daughters and has 18 grandchildren and 11 great-grandchildren. He is a man of high values and great integrity; a warm, outgoing, generous and compassionate man; a man of deep faith; an international geological ambassador of goodwill as well as a black belt in judo.

Gerry has stated in his recently published autobiography that the best decision he has made in life was to marry Sue Tyler (Theilheimer) in 1958. Without a doubt, Gerry and Sue have made quite a team over the past decades! Now, in the middle of his ninth decade, Gerry shows little sign of slowing down. He remains involved, productive and is still going strong—clearly, not yet content to just rest on his well earned laurels. Tonight, with presentation of the 2006 Sloss Award to Gerry Friedman, we recognize another Titan of the stature of Larry Sloss in the Pantheon of modern sedimentary geology. It has been my privilege and distinct pleasure to serve as his citationist. Ladies and gentlemen, let me now present my dear good friend, our colleague, and an inspiration to us all—Gerry Friedman.

Response by Gerald M. Friedman

I have lived my life on several levels. One of my interests is my desire to share with others. In this sharing I feel that Lawrence (Larry) L. Sloss (1913-1996) has been one of my partners. In 1966, two months before his death we both received the Distinguished Educators Award of the American Association of Petroleum Geologists in San Diego (Fig.1). Larry and I had overlapping interests. In my textbook *Principles of Sedimentology*

(Friedman and Sanders 1978) five references are cited relating to Larry's studies. In the year 2000 in my paper "about relationship between new ideas and geologic terms in stratigraphy and sequence stratigraphy" in the *Bulletin* of the AAPG, I cited him seven times. In this same paper Larry has been "hailed as the father of sequence stratigraphy". Among the strata covering North America, Sloss et al. (1949) named four sequences of which the most important at the base was the Sauk Sequence. In 1994, the year before Larry's passing I published a paper on Sauk (Cambrian Ordovician Sauk platform carbonates) and in the year of his demise (1995) my topic was titled "intra-Sauk karst".

After eight years as a senior member of the Research Center of Amoco Production Corporation, now BP, in Tulsa, Oklahoma (Senior Research Engineer, Senior Research Scientist, and Research Associate and Supervisor of Research in Sedimentary Geology), I transferred to Rensselaer Polytechnic Institute (RPI) wearing two hats: one as Professor of Sedimentary Geology and one as Editor of the *Journal of Sedimentary Petrology* (now *Journal of Sedimentary Research*). I was publisher of the results of research in sedimentary geology for the SEPM - Society for Sedimentary Geology. When I was first elected to the editorship, I had just won the *Journal of Sedimentary Petrology's* covetous Best-Paper Award (now Outstanding-Paper-Award) and my task was to guide this journal into the up-coming boom of the 1960s and 1970s. In the late 1950s Editor Jack Hough in his "Editor's Note on the State of the Journal" (1957 p. 476) wrote "...investigators in the field of sedimentary petrology are urged to consider the *Journal of Sedimentary Petrology* (JSP) as a primary outlet for their manuscripts." Although already 26 years old at that time, JSP was yet pedestrian and good papers went elsewhere (*Geological Society of America Bulletin, Journal of Geology, American Journal of Science*, and non-U.S. journals). My task was to turn the journal around. This aim was accomplished. By 1969, JSP not only had become the leading international journal in sedimentary geology, but its total published pages exceeded that of any volume published before or since. In fact, 21 years later the 1990 volume published approximately 30 papers less than that of 1969.

My greatest satisfaction has always been in helping others. My motto is "be friendly and helpful." My mission has included training students at the undergraduate, graduate, and post-doctoral levels. My students' awards are most impressive and include the following:

At the International Level

- Vice President, International Association of Sedimentologists: **Eli Gavish**
- Committees of International Union of Geological Societies: **Sal Mazzullo, Charlotte Schreiber**
- National Correspondent for Sedimentology, International Association of Sedimentologists: **Johannes Schroeder**
- Chairman, Program Committee, Tenth International Sedimentological Congress: **Gedalia Gvirtzman**
- Secretary, Program Committee, Tenth International Sedimentological Congress: **Eli Gavish**
- Perez Grader Award, Geological Society of Israel: **Eli Gavish**

