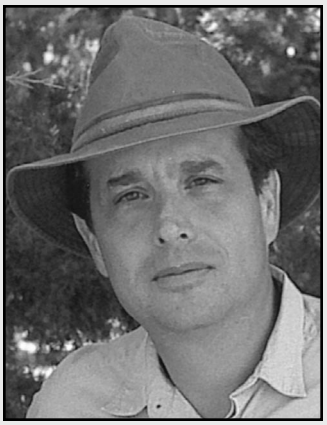
RIP RAPP ARCHAEOLOGICAL GEOLOGY AWARD

Presented to Rolfe D. Mandel



Rolfe D. Mandel
Kansas Geological Survey

Citation by E. Arthur Bettis III

It is a great pleasure and honor to introduce my friend and colleague, Rolfe Mandel, for the presentation of the 2003 GSA Rip Rapp Award. Few have influenced geoarchaeology through research and service as much as Rolfe, and I am pleased that GSA has recognized the level of his accomplishments with this award.

Rolfe has been involved in archaeological geology for over twenty years. He has served the discipline in government, academic, consulting, and editorial positions, and has been a driving force in forging a closer alliance between archaeology and geology. Geoarchaeology is Rolfe's calling, his research is impeccable, his field trips are legendary, and he is one of those rare people that walks the walk and talks the talk of Quaternary geology, pedology, and archaeology.

Rolfe's contributions to archaeological geology are many, but two are truly outstanding in their scope and impact. His decades of research on the geoarchaeology and alluvial landscape history of the central Great Plains of the United States have revolutionized our understanding of the region's Holocene landscape history and fostered landscape evolution-based approaches to evaluating the history of human habitation. As a result of extensive investigations in Kansas, Nebraska and Oklahoma he has formulated the most well-dated regional history of basin-wide fluvial response to Holocene bioclimatic change in the world. Rolfe has masterfully blended archaeological geology studies from a large number of cultural resource management investigations to develop a framework for understanding the impact of geologic and pedologic processes on the preservation and visibility of the central Great Plains archaeological record. In the course of this endeavor he has formed strong interdisciplinary ties with archaeologists, paleoecologists, soil scientists, geographers, and geologists across the region.

Rolfe's long-lasting and tireless effort to forge a formal relationship between GSA and the Society for American Archaeology has brought about a major increase in the interest in archaeological geology and geoarchaeology in both societies. He founded the Geoarchaeology Interest Group of SAA, which now boasts 562 members and regularly sponsors symposia and field trips at the annual SAA meeting. Rolfe has served the Archaeological Geology Division of the GSA in several capacities, including chairing the division and as the newsletter editor. He also chairs the division's educational committee and maintains the Directory of Graduate Programs in Archaeological Geology and Geoarchaeology, an invaluable resource for students. Few individuals have been as active in promotion and participation of their professional society as Rolfe has been in **both** GSA and SAA.

Rolfe's expertise and contributions are not limited to the Great Plains. He has undertaken geoarchaeological investigations at a number of localities east of the Rocky Mountains, including Watson Breaks, the oldest mound complex in North America, Big Eddy, where a record of human habitation spanning the last 12,000 years is preserved, and Big Bend National Park. As a geomorphologist with a thorough understanding of archaeological processes and sites, Rolfe has contributed immensely to several Near Eastern archaeological projects. His work at sites in Egypt and Jordan helped to explain how people living in sites located in arid environments were able to extract the maximum amount of resources from a harsh surrounding. His research also aided in understanding occupational sequences at "mega-sites" such as Ain Ghazal in Jordan. In addition, Rolfe's research was instrumental in establishing a cultural link with extinct pygmy hippopotamus at the controversial early Holocene site of Akrotiri Aetokremnos in Cyprus.

Under his editorship *Gearchaeology: An International Journal* has emerged as the premiere professional journal of geoarchaeology. Rolfe's untiring work with authors and lobbying for special issues focusing on topics in the forefront of the discipline sets him apart as one of the best editors of today's professional geoscience and archaeology journals. In addition to the journal, his editorial skills are evident in *Geoarchaeology in the Great Plains,* a historical and theoretical perspective on geoarchaeological research that has been widely acclaimed by both archaeologists and geologists.

Rolfe has been on the cutting edge and continues to push the frontier in his research. His present focus on Quaternary geology and first Americans in the Great Plains promises many significant discoveries and several new chapters in the story of people's presence on the Plains. Rolfe is an inspiration to his colleagues, an outstanding mentor and role model, and an ambassador for the world's archaeological geology and geoarchaeology community. His efforts and accomplishments reflect the spirit and standards of the award he is receiving and GSA should be honored to count a person of his professional and personal caliber in its membership.

Response by Rolfe D. Mandel

I am honored to receive this award, and thank you, Art, for your kind, over-generous words. I also thank the Archaeological Geology Division Awards Committee for its support and Rip Rapp for helping establish this division and for endowing the award.

People often ask me how and why I became a geoarchaeologist. The answer to the first part of this question is difficult because in reflecting on my career, I see so many twists and turns along the path, with many individuals influencing my direction. My parents, both scientists, stand at the beginning of that path. As a child growing up in San Antonio, my idea of a good time was looking for fossils in road cuts in the Texas hill country, and my parents spent numerous Sundays escorting me on those adventures. They fostered my interest in natural history, and encouraged me to explore the environment. I am very grateful for their guidance and support.

Although I started out majoring in biology at San Antonio College, Millard Brent, a physical geographer on the faculty, took me under his wing and steered me towards the geosciences. In 1971, I transferred to the

University of Texas (UT) and majored in geography. Again, an individual, in this case Curt Sorenson, played a significant role in shaping my career. Curt got me fired up about geomorphology and soils, an interest that has never waned. He also instilled in me a passion for field work and, perhaps most important of all, he was (and remains) an endless source of encouragement. Curt left UT for the University of Kansas (KU) in 1975, and talked me into entering the geography graduate program at KU the following year. I told friends and family my absence from Texas would be brief, perhaps three or four years. Little did I know that I would become a resident of the Central Great Plains for the next 27 years.

During my early years at KU, I took geomorphology courses from Wakefield Dort, a geologist. He introduced me to geoarchaeology, describing his own research experience at sites such as Owl Cave and Shriver. Although it sounded very interesting, my involvement in geoarchaeology was yet to come.