At the National Level

- Associate Editor for American Association of Petroleum Geologists Bulletin: **Joachim Amthor**
- American Association of Petroleum Geologists Convention Chairman 2006: **Charles Sternbach**
- The Sorbie Medalist of the International Association of Sedimentologists: **Charlotte Schreiber**
- Cornell University chairperson, recipient of the Lawrence L. Sloss Award at Salt Lake City 2005 GSA meeting: **Terry A. Jordan**
- Leverson Award, American Association of Petroleum Geologists (AAPG) : **Charlotte Schreiber**
- Leverson Award: **Sal Mazzullo** 3x
- Honorary Mention, Outstanding Paper Award, (Society for Sedimentary Geology) SEPM: **Joel Gevirtz**
- Outstanding Paper Award, SEPM: **Peter J.R. Buttner**
- Reprinting by Societies of their previously published papers: **Eli Gavish and Joel Gevirtz**
- Counselor, Geological Association of Canada: **John W. Kramers**
- SEPM, Member of Research Committee: **David Haglund**
- Heads of Research Groups, SEPM: **Michael Treesh, Roy Nurmi, and Charlotte Schreiber**
- Chairman of SEPM Research Group: **Joel Gevirtz**
- Chairman of the New York Academy of Sciences and member of the AAPG Research Committee: **Charlotte Schreiber**
- Chairman of the Outstanding Earth Science Teacher Program: **John Way**
- The Association of Women Geologists awarded its highest honor: **Charlotte Schreiber**
- Vice President of AAPG: **Roy Nurmi**
- President of GSA: **Victor Baker**
- Vice President of the American Insitute of Professional Geologists: **Bill Siok**
- Executive vice-president for exploration and production and member of the board of directors of the Anadarko Company: **John Seitz**
- Mattson Award (AAPG): Joachim Amthor
- National Distinguished Service Award of the AAPG: **Brian Keith and Roy Nurmi**
- AAPG National Awards in Antonio: **Roy Nurmi and Joachim Amthor**
- Secretary of AAPG's House of Delegates: **Brian Keith**
- Editorial board of Facies and received the Abraham-Gottlob Werner Medal of the German Geological Society: **Johannes Schroeder**
- Chairman of the Board of the Geophysical Institute of Israel: **Gedalia Gvirtzman**
- Editorial Board of Leading Edge: **Linda Sternbach**
- Editorial board of the Journal of Sedimentary Research: **Charlotte Schreiber and Sal Mazzulo**
- President and CEO. John received the "Living Legend in the Oil Business" award, the youngest geologist ever to receive this honor: **John Seitz**
- Secretary-Treasurer of the Society for Sedimentary Geology (SEPM): **Sal Mazzulo**
- AAPG's international award at the AAPG convention in Rio de Janeiro: **Rody Medeiros** (now deceased)
- Membership in House of Delegates of AAPG: **Ken G. Johnson, Brian Keith, and Linda Sternbach**

At the Regional Level

- Vice-President and Candidate for President, West Texas Geological Society: **Jeff Smith**
- President, Edmonton Geological Society: **John W. Kramers**
- Vice-President, Petroleum Exploration Society of New York: **Roy Nurmi**

- Secretary, SEPM, Eastern Section: **Tom McKinney**
- President, Eastern Section, National Association of Geology Teachers: **Ken G. Johnson**
- Treasurer of PESNY: **Joe Schrank**
- Treasurer of the eastern section of AAPG and moved up to vice president and president: **Ken Johnson**
- Distinguished Service Award of the Houston Geological Society: **Charles Sternbach**
- President Houston Geological Society: **Charles Sternbach**
- Houston Geological Society president's award: **Charles Sternbach**
- Recipient of the AAPG regional Distinguished Service Award: **Ken Johnson**
- AAPG Eastern Section's Division of Environmental Geoscience Meritorious Contribution Award: **Peter J.R. Buttner**
- Editor of the Houston Geological Survey Bulletin: **Linda Sternbach**
- Chair of AAPG's Division of Environmental Geosciences, chairman of its Earth Sciences Outreach Program, Associate Editor of Environmental Geosciences, and received the division's research award: **Ken Johnson**
- AAPG/ES Honorary Membership Award, and became archivist for AAPG's eastern section: **Brian Keith**
- Retired chief geologist from Shell Oil Company: **David Haglund**
- American Association of Petroleum Geologists, Eastern Section 2005; Outstanding Educator Award: **Peter J. R. Buttner**
- Houston Geological Society: Honorary Life Membership: **Charles Sternbach**
- President elect, Houston Geological Society: **Linda Sternbach**