Upon completing my M.A., I became a Research Associate at KU's Institute for Social and Environmental Studies (ISES). For several years, my research at ISES focused on mined-land reclamation and various land-use issues. However, that changed in 1981 when Alan Simmons, an archaeologist, became the director of the cultural resources management program at KU's Museum of Anthropology. Alan was working in the Great Plains and eastern Mediterranean, and invited me to join in his research. This was a defining moment in my career, and it led to frequent collaboration and a long-lasting friendship. At about the same time, Art Bettis and I became acquainted. Art's geoarchaeological research in western Iowa captured my attention. I started thinking about how temporal and spatial patterns of late-Quaternary landscape evolution shaped the archaeological record of the Central Plains, and addressed this issue in my doctoral dissertation at KU. It has been the centerpiece of much of my research during the past 20 years.

My teaching career started in the department of geography and geology at the University of Nebraska-Omaha (UNO). After four years at UNO, I returned to Kansas and spent the next 10 years working in two worlds: the world of a private consultant practicing geoarchaeology in the Central Plains and Midwest, and the world of an adjunct professor in the geography department at KU. My role in academia involved serving on thesis and dissertation committees, conducting geoarchaeological research in the U.S. and eastern Mediterranean, serving as Editor-in-Chief of *Geoarchaeology*, occasionally teaching field school, and a variety of service-related tasks. The point I want to make is that this was a very rewarding experience and it allowed me to interact with many people, especially archaeologists. However, I must add that it was an exhausting period of my life. Paul Goldberg and many of my other close colleagues often listened to me kvetch about "the journal" and other things that consumed my time. I thank them for not hanging up the phone.

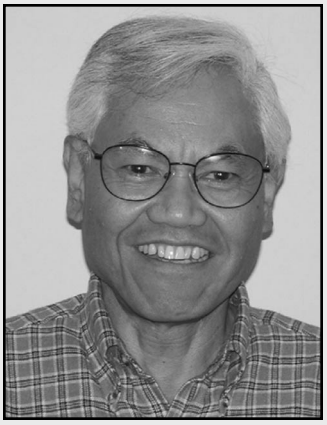
In April of this year, my career path became more focused. With the establishment of an endowed geoarchaeological research program at the Kansas Geological Survey, I was placed in charge of searching for Paleoindian and pre-Clovis cultural deposits in the Central Plains and Midwest. Or, as my wife would say, I now have a real job. This is an exciting challenge for me, and I am grateful to Lee Allison, Director of the Kansas Geological Survey, for recognizing the value of this research.

So, why did I become a geoarchaeologist? I could provide a long, philosophical answer, but I will cut to the chase. Practicing geoarchaeology is a lot of fun, and I am looking forward to continuing down that path.

Many friends and colleagues have been a source of enthusiasm and support. I thank Art Bettis, Paul Goldberg, Vance Holliday, Ed Hajic, Reid Ferring, Julie Stein, Jack Hofman, Alan Simmons, Joe Saunders, Alston Thoms, Chris Hill, and Chris Caran, to name a few. A special thanks goes to my mentors, Curt Sorenson and Wakefield Dort, for their guidance and patience. Last, but not least, I am grateful to my wife, Sharon, and my son, Daniel, for enduring my frequent departures to places often far from home. Their tolerance and encouragement, and the support of my friends and colleagues, have been my inspiration. Thank you, all of you, for helping me achieve this award.

GILBERT H. CADY AWARD

Presented to Romeo M. Flores



Romeo M. Flores
U.S. Geological Survey, Denver

Citation by Tim A. Moore

I met Romey before I knew him. Not too surprisingly, it was under a brilliant cobalt sky in late summer in the Powder River Basin. The image I most remember was that of a large Ram Charger, red I think it was, with this Filipino in a baseball hat squinting over the steering wheel at me. He was sucking on a toothpick. It made me wonder what he had for lunch. But it was 1980, I had not yet completed my undergraduate study and thus did not know Romey was well into formulating models for the Powder River Basin that would soon become classic. Nor did I know that twenty years later I'd be knee deep in peat muck in a Sumatran bog with him under completely different circumstances. But I get ahead of myself.

Born and raised in the Philippines, Romey attended The University of the Philippines from 1955 to 1959 obtaining a Bachelors of Science degree in Geology in 1959. After graduating in 1960, he then was granted admission into The University of Tulsa graduate programme where in 1962 he was given a Masters of Science in Geology. He then went to Louisiana State University where, as one of John C. Ferm's first students, he worked on coal-bearing sediments in the Appalachian Mountains. I can remember John telling me how he had dumped Romey off in the middle of nowhere at an Appalachian roadside outcrop. When John came back two weeks later, Romey was still coming to terms with that same outcrop and it looked like the outcrop was winning. But the knack of doing field work must have been instilled in him as Romey is one of the best field sedimentologist that coal science has ever had.

After he was awarded his PhD in 1966 Romey was hired by the Department of Geology at Sul Ross State University in Alpine, Texas, where he conducted research in the central Appalachian and Marathon Basins. He was there until 1975 where he gained full professorship and was also Chairman of the Department. During this time too he briefly held a Post Doctoral Fellow at the Department of Geology & Oceanography, State University of New York, Fredonia (1967-1968).

In 1975 Romey moved to the U.S. Geological Survey in Denver, Colorado. He has maintained his strong academic interests and has been Adjunct Professor and Graduate thesis co-advisor to 38 MS and PhD students at Colorado State University, University of Colorado, Colorado School of Mines, North Carolina State University, University of Kentucky, Northern Arizona University, New Mexico Institute of Technology, Texas Tech University, and South Dakota School of Mines. In addition, he has been Graduate thesis co-advisor and external examiner for students at the Universite de Liege, Belgium; University of Queensland, Australia; University of Natal, South Africa; and University of Witwatersrand, South Africa. Perhaps one of the reasons Romey has remained so relevant in the field of coal sedimentology is because of his commitment and interactions with graduate students over the last thirty years.

Romey has the ability to remain incredibly focused. And it is that trait which has allowed him to understand almost all aspects of basin development in the Powder River Basin. But perhaps just as enduring has been his insistence that coal beds and coal basins must be examined in a multidisciplinary approach. Working with the likes of Ron Stanton, David Pocknall, Frank Ethridge, Jean Weaver, Gary Stricker, Peter Warwick, Vic Cavaroc, J. Thorez, John Hanley and many many others, he has helped lead teams of scientists in teasing out answers about the formation of coal bearing basins. The reason so many have worked with Romey is that he works hard, is generous with ideas to co-authors and relishes a good scientific argument. This recipe has resulted over 268 published papers, with more still in the oven.