I can write a book about the success of my students in the petroleum industry and in academe. Teaching to improve the geological profession, whether in the classroom, in the field, in subsurface studies, in short courses, in editorial work, or in publishing textbooks, is part of my destiny. I have taught short courses on every continent, except Antarctica, to approximately 10,500 geologists in the petroleum industry. I had during my tenure 130 Ph.D. students, masters' students, and post-doctoral associates.

I like to thank my colleagues especially Larry Woodfork, who nominated me,and my students who worked with me for receiving this award.

STRUCTURAL GEOLOGY & TECTONICS DIVISION CAREER CONTRIBUTION AWARD

Presented to John F. Dewey

John F. Dewey
University of California, Davis

Citation by Celâl Şengör

Today, we are here to celebrate the career one of the greatest geologists of our times, who, during the last three decades of the twentieth century, has put his stamp on the tectonic interpretation of Earth's behaviour. How fortunate it is for geology that he is still active and, by all appearances, is likely to remain so for years to come. It is an immense honour for me as a fellow geologist but, even more so, as his pupil, to present Professor John Frederick Dewey to you as the career awardee of the Structural Geology and Tectonics Division of the Geological Society of America this year.

Fortune favours the prepared mind. John's career as a structural geologist was about a decade old when plate tectonic theory burst upon the geological science in the late sixties. He read geology at Queen Mary College and obtained his doctorate in Imperial College with a thesis on the Ordovician and Silurian rocks of western Ireland. Although not his thesis advisors, Dewey has always regarded John Ramsay and Janet Watson as his most important teachers and mentors.

In the late sixties, few geologists grasped the significance of plate tectonics because a broad view of the geological behaviour of our planet was the first necessity. In the sixties, there were a number of such geologists with an encyclopaedic knowledge of global geology, yet not one of them became a John Dewey, because they lacked the other, in my view the more critical, component of a broad world-view of geology: A critical rational approach, i.e. to dare to ask the question: *What ought it to be like?* Such a question had long been anathema in twentieth century geology because of the prevalent silly Baconianism. As Tuzo Wilson wrote 'more geological mapping was both the method and the aim of geology' in those days.

Indeed, when I started my geological education, I was instructed to learn 'the basic principles' first and then be ready to question the data. However, my previous reading in the history of geology had taught me that those very 'principles' that I was advised to learn (implicitly, without questioning) were the mistakes of tomorrow. When I met John Dewey, after my first year in geology through a short course he was giving together with Walter Pitman, I instantly recognised a teacher who not only allowed, but actively encouraged, questioning even the most basic 'principles.' On the day we met (10th June 1975), I told him, as a freshman, that I thought his model for the tectonics of Turkey as published in the classical 1973 Dewey et al. Alpine System paper (*GSA Bulletin*) was wrong. John said "I know, but tell me how we can correct it". This reaction, pronounced with a genuine interest and smile during lunch, led to much scribbling on several paper napkins and, during that conversation, John conceived the idea that the Aegean grabens might have been created by east-west shortening and offered to write a paper with me, which appeared in 1979 in the *GSA Bulletin*. What really impressed me was John's incredibly quick and inqiusitive mind, his genuine love for and determination to seek the truth and his generosity and kindness towards a freshman. I decided that I must continue my studies with him. That decision turned out to be the most important and the luckiest I have made in my life. To this day, I have been a constant beneficiary of John's kindness and generosity towards me. I probably owe him almost as much as I owe my own parents. His generosity and kindness to all his students and colleagues have been no less.

When the kinematic theory of plate tectonics was almost complete in 1969, very few geologists dared to reinterpret geological data from an entire mountain belt in terms of it. I know of five papers that came out in 1969 on this topic: John Dewey's on the Appalachian/Caledonian System and on the conversion of Atlantic-type continental margins to Pacific-type continental margins, Warren Hamilton's on Mesozoic California, Hans Laubscher's on mountain-building (but essentially on the Alps) and Mitchell and Reading's on geosynclines in terms of plate tectonics. Of these only Dewey's and Hamilton's papers dealt with the motion of the plates not only to explain why the mountains were where they were, but also got into the bowels of the orogens to show us what the single lines geophysicists were drawing along convergent boundaries in reality were and how they worked to create the real geological record. Recently, I had to remind, in a book review on the Lake District in northern England, that Dewey's 1969 paper had explained the individual Lakes elements already in his 1969 Nature paper! I could have done the same for parts of Ireland, Newfoundland, and the northern Appalachians!

Once these initial papers were written, John's research forked: he continued to explore the theoretical implications of plate tectonics and he got into the field to test his and others' models. Therein we see how his critical rationlism was working. Dewey not only falsified many models by others, but also some of his own (including those dating from pre-plate tectonics days from the British Isles). Initially, for example, he thought ophiolites could glide down as gravity nappes. After work in Newfoundland with his studets and visits to many ophiolites in the world, he changed his mind. In fact, his team's ophiolite research created such a sturdy edifice, that much of what is going on now on ophiolites is icing on its cake.

John spent the early seventies exploring plate tectonics in many mountain belts and, together with his colleague and life-long friend Kevin Burke (another awardee of this section), in rift valleys, along continental margins and on continental plateaux. These years saw the birth of the still-used models of uplift-generated triple-junctions on plume heads, of Tibetan-type plateaux in continental evolution, of cracking continental plates along complex zones of deformation. Through these studies, John reached a conclusion that horrified both him and those who read it and tried to come to grips with it. He documented, in an ingenious paper in the John Rodgers (another awardee of this section) volume of the *American Journal of Science* in 1975, that plate tectonics must destroy geological evidence on such a scale as to render unique reconstructions of the past impossible! Anybody who understood the reality of subduction would have guessed that, but John showed, on hypothetical worlds masterfully draughted on Wulff-nets how a continuously-evolving network of plate boundaries must behave and which kind of evidence would get destroyed in what sequence and at what stage of plate bundary evolution. This kind of rigorous analysis, while forcefully driving home to geologists that they cannot hope at the end of the day to be all-knowing, rescued them from despondency by showing them what systematic clues they can hope to find to fill the gaps, albeit hypothetically, that opean up during plate boudaray evolution. John has repeatedly emphasised the chance aspect in geological evolution. Anybody who has not read John's 1975 *Am. Jour. Sci.* paper and its offspring his 1976 Tectonophysics paper is at a serious disadvantage in interpreting geological history in terms of plate tectonics. John showed that, while much evidence is lost, history may still be testable as much as physics is, and that geologists must strive to erect testable hypotheses to reconstruct the past.

In the middle and the later part of the seventies we see John, with his colleagues, getting into the Precambrian (which he had already touched in 1969, with Kevin Burke, in a paper on the reinterpretation of the Pan-African 'tectono-thermal' event of Kennedy, which first appared in 1972). They showed that the naive interpretation of the greenstone belts as little deformed synclines was hopelessly wrong and resulted from not appreciating how the structures of the Phanerozoic orogenic belts had been unravelled by a judicious combination of detailed biostratigraphy and structural geology. In the Pre-Cambrian, the lack of biostratigraphy had crippled structural interpretations much more than most Precambrian geologists seemed to have recognised. John took a position akin to that adopted by Eduard Suess a century earlier; he was willing to be actualistic but without losing sight of the fact that the terrestrial globe had an irreversible history. Today, Precambrian, especially Archaean, tectonic research rises on the pillars that John and Kevin erected.