But Romey has not limited his study to the Powder River Basin. I think a number of us in coal geology have experienced the feeling of anticipation at looking at a new basin in some forgotten part of the world only to find Romey has been there before us! In his studies Romey has not only worked in many of the basins in the USA (for example, Wind River, Raton, San Juan, basins in Alaska) but he has also worked in Brazil, New Zealand, Belgium, China, Australia and Indonesia to name a few.

In the early 1980s Romey was one of the first coal geologists to use the peat domes of SE Asia to explain the low-ash nature of many coal beds through out the world. It does not seem such a big deal now but it was a revolution in thought then. That idea drove others to verify the analogy by visiting these bogs and most concluded that the model worked. However, it was not until 2000 that Romey actually got to visit one of these domed peat bogs himself and I had the pleasure of acting as one of his guides. It was also nice to 'repay' Romey by getting him wet, mucky and bug bitten to really show what his model did not.

I am tempted to end with a sentence beginning with 'finally'. But all of us who know Romey also know there is yet a long way before that 'finally' can be written. Indeed, even at this moment he is on my case to finish a paper with him and I can no longer use the excuse of writing this citation!

Response by Romeo M. Flores

I am privileged, and sincerely pleased, to be selected by the Award Panel of the Coal Geology Division of The Geological Society of America for the 2003 Gilbert H. Cady Award. I am grateful to Tim Moore for the citation and nomination, and to Frank Ethridge, Robert Millici, Leslie Ruppert, Peter Warwick, and panel members for their support.

I am humbled to receive this award and to be accorded the honor of being placed among the ranks of distinguished former recipients whom I admire and who have produced such fundamental contributions in coal geology. I am also astonished, but extremely appreciative, at being recognized in this manner for work that I have so much enjoyed these past years.

Achieving this award would not have been possible without the invaluable guidance and support of many individuals — mentors, coworkers, and other close associates — who helped to shape my chosen career and afforded me the opportunity to pursue it. Coal geology was not a part of my undergraduate studies at The University of the Philippines, where hard rock geology dominated, so I must

first mention Dr. M.E. Hopkins ("Hoppy" to friends at The University of Tulsa) who provided my initial exposure to coal. I took Hoppy's graduate stratigraphy class in which there was heavy emphasis on coal cyclothems in the Illinois and Arkoma Basins. It was of great interest to me that the class textbook by Marvin Weller referred to Philippine coal cyclothems of which I had had no prior knowledge. (Quite a surprise!)

I owe my formal training in coal geology to Dr. John C. Ferm ("JC" to his students), also a recipient of the Cady Award. At Louisiana State University, JC trained his first (1963-1969) group of budding coal geologists or "Fermites" (Vic Cavaroc, Barry Henderson, Dave Hobday, Dave Pedersen, Harry Roberts, Jim Webb, Peter Whaley, and Ron Zimmerman). Through a National Science Foundation grant of Drs. Ferm and Eugene Williams of Pennsylvania State University, the "Fermites" training ground was the northern Appalachian Basin, with the objective being the Middle Pennsylvanian Allegheny Group. My part of the project was stratigraphy and sedimentology of the middle part of the Allegheny Group in eastern Ohio, which evolved into a Ph.D. thesis. The theses of graduate students formed a core of Dr. Ferm's research, which revolutionized correlations of coal beds and concepts of coal cyclothems in the northern Appalachian Basin. Dr. Ferm's revisionist idea (e.g., "Allegheny Duck" model) emphasized autocyclic deposition, a la modern delta processes, as the major controlling factor of coal cyclothems. Being a part of this episode of growth in our coal science in the 1960's shaped my philosophy in coal geology, which I have adopted, remolded, and, hopefully, advanced.

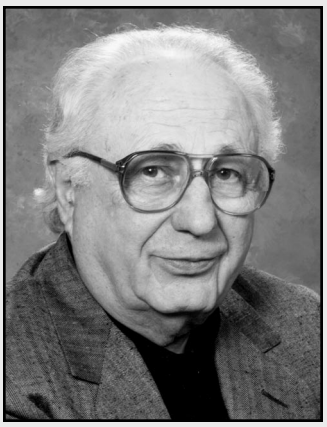
My role in advancing coal geology was to serve as a catalyst to former graduate students from North Carolina State University, University of Kentucky, Colorado State University, Texas Tech University, Northern Arizona University, University of Colorado, Colorado School of Mines, and University of Liege, Belgium. These students joined my U.S. Geological Survey projects as summer field geologists working on Master and Ph.D. theses in coal basins in the Rocky Mountain and Great Plains regions and Alaska. Their voluminous stratigraphic and sedimentologic work contributed immeasurably to my knowledge of integrating coal facies and sedimentology into the broader aspects of coal geology in Tertiary and Cretaceous coal-bearing rocks. More specifically, application of domed ombrogenous peat mires of Southeast Asia as analogues to the thick, clean (low-ash yield) coals that formed in detritus-rich fluvial settings in the Powder River Basin, which I first presented at the 1980 Rocky Mountain Coal Symposium, eventually served as a working model for alluvial coal deposits in the Rockies and elsewhere.

In closing, I wish to particularly acknowledge the great indebtedness I owe for being able to work with renowned coal stratigraphers, coal petrologists, coal geochemists, and coal palynologists, too numerous to mention here, at the U.S. Geological Survey. It is in that environment where ample opportunity was afforded to advance interdisciplinary research and teamwork essential for solving basic and applied problems of coal geology.

For them, friends, and my family, I am honored to accept the Cady Award.

E. B. BURWELL, JR., AWARD

Presented to Ellis L. Krinitzsky



Ellis L. Krinitzsky
Engineer Research & Development Center, Mississippi

Citation by Allen W. Hatheway

In order to properly design seismic-withstand qualities into critical engineered works, civil engineers and architects need to consider the most likely characteristics of ground shaking that might be felt by a structure. This evaluation must consider the actual seismo-tectonic region, with the location of its earthquake sources and the potential of each to produce a maximum credible earthquake.

The engineering community currently is beset with a variety of unsatisfactory approaches by which ground motions are specified for incorporation into seismic-withstand designs for critical structures. Most of the motions now actually specified are not properly founded on true geologic evidence nor are the values scientifically realistic.

Human lives are at stake! Ellis Krinitzsky has spent the last thirty years in a calling to correct this situation. Ellis' message has a duality, first to specify a rational and correct methodology and secondly, to shed light on the abuses by those who would advise that design be based strictly on seismic probabilities obtained by methods that are opaque to the designer, to public safety regulators, and to the public at large.

Dr. Krinitzsky's paper, *How to Obtain Earthquake Ground Motion for Engineering Design,* should be considered by architects and design engineers in their roles to protect the public, and Krinitzsky's stated findings and methodology must be used in future inquiries concerning those engineered works that fail to protect the public during earthquakes.

Here in this one economical technical paper, Krinitzsky has come forth with all that is needed for an honest geoscientist to go about collecting and evaluating truths for the informed purpose of assigning dependable earthquake ground motions for engineering. Krinitzsky's courage is most bold in that his methodology stands alone. There is nothing like it in the broad literature of the subject for definitive prescription of the steps and analyses essential for engineers to incorporate into their seismic-withstand computations. In this sense he has met the test of professional responsibility and he has thrown all of his energies and capacities into this procedure for us. This methodology represents the highest order of calling to his profession and is furthermore a sterling example of responsibility as a practicing earth scientist.

Krinitzsky's contribution is even more important as it is the only alternative to the dominating practice in North America, which is a veiled, black-box dogma called "seismic probability." The inherent failings of seismic probability have been exposed by Krinitzsky in a series of path-finding papers beginning with publication of his GSA/AEG Richard H. Jahns Distinguished Lecture in 1993. Krinitzsky showed that seismic probability is a "black box" because it relies entirely on mistaken assumptions, faulty logic and statistical methods that are used improperly. It is applied without a standard procedure and commonly without an identified methodology and therefore produces results that are opaque to rational understanding.

Never mind for the moment that probabilistic ground-motion predictions ignore much of the relevant geoscience evidence gathered by those who seek, track, record, measure and analyze Nature's stated, accumulated record of earthquake characteristics. In stark contrast, Krinitzsky's methodology incorporates only applicable scientific and technical evidence.

In Krinitzsky's method, one does not encounter the smoke and mirrors of seismic probability. Each step of assemblage, review, evaluation, and interpretation of evidence is openly defined. The beauty of his methodology is that he has assembled every bit of it from not only his own endless effort, but from the valuable geological and seismological work of his colleagues. From 1973 through 1995 he managed and directed U.S. Army Corps of Engineers' funding that paid for a series of 28 Waterways Experiment Station (WES) contract research reports that were awarded to a broad spectrum of talented researchers. From this, his own work, and that of his WES colleagues, Krinitzsky's method can stand the test of reality in after-event scrutiny. It is the gift of an honest and informed geoscientist, for the direct appreciation and use of his colleagues in the professions dedicated to saving lives in future earthquakes.

This single short paper stands also to call attention to the glaring need for earthquake ground-motion purveyors to have the courage to provide transparency in their analyses. More importantly, may Krinitzsky's statement of clear methodology become a *de facto* standard for truthful declarations of all workers in geoscience input for seismic-withstand design. We are dealing with nothing less than generating provisions for saving human lives.

Apart from providing a rationale having clarity, Krinitzsky's methodology is available to be employed henceforth in reviewing the honesty, worth, and applicability of every geoscience report of ground-motion inputs for engineered seismic-withstand design. The true usefulness for Krinitzsky's methodology will be its application in post-event inquiry to determine the competence of individual recommendations for every engineered structure that has failed during the next killer earthquake. The opportunity to apply Krinitzsky's method in the retrospection of the next huge, killer earthquake could come as early as "tomorrow."

Response by Ellis L. Krinitzsky

Dr. Hatheway refers to my criticisms of earthquake hazard evaluation by probability and my advocacy of a more rational method based chiefly on geology. He and I think seismic probability is done with inadequate data and is dependent on unjustifiable assumptions. Hatheway and I are not alone in our beliefs. I would say that most of the geological profession, who know the issues, believe as we do.

Of course there are those unrepentant seismic probabilists. I think most of them are fully aware of the defects in their method. They turn a blind eye for several reasons. One is they have no knowledge of geology nor how fundamental it is for evaluating earthquakes. Instead they are enchanted with the wonderfully desirable numbers that they can get by wishful thinking. Another is their ego. When shown their errors, they can't bring themselves to admit a mistake. And another is money. Seismic probability brings in money, and for some it is immensely lucrative. That

is why the leaders in seismic probability turn their backs on open discussion. And that is why they try to silence and discredit other views, but not deal with them.

However, seismic probabilists do respond to criticism in their own way. Mostly, they create review committees and pack them with themselves. Their shtick is to generate gigantic, one-sided, dreary reports that nobody reads. However, those reports impress high-level managers by bulk, not content.

When I published a paper in Civil Engineering, a top one of those gurus shamelessly wrote to the editor to complain that papers by me should not be published without peer review. He knew my papers were peer reviewed. What he meant was he had not himself had a chance to trash my paper and he wanted an opportunity next time.

Also, in a board meeting of the Earthquake Engineering Research Institute, a board member called me unethical. He also said my papers were trash. Only one board member spoke up for me. The rest wanted to deny me any platform in the EERI. Later, when I offered a presentation for an EERI-sponsored conference, my presentation was rejected. I protested vehemently. They did find a place for me. But those experiences taught me to stay away from the EERI.

So, when I had a paper I thought was good, I took it to my friends in the AEG/GSA to publish in *Environmental and Engineering Geoscience.* However, E&EG has an editor who sells seismic probability. He took my paper and sent it for review to a seismic probabilist. The review that came back was like a howl of outrage. There was nothing constructive in it. Its thrust can be boiled down to two firm demands. First, my paper must state that it is only my opinion. Never mind that the content was based on work in the Corps of Engineers and that most of what I presented was backed by Corps of Engineers policy. Second, the reviewer said seismic probability was the "law of the land," and strongly implied that anything different cannot be suitable for publication. I suppose the reviewer wanted me to reconstruct my paper to fit the "law of the land," which would be to permit only seismic probability. I'd like to know what law that reviewer was talking about? Even if there were such a law, which there isn't, when is any law beyond criticism in America? Laws that are beyond criticism bring back memories of the Third Reich and the Soviet Union.