In the eighties, John returned to the more detailed structural evolution of the orogenic belts and considered arcs, collapsing orogens, and "terranes" About terranes he initially had a most tolerant approach, adopting graciously the terminology of those who reinvented what already Tuzo Wilson and he had clearly said in the late sixties and the seventies. My fellow students from our Albany days will recognise that those papers fundamentally say nothing that we had not been hearing in the mid-seventies in John's lectures. When terranology became an end in itself, he revolted. The papers I wrote on that subject and those that we co-authored were all written in close communication with John. Later, his interests became concentrated around complex strain histories and they culminated, in 2002, in his masterly analysis of transtension. Here we see one of the best examples of John's method of approach to geological problems. He first lays out all the theoretically possible aspects of a problem, then takes individual geological objects, such as hand samples, outcrops, entire orogens, and tests the models using observations. Observations inspire further generalisations, correct errors, and lead to further questions. Then, he returns to the drawing board and tries to answer the questions first theoretically, laying out the basis for the next field-checks by modifying the original model, the iterative, networking, approach.

Most recently, his research has centred on 3-5 Ma transtension along the eastern side of the Sierra Nevada and the pre-Carboniferous history of the US Cordillera west of the "706" line, where he takes the superexotic view that all terranes with pre-end Devonian deformation originated in the Appalachians. He has also been mapping and describing mega-boulder deposits generated by freak waves and tsunamis, espcially in New Zealand and western Ireland.

He has never been seduced by the deceptive numerical pseudo-precision of simplistic physical models derived from the application of elementary engineering concepts to geology. He has long warned against the bogus air of precision that one may obtain by ignorant application of ideal models, developed on unreal objects and for unreal circumstances, to real geological objects and processes evolving in inscrutable complexity in the abyss of deep time. He has been rightly intolerant of those producing numbers from either computers not tied to field reality or samples collected in the absence of a carefully-constructed geological map. While we were his students, he allowed none of us obtain a degree without making a detailed geological map. Later, he allowed those with physical handicaps or of a more geophysical bent to do so but, even then, he made sure that they studied and understood geological maps und used them in their work. For John, geology is the ultimate natural science and unforgivable that a geologist should adopt the methods and theories of only one of its hand-maidens such as physics, chemistry or engineering.

I could go on and on about John the geologist, but time fails us. He is far greater than the limits of a single citation could possibly read. Without him, the geology of the latter half of the twentieth century would have been very much poorer.

Of the man John Dewey, I wish to say much, but I am deeply biased, as he and his wife Molly have always treated me as an older son and my affection, respect and indebtedness to them both are boundless. However, as no son should be barred from speaking about his father, so no grateful student should be prohibited from talking about his mentor. In John Dewey, all his students have found a wonderful, concerned and engaged teacher. His ability as a teacher and as a lecturer is legendary. His readiness to drop everything to answer a question has always impressed me. One day in Albany, when I asked him why he used a certain size Rotring pen while draughting a certain line, he dismounted the entire figure from the light table, walked across campus with me to the only reducing xerox machine we had on campus just to show me what it would look like when reduced! This reminds me what a superb draughtsman John is. He draughts all his own figures, now in Adobe Illustrator, and has always insisted that, when writing a paper, one should always first draw the figures: Of geological objects and processes, he was fond of saying 'If you cannot draw it, it does not happen!')

There is no more affectionate and considerate friend. A model family man, he invited me, after I had met him in Maryland in the Summer of 1975, to stay with him and his family during the coming Christmas. While the presents were being unpacked, he noticed that I had no present. He walked up to his bookshelf, picked up a rare 19th century geology book from his collection (T. Mellard Raede's, *The Origin of Mountain Ranges*) and handed it to me saying 'And this is your present!' I shall never forget that gesture. John has been a great teacher and a mentor to all his students.