I was astonished. As an editor of a journal, I have seen hundreds of reviews. However, I have never seen a review that was so self-serving and so utterly stupid. And the editor wrote to tell me that when I submit my revised manuscript, he will send it out for more review.

I withdrew the paper immediately and sent it to Elsevier. The paper had previously been reviewed for me by four of the Editorial Board members of *Engineering Geology,* all favorably. The paper was published in *Engineering Geology* without change.

Elsevier tracks the downloading of its papers. My paper had the honor of being one of the most downloaded. There was tremendous interest in this paper, and it came from all over the world.

So, why do I bother you with the troubles I had in publishing another paper? Well, it is the same paper that just now has been honored with the Burwell Award. That paper has come full circle within the GSA.

We travel a rocky road in life. But sometimes there are compensations. Sometimes, as now, there are more than compensations. To receive the Burwell Award for this paper is a wonderful honor, a marvelous reassurance, and a tremendous encouragement. I am grateful to all of you for it. And I thank you for it.

2003 GEORGE P. WOOLLARD AWARD

Presented to Lisa Tauxe

Lisa Tauxe
Scripps Institution of Oceanography
University of California, San Diego

Citation by Dennis V. Kent

Lisa Tauxe is a stellar researcher in earth magnetism. She also teaches, is an accomplished musician, has a family and is active in scientific and civic circles. She has authored or co-authored over 110 papers — including a poignant piece in Eos on juggling dual-careers in academia, nurtured more than a half-dozen PhD students, and hosted a steady stream of post-doctoral scholars. In the process, Lisa has established at Scripps one of the premier paleomagnetics research facilities in the world and herself as one of the preeminent workers in the field.

Her early work was in magnetostratigraphy. Lisa's first paper as a graduate student was a sole-authored contribution in Nature that dealt with a revision of the age of Miocene hominoids in Asia based on revised magnetostratigraphic correlations in the Siwaliks. Also as a graduate student she went out as the paleomagnetist on DSDP Leg 73 and produced a superb magnetostratigraphy for the Cenozoic. This record was key to the development of integrated magnetobiostratigraphic time scales and the data are still being used today. In East African continental rift sediments, she was able to confirm that Nick Shackleton got the age of the Brunhes/Matuyama boundary about right using orbital time scales and that the much-debated discrepancy in its age was due to a bias in the traditional potassium-argon dates. Her ongoing work in magnetostratigraphy has dealt with the precise age registry of important geologic levels, such as the Paleocene/Eocene and Oligocene/Miocene boundaries, for improved global correlation.

Lisa is also noted for her work on paleointensity, one of the most difficult parameters of the geomagnetic field to measure but critical to our understanding of its generation and long-term evolution. She followed two research avenues - relative paleointensity in sediments, where she was able to significantly improve data reliability by developing the rigorous psuedo-Thellier technique, and absolute determinations in igneous rocks, where she pioneered the use of submarine basalt glasses that turn out to be an ideal material for classical Thellier methods. Some important outcomes of this work are that the mean long-term value for Earth's field intensity may only be about one-half of what had been assumed and intriguingly, that there may be a dependency of the mean intensity on polarity interval length.

A major recent interest is TAFI, a collaborative project with geomagnetic theorists, such as her colleagues Cathy Constable and Catherine Johnson at Scripps, and experimentalists, such as Laurie Brown and Neil Opdyke, to obtain a precise and accurate description of the time-averaged geomagnetic field. We can expect that the geocentric axial dipole hypothesis, a central tenet of virtually all paleomagnetic studies, will finally be tested in detail.

Underlying all her efforts is a profound understanding of statistical methods that need to be employed to derive reliable and testable conclusions. She is a forceful advocate of techniques novel to our discipline, such as the boot-strap and jack-knife, to estimate representative values and error limits on distributions ranging from susceptibility ellipsoids for determining magnetic fabrics to the widely used fold test for constraining age of magnetization. She is a proficient computer programmer and has made a whole package of useful software available in her recent principles and methods book as well as on her website.

On a more personal note, those of us who know Lisa are completely taken by the enthusiasm and joy with which see approaches scientific problems. We also know that she is very competitive so if you venture into her sphere of interest, you better get it right.

For her contributions to geophysics and to the scientific community, I am pleased to present Lisa Tauxe as the 2003 recipient of the Woollard Award.

Response by Lisa Tauxe

Receiving the Woollard Award was an unexpected pleasure. I have since learned a few things: how to pronounce it (WoollARD to rhyme with yard) and that it is named after a man known for his warmth and generosity dedicated to the use of geophysics to solve geological problems. I was tickled to find that past recipients include Rob van der Voo and Neil Opdyke, two men who have been both mentors and friends through-out my career. And I am also delighted to have Dennis Kent, this year's Day Medalist as a citationist.

I don't like the "shoulder standing" metaphor often used in acceptance speeches because it implies a lot of climbing over peoples backs. The process of growth in my case has been more like a long and intense conversation. I'm from the "Question Authority" generation, but my mentors and colleagues have always responded with grace, humor and remarkably good advice.

I have been very lucky throughout my life. My parents tolerated my "tom boy" ways and made it clear that girls could achieve whatever they were willing to work for. Growing up in Minnesota gave me a powerful urge to travel and to be outside, so when I took my first geology course on the advice of my brother, I discovered my calling. I've been hooked ever since.

In college, I pleaded with David Pilbeam, to let me go on his expedition to Pakistan. He let me go, somewhat reluctantly I think and it was one of those life changing events. It was there that I met Neil Opdyke, a story which I only tell after a few drinks. I became his student in grad student paradise, Lamont. My Lamont friends, especially my office mate, Brad Clement, enriched my life in countless ways. Dennis Kent graciously adopted me when Neil left Lamont for Florida and taught me what he could about how to do science. I also met my best friend, Hubert Staudigel, at Lamont and married him in Lamont's rose garden.

As I was finishing my thesis, it suddenly dawned on me that I would have to WORK for a living. The prospect terrified me. One day as I was perusing the want ads, I got a call from Hans Thierstein, inviting me to apply for a job at the "other" other oceanographic institution, Scripps. It was to build a paleomagnetics lab, a tremendous opportunity for someone as green as I was and I was just foolish enough to take it.

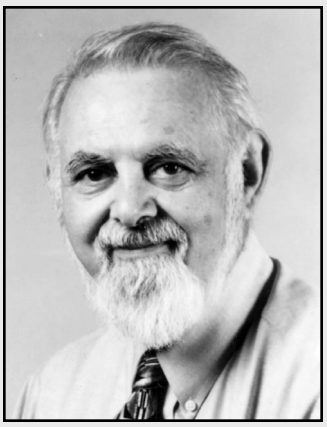
I have had many wonderful colleagues, students and post-docs at Scripps. Cathy

Constable, Jeff Gee, Catherine Johnson, and Bob Parker have taught me most of what I know about geophysics and I am profoundly grateful for their friendship, help and support over the years.

It is with gratitude that I accept this award. Paleomagnetists occupy an odd corner of Earth science nestled between geology and geophysics, drawing on both to help understand how the Earth works. We are viewed at times with suspicion or amusement. It is therefore also with pride that I receive this award from the Geophysics Division of the Geological Society of America.

HISTORY OF GEOLOGY AWARD

Presented to Ellis L. Yochelson



Ellis L. Yochelson
USGS and Smithsonian Institutuion
Retired

Citation by Michele L. Aldrich

In presenting Ellis L. Yochelson with the History of Geology Award for 2003, the Geological Society of America recognizes over four decades of scholarship. Ellis published his first work in the history of geology in 1960, but before that he had already established an impressive career in paleontology.

Ellis was born in Washington DC in 1928. He enrolled at the University of Kansas and the University of Maryland, receiving a Bachelor of Science degree in geology in 1949, the Master of Science degree from Kansas in 1950, and Ph.D. from Columbia University in 1955. The most important even of his adult life occurred in 1950, when he married Sally Witt, who has anchored his professional and personal life ever since, including helping organize numerous scientific and historical meetings.

He was affiliated with the Paleontology and Stratigraphy Branch of the Unites States Geological Survey from 1952 to 1985, after which he served on WAE status, senior scientist emeritus, and volunteer ever since. During his USGS tenure, Ellis has been headquartered at the National Museum of Natural History, where he has served as Research Associate since 1967.

His Smithsonian connection resulted in historical as well as scientific achievements, reflected in his advice on the content and narrative text of several exhibits. Ellis had also taught at American University, George Washington University, University of Maryland and University of Delaware. He has been active in promoting science education in the schools in Washington DC and Princes Georges County in Maryland.

As a paleontologist, Ellis specializes in gastropods and trace fossils. Like other successful paleontologists, he has an uncanny ability to sense which field localities are apt to yield specimens, just as good historians develop an intuition for which manuscript collections to search (although both phenomena may be self-fulfilling prophecies, of course). Anyone who has done fieldwork with Ellis can attest to his enthusiasm for the science – friends had to drag him off a Northern California beach where, for the first time, he saw masses of by-the-wind sailors, creatures whose relatives he knew well from traces in the fossil record.

His field work led Ellis to undertake significant overseas travel. He has visited Norway several times but his most exotic expedition was to the Ellsmere Mountains (Antarctica) in 1979-1980, which resulted in a record number of slide trays with which to wow his audiences, the most remarkable being a half carousel of white-out slides akin to the monochrome paintings of Robert Rauchenberg.

Ellis is noteworthy for his energetic activities in professional groups to support paleontology and history of geology through the sponsorship of symposia and the publication of books and articles. He has served as an officer in several paleontological organizations, including President of the Paleontology Society in 1975. He was a cofounder of the History of Earth Sciences Society, persuading people that it was crucial to have such a group to support Gerry Friedman's journal, Earth Sciences History. Ellis was secretary treasurer of HESS in 1982 – 1984 and President in 1989.

Officially connected to the organizing body of the USGS Centennial during 1975-1979 but unofficially active in planning long before that, Ellis is responsible for much of the scholarly luster that shined from that event, making it a time for cerebration as well as celebration. He has also advised Canada and the states of New York, Pennsylvania, and Virginia on anniversaries of their geological surveys. He also actively promoted history of earth science as part of the Smithsonian Institution's recent 150th anniversary, most notably through sessions at the North American Paleontology Conference held in Washington DC that year.

But it is primarily for his scholarly achievements in the history of geology that the Division is honoring him today. His first publication on the topic was a biographical sketch in 1960 of J. B. Knight. Ellis's seventy page biography of Charles Doolittle Walcott appeared as a National Academy of Sciences Biographical Memoir in 1968; this is an analytic piece on Walcott's scientific and administrative life based in part on Walcott's papers, not the usual blah commemorative essay that appears in this series.

His interest in biography has continued through essays on geologists in the Dictionary of Scientific Biography, Dictionary of American Biography, and American National Biography. These series have very high editorial standards for accuracy, and demand the ability to compress lifetimes of scientific achievement into a few pages. Ellis is also an accomplished book reviewer for scientific and historical journals, submitting fair-minded work on time, of the right length, and properly formatted.

Ellis has written and edited several items of great use to our field. He coauthored Images of the USGS with Cliff Nelson in 1979; 15,000 copies of this 56 page booklet were issued. Ellis produced a history of the National Museum of Natural History building in 1984 in celebration of its 75th anniversary, a topic to which he has returned several times. In 1980, he edited a GSA Special Paper on the ideas of Grove Karl Gilbert, and in 1982 he coedited Frontiers of Geological Exploration of North America, arising from a USGS centennial symposium held in Idaho.

But this award is given mainly in recognition of Ellis's massive two volume biopgraphy of Charles D. Walcott. For three decades, Ellis shared his research on Walcott through papers at scientific meetings as he worked on this opus. This gave him feedback on all aspects of Walcott's life. We have had Walcott sliced, diced, curried, chicken-fried, sauted, sweet and sour, mole, marsala, Florentine, hash, stew, and Walcott Wellington. A history of geology session was incomplete without a Yochelson paper on some aspect of Walcott. This has led to the definitive work on the man, but at a price – the manuscript was much too long. Tom Dutro said to cut it. John Pojeta said to cut it. Alan Leviton said to cut it. Most important, the published, Kent State Press, said to cut it – in half. In despair, Ellis said he could not part with another word and asked me to look at it. I chopped out about a third of the first several chapters and told him he could see how to do the rest. He accepted

about half my suggestions, and Kent State Press went to print with it.