I have often written that top scientists very seldom make good teachers. Dewey is one of those rarities. Not only is he a superb lecturer, a great discussion partner, and an inexhaustible well of information, but he has that great knack of making his students discover things for themselves. One evening in the mid-seventies, I remember his telling Gary White, who had just arrived in Albany to become one of his graduate students, that he did not inflict help upon his students. He has always refused to spoon-feed us. As a graduate student, one had to come up with one's own research topic and to make it acceptable to

John. This was tough. Even tougher was the complete freedom one enjoyed as his graduate student. John laid down no guidelines in research, although he was always available with advice if asked. However, he encouraged his graduate students to talk to each other (we do, to this day!). If one was able to stand all that, one became an independent researcher in one's own right and not a Dewey clone. John has had 56 graduate students who, except for two who have sadly died, are now distinguished geologists across the globe.

Colleagues, I present to you, with much pride and immense satisfaction, this year's Career Contribution awardee of the Structural Geology and Tectonics Division of our society, Professor John Frederick Dewey.

Response by John F. Dewey

I am deeply honored and touched by this award. Celâl has been most generous but I am approaching 70 and "retirement" is looming in the not-too-distant-future. The career contribution award suggests thank you and goodbye, but I promise that I will keep on doing field-based geology in structure and tectonics but I do have some new interests in the deposits of tsunamis and freak waves mainly in New Zealand, Ireland, Aruba, and Cyprus.

First, the negative. I will outline some of my profound concerns about the present state of Geology and academic life. I may be considered a grumpy old man but I can say whatever I choose at my age because I am seeking neither a job nor NSF funding.

Earthscope, IRIS, and programs like them are expensive boondoggles. Random data collection, of course, is always useful as would be a proposal to map the whole of Africa at the 1:10,000-scale but it is not the way to do science. Actually, any surface random data collection like Quadrangle Mapping is much more useful than Earthscope because of the small filter size and direct access to rocks. It is peculiar how large-scale geophysical random data collection, which homogenizes at a very large pixel scale is considered to be superior to geological mapping at a small resolved pixel scale where one can actually see the rocks. Large expensive programs, driven by program managers and geopolitical activists, are, generally, appalling and costly nonsense. At an early stage, we needed less sycophancy from the geological community, such as "how can we adapt and use Earthscope to our geologic advantage "and more straight talk such as "please stop this nonsense and put all that cash into the responsive mode where all funds should reside". It is now too late, but important that geologists now inject some science into the program.

What started out as a new and vibrant marine geophysics that completely changed our geo-world in the 1960's has been used to denigrate and diminish the central and critical role of geology in the Earth Sciences. Geology is becoming like a puffball; the core of the science is rotting out inside a thin hard shell of the avant-garde and fringe. There is more than one Professor of Geology who has never made a geologic map, looked down a microscope, or studied rocks, minerals, fossils, or seismic sections, or logged a core. Classic field-based observational geology is being squeezed out. Microscopy and optical mineralogy are being phased out and students are not taught to map properly and make field observations. How can one do serious petrology without optical mineralogy? The Universal Stage is a powerful tool in petrography yet is now scarcely taught or used. Whole departments are ignoring the fundamentals and undergraduates who want to study geology are being cheated. The future of geology is now at serious risk because the young are not being properly trained in the basics especially in the field. Francis Pettijohn said "The field is where the truth resides; rocks do not lie, and there is nothing as sobering as an outcrop." Field geology can be intellectually and physically very demanding, sometimes hot and sweaty or freezing and wet but without it, a resulting map, and observations of rocks, minerals and fossils, nothing much useful can be done.

Another problem is the seductive pseudo-precision and accuracy of numbers that come out of machines. Simple basic geology 101 tells us that the Sierra Nevada went up in the late Cenozoic yet new and untested geochemical arguments are used to counter this. The established stratigraphic position and order of Ordovician sediments in western Ireland are challenged by zircon numbers with no micro-mineralogy or serious discussion of lead loss/gain. We have been seduced by and begun to believe implicitly in the sometimes bogus results of some of these methods. Rb/Sr was once considered the "bee's knees" of geochronology but is now realized to be almost worthless. Quantitative mensuration methods are important but have to be weighed as a component of all the evidence rather than considered to be the definitive truth. Numerical modeling is important in constraining ideas but is not the touchstone of veracity.

I am not suggesting that only hard rock field-based geology is worth studying. To understand the Earth, its processes and evolution, we need everything from all kinds of observation, experiment, numerical and analog model building , analysis, synthesis, and lateral thinking. My complaint is that the techniques of the core of geology are being progressively reduced and eliminated in favor of trendy and probably ephemeral topics. Environmental geology is a buzzword that conceals a lot of shallow and poor science; as Kevin Burke once remarked "I am an expert in this area, I have lived in the environment for seventy years". The ultimate piece of nonsense is astrobiology/exobiology, the only subject that I know that has no observational base and no material. Its rationale seems to be an excuse to study the Archean and the origin of life (why find an excuse?) and plenty of NASA money.

I am deeply concerned about the modern university obsession with accountability, assessment and review, but only of course of academics not administrators. The intellectual tradition of scholarship is decaying as the corporate business mode takes over with all its attendant money-based decision-making. The faculty, who perform the basic and essential university mission of teaching and research are paid substantially less than administrators. The recent history of some major universities involves devious and secret actions in wasting public money at the highest administrative levels; partners hired and given newly-defined and highly-paid jobs, massive funds spent on upgrading housing, expensive sabbaticals taken just before retiring , being fired, or relocating , exit golden handshakes, and secret unaccountable housing loans given to un-named individuals. The wasted money of "hands in the till and noses in the trough" is of less concern than the arrogance of putative importance and entitlement shrouded in secrecy. This kind of stuff, of course, is not available to academics and has to be stamped out. Faculty need to take over universities again; administrators should obey their instructions. We are in trouble when Chancellors, Vice-Chancellors, Provosts, and Presidents think of themselves as top dogs and CEO of their institution in the corporate business mode.

The overhead is a drug to which administrators have become addicted; it gives Chancellors and Presidents slush funds. Grants and overheads are corrupting serious scholarship. The overhead pours in, the faculty who generate it are rated by their ability to obtain it, while administrators, who do not and cannot generate it, cream it off to spend it in unaccountable ways. They are even beginning to tax research gifts to department and individuals.

The NSF funding system, especially in Structure and Tectonics, is moving away from the field base. It is no different internationally; the system is run largely by people who do not go into the field and have no sense of or interest in the field base of geological reality. Funding goes to safe research that has already been done, and to the ongoing support of large laboratory systems in which the funding agencies have an investment and a vested interest. The risky, innovative and clever is doomed to grades of good and very good, the kiss of death. Funding commonly goes to research that has already been done. I have thought for some time, and for many reasons, that the geo-funding activities of NSF should be transferred to the NAS, where they would be awarded to the best and most original research. The NSF Program Manager position, in its present form, is a position that should be disbanded in that managers have too much power to influence and steer, if not direct, the kind of science that that they regard as important. Program Managers do not have a fatidical and exclusive knowledge and understanding of what is and may become important. Everything is important. The proper way to proceed for all the money to be in the responsive mode, for the panels to consist of the best people, and for the panels to make decisions, not recommendations, that the Program Managers administer.

To the young , I say "take up the challenge to preserve geology and our universities if you care about them". You have the power through your faculty senate, to take charge. Don't get sucked into the system; remain uncorrupted but remember "the ruling clique in the funding system and administrations may try to get you through funding, tenure, and promotion. Your university does not care about scholarship and what research you are doing; they are concerned mainly with the overhead, the number of papers that you have published in refereed journals , and external recognition through medals, awards, and prizes Your promotion and tenure depend upon these factors while only scant regard is paid to university service, teaching, and serious scholarship. Universities should be about scholarship, a semi-forgotten word that means academic achievement and learning at a high level, exemplified *par excellence* by my citationist and many of my students. There have been great scholars who have spent many years developing a fundamental piece of research while publishing little or nothing but teaching superbly at the highest intellectual level. Such people would not have a chance in today's universities. Vertebrate paleontology, for example, is a field that demands an immense amount of work before something sensible can be published. Universities have to change the way in which faculty are assessed for tenure and promotion to promote scholarship rather than the present slavish dependence on an absurd algorithm.