The book has many merits, but I will mention only two here. First, Ellis dealt masterfully with Stephen Jay Gould's presentist attack on Walcott's work on the Burgess Shale fauna. Instead of a wild ad-hominem counter-attack, Ellis stuck to the issues and laid out exactly what Walcott did accomplish. Second, the biography places Walcott in his historical context. Ellis explains Walcott's continued administrative service as reflecting the Progressive vision of science as a way to solve human problems. While there are many disjunctions between Ellis and Walcott (Ellis has never been noted for his patience with bureaucracy despite or perhaps because of his life in Washington DC), they shared a faith that science could be a force for good on this earth.

Response by Ellis L. Yochelson

Because of "Oscar" Awards, public acknowledging is a well-known activity, and it is virtually impossible to prevent becoming a cliché. As a change, I will skip through the alphabet acknowledging a few people and places. The list is a small sample of the many to whom appreciation should be rendered.

Z - for Karl von Zittel, a chronicler of history of geology.

Y - is for three Yochelson kids, an investment which has paid grandchild dividends.

X - for Latin "Ex" (strange) as in expert and "spurt" as in a drip under pressure—my feeling now surrounded by my peers and betters.

W - for the late Alexander Wetmore, who presented opportunity and challenge to consider the life of Walcott.

V - for varied, as in my publication record (also eclectic or disorganized) .

U - for USGS for which I worked hard, but also stole time to do important things.

T - for Taylor, Ken, an exemplar for any history of science graduate student who aspires toward earth sciences.

S - for Sally who has put up with an incredible amount of aggravation for an incredible number of years; (not all aggravation is from history of geology).

R - for retirement; (with the formerly generous plan of the government this was my best career move).

Q - to be forgotten; (quest for knowledge is too dorky to include).

P - for publication, carrying with it certainty of mistakes; (the way to avoid them is not to publish, which is the biggest mistake).

O - for opportunity, granted me by many people for more than five decades.

N - for the Natural History Library, its librarians and all other libraries and librarians consulted; my appreciation includes archives and archivists.

M - for George Perkins Merrill, the ultimate source of why we are gathered.

L - for Leviton, Al, who provided unexpected opportunities to talk and publish.

K - for Kent State University Press, who actually sent a royalty check, which averaged out to $1.26 per year of investigation/writing, but moved me from mere author to professional writer.

J - to be ignored; (older son Jeffrey forced me from my KayPro to a real computer).

I - for Institution, Smithsonian (the "S" is for a more important purpose), for providing research associateship and for its archival staff.

H - for History of Geology Division and what more can I state other than THANKS!

G - for Gastropoda, the fossils of which provided my toehold into geology.

F - for Friedman, Gerald (and Sue) who made *Earth Sciences History* both evolve and progress.

E - for evaluation, as in book review, some of which make you quell with joy and others make you quake with dismay.

D - for deadline, a devise of fiendish editors - an oxymoron - and, because the world is not fair, who are always right.

C - for Claude Albritton, a senior man who went out of his way to be gracious to a greenhorn.

B - for Bork, Kenneth, who should know already why he is appreciated.

A - for Aldrich, Michele, who went through a book- length manuscript with both fine-tooth comb and hobnail boots, yet, despite all, was willing to be a citationist.

I appreciate this honor more than I can express. Insufficient as is the letter "H, conversely it conveys my all.

O.E. MEINZER AWARD

Presented to Steven E. Ingebristen

Steven E. Ingebristen
USGS, Menlo Park

Citation by Stuart Rojstaczer

It is truly my privilege to give the citation to my dear friend, Steve Ingebritsen, for this year's Meinzer award. Unlike most of you here, who know Steve strictly from his science, I know the whole person very well, his science, his family, and his friends. I've worked with him, written papers with him (None of which I note were cited in this award!), told stories to his three kids, and explained to his wife why he was late for dinner. I've even traded clothes with him. I've seen him with a smile on his face over the accomplishments of his kids. And I have seen him at 14,000 feet trying to deal with hypothermia.

I know him like a book I've read many times. And to carry that metaphor further, Steve is an excellent book. Every chapter is a good read. He is a wonderful friend and a great husband and father. He is a outstanding manager of people as Branch Chief at the U.S. Geological Survey. He cares about people, and doesn't hesitate to go out of his way to help others.

He isn't perfect. It's a truism that you can tell a lot about a person by the company he keeps. And when it comes to friends, Steve has a history of being attracted "ne'er do wells" including yours truly. Whether this tendency reflects a latent desire to live a "ne'er do" life vicariously or a desire to reform them by leading by example I cannot say.

And while winning awards like this one isn't a personality contest, it's worth noting two fundamental personality characteristics of Steve. He is a true optimist. He is not cautious at all intellectually. These characteristics, fundamental optimism and fearlessness in the pursuit of intellectual ideas are why I believe he has been so successful. It means that he is willing to take intellectual risks and believe that he can solve problems other people shy away from.

Awards like this ostensibly are awarded for work done in the last five years, but in fact this is a career achievement award, and Steve has had an outstanding intellectual career examining the interaction of fluids and heat in the crust of the earth.

Most people in groundwater are applied scientists. In contrast, Steve has pursued a different path and I think a very intellectually rewarding one. He works on fundamental problems on how a fluid-filled Earth behaves. He has been doing this for about 20 years now, and he is still coming up with rewarding insights.

His work on the evolution of hydrothermal systems done almost two decades ago yielded benchmark papers. His analysis of heat flow in the Cascades defied conventional wisdom. Most recently, his synthesis of permeability data in the crust of the Earth is a gutsy piece of work that I believe will be referenced and used for many decades to come.

Steve tackles interesting and difficult problems. When it comes to his intellectual life he is courageous. Because of his optimism and fearlessness he is leaving a lasting intellectual legacy, one that I think will continue to grow. He is someone who will always be able to find new problems and examine them in exciting ways. Thankfully, the baseball wisdom that nice guys finish last doesn't always hold true. Steve is one of the best groundwater researchers working today and is fully deserving of this award.