Another problem is the scant attention paid to the literature and history of geology. The vulgar modern trend is to search and refer only to the digitally available literature of the last five years. Consequently, there is much "rediscovery of the wheel, commonly in elliptical or hexagonal form.

Now the positive. I am excited by some of my new research interests and students in UC Davis. Dave Benner and Tatia Taylor, top-class field geologists, have worked with me and taught me a lot about neotectonics and transtension in the East California Shear Zone along the eastern flank of the Sierra Nevada, especially in the Coso geothermal field. Frank Monastero, Director of the US Navy Coso Geothermal Program has been a tower of strength and knowledge in supporting our research, while Jeff Unruh of Lettis Corporation has generously shared his ideas and data, and Don Turcotte is a dependable intelligent counsel and pillar of strength in quantifying the difficult in elegant and simple ways. This Coso transtensional research will be published soon and will change the way in which we think about vertical axis block rotation in both plane and non-plane strain regimes. There are so many problems in structure and tectonics world-wide. All involve an eclectic range of techniques from the thin section to the solar system but most involve field work, laboratory measurement, experiment and modeling.

The USA has been central in my life as the best place in the world to do geology. My ten years in Albany during the 1970's and the last six years in Davis have been wonderful with a small but excellent faculty and top-class carefully-selected and excellent graduate students. Both periods in the USA have generated an intellectual rejuvenation in me. I advise the young of the world to come to America to forge, at least the early stages of, their career.

Hans Laubscher, Greg Davis, Jan Tullis, Tanya Atwater, and Kevin Burke are all hard acts to follow as recipients of this award and illustrate the great range of ideas and techniques in our science. There are many Kevin stories but the simplest and most persistent is the best. If you tell Kevin something that you think is original, he will respond with "there's a lot of it about".

There have been many great people who have been important in my career for whose friendship , influence, and guidance I am deeply grateful: Janet Watson, Robert Shackleton, Chuck Drake, Teddy Bullard, Jim Gilluly, Warren Hamilton, Bill Dickinson, Bill Kidd, Kevin Burke, Hank Williams, and all my 56 graduate students, who I will not list. I have been very lucky and am very grateful for receiving lots of research funding for forty six years, from many companies, trusts, and funding agencies.

I see the embers of a fire in the rise of a new generation of brilliant young field-based geologists such as David Chew, Paul Karabinos, and Alex Kisters, supported by the middle-aged generation such as Mike Brown, Peter Cawood, and Alan Glazner, and the older generation such as Art Snoke and Carl Anhaeusser, to name but a few. I have learned so much from many geologists, especially from Maria Mange, who showed me the power of high-resolution-heavy-mineral-analysis in tectonics, from Paul Ryan who is world-class at combining field-based geology with numerical modeling, and from my citationist who has demonstrated what can be done with a phenomenal memory, a keen kinematic sense, a fine analytic and synthetic ability, and a complete knowledge of the geology of the world, its history, and its literature.

The Career Contribution award suggests a career coming to its close. I have been teaching for 46 years (about 9,000 lectures, 6,000 hours of practicals/labs, 5,000 hours of field courses, a total of some 20,000 hours or 2.283 years of instruction) in Manchester, Cambridge, Albany, Columbia, Durham, Oxford, and Davis. It does not sound like a lot but try standing on your feet teaching continuously for 2.283 years. I now feel the need to give up full-time teaching. I may be coming to the end of my full-time teaching career but not of my research career. I hope to spend the rest of my life doing lots of geology around the globe in the field, skiing, cricket, watercolour painting, playing the piano, model railroading, walking, consorting and drinking fine wines with old friends, gourmet cooking, and listening to British and Irish classical music. My geology will be mainly in western Ireland, Newfoundland, Norway, California, South Africa, and New Zealand, and the topics will be arc-continent collision, mélanges, transtension, and tsunamites and freak wave deposits but, who knows, I may be seduced into any kind of geology that takes my fancy, the only truly fundamental and the very best science. Thank you all so much for having been my friends for so many years and for being here tonight.