Response by Steven E. Ingebristen

My career in hydrogeology began when I had the great good fortune to be admitted to Irwin Remson's hydrogeology program at Stanford, where I was surrounded by an inspiring group of fellow students including Stuart Rojstaczer, Jean Bahr, Hedeff Essaid, Dick Iverson, Ken Belitz, and many others. (And I mean "good fortune" quite literally; Irwin told me a few years ago that Stanford was no longer taking chances on students like me, who didn't work as hard in college as I could have.) The Stanford hydrogeology program was a wonderful learning environment, and I think that all of us benefited greatly from Irwin's kind and generous leadership.

The same year that I started at Stanford – 1980 – I was hired as a student employee at USGS/Menlo Park. Since then, I've enjoyed the highly stimulating work environment at the Survey in Menlo Park. My own efforts over the years have been funded mainly by the USGS Volcano Hazards Program, focussing on problems at the interface between hydrogeology and the solid-earth sciences. In this regard it's been tremendously helpful to be collocated in Menlo Park with what are likely the world's best earthquake- and volcano-hazards teams. And among our many distinguished local hydrogeologists, John Bredehoeft, Paul Hsieh, and Barbara Bekins have been important guiding influences over the years.

I also have had great good fortune with more distant collaborations, notably with Stuart Rojstaczer at Duke, Craig Manning at UCLA, and Ward Sanford and Dan Hayba at USGS/Reston. The list of papers that was cited for the Meinzer Award reflects very enjoyable collaborations with these colleagues.

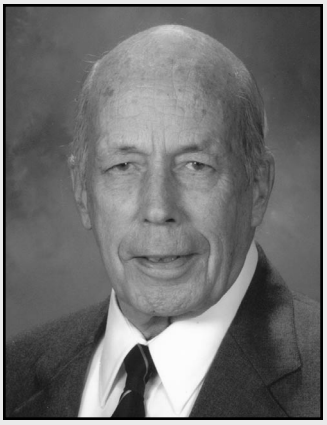
Receiving this sort of award presents an opportunity to wax philosophical, and has led me to reflect upon thoughts that I've heard expressed by distinguished colleagues over the years. Frank Schwartz started a healthy dialog a few years ago with his assessment of the "maturity" of hydrogeology as a discipline. I think that it is reasonable to view hydrogeology as "mature" in the sense that we often have adequate models to address problems in the traditional water-resources arena. (Though – as others have noted – we are often model-rich and data-poor.) But there are clear opportunities to make important contributions by applying state-of-the-art hydrogeologic approaches to non-traditional problems. Because of my own background I am most aware of opportunities at the interface with solid-earth sciences, and would cite, as one example, the growing awareness of the influence of fluids on fault behavior. There are also wonderful opportunities at the interface with the biological sciences, ranging from the applied (groundwater as an ecosystem resource) to the fundamental (the role of groundwater in evolution of the "deep biosphere"). There are – and surely always will be – a lot of exciting and worthwhile problems to work on.

I'll conclude by echoing something that Fred Phillips said two years ago when he received this award. Fred said words to the effect that none of us goes into this particular field to get rich; instead, we're attracted

mainly by the intrinsic interest and value of the work, and one of the greatest external rewards that we hope for is that our work be deemed useful by our peers. I'm very grateful for this recognition from those who have found my work useful. I had the opportunity to meet many of you three years ago as the Birdsall-Dreiss Lecturer, and would add that I am proud of the sense of purpose and community spirit that exists among hydrogeologists, and am glad to be part of it.

DISTINGUISHED CAREER AWARD

Presented to John A. Reinemund



John A. Reinemund
USGS Chief of Internation Programs
Deceased

Citation by Maurice J. Terman, George Gryc, and Richard J. Calnan

The International Division of GSA presents, posthumously, its inaugural Distinguished Career Award to John A. Reinemund in recognition of his outstanding career and contributions to the global community. John Adam Reinemund was a participant, supervisor, and consultant in a remarkable variety of projects worldwide during a career of more than 60 years. His geologic activities resulted in significant contributions to the collection and dissemination of earth science information especially for mineral and energy resources. His skill and creativity in solving problems successfully promoted earth science programs requiring cooperation and collaboration between academia, industry and government in the United States and in many countries and regions of the world.

John received a war service appointment with the U.S. Geological Survey (USGS) in their strategic minerals investigations to determine the availability of domestic supplies of minerals that were increasingly difficult to obtain from overseas sources. After his military service, John was assigned to mapping and assessing the reserves of the Deep River Coal Field in North Carolina, and to provide geologic guidance for a U.S. Bureau of Mines drilling program. In 1949, John transferred to the USGS headquarters in Washington D.C. where he prepared a professional paper on the Deep River Coal Field and Triassic Basin.

From August to December 1949, John was sent to Korea, along with three other USGS geologists, to make an assessment of South Korea's coal resources under a project funded by the U.S. Economic Cooperation Administration. When John returned to Washington he was appointed Deputy Section Chief of the USGS Fuels Branch. In that capacity, he assisted in inspecting and reviewing projects in the eastern United States.

In 1956, under an agreement with the U.S. Agency for International Development (USAID), John served as Principal Geologic Advisor to the Government of Pakistan. As Chief of the USGS team, he recommended the development of a national geologic and mineral program that included training the professional staff of the Geological Survey of Pakistan, preparation of a new geological map of Pakistan, identification and exploration of known mineral deposits, mapping of coal fields, and the establishment of engineering geology, photogrammetric, and publications programs. New national facilities were built in Quetta and regional facilities for East Pakistan (now Bangladesh) were established in Dhaka.

The demonstration in Pakistan of John's exceptional scientific and administrative abilities led to his appointment in 1964 as Chief of the Foreign Geology Branch. Through his interpersonal skills and his understanding of the fundamental problems faced by developing countries, he was successful in restructuring the USGS' overseas programs in technical assistance.

In 1967, Augustana College awarded John Reinemund an Honorary Doctorate of Humanities in recognition of his achievements in international scientific, technical, and educational assistance to emerging nations.

Thus for 20 years, John Reinemund devoted his energy to developing and directing worldwide international programs in the earth sciences through technical assistance, scientist exchanges, local or regional symposia, research projects and professional development. John placed much emphasis on personal contacts; his friendship with officials in many countries and his extensive travels to guide negotiations, maintain contacts, and monitor the Survey's overseas progress have undoubtedly contributed to the high prestige with which the USGS is now regarded abroad. His innate diplomacy, along with his remarkable organizational skills, the foresight of his scientific judgment, and a calm human compassion have earned John the respect and admiration of all those who have dealt with him.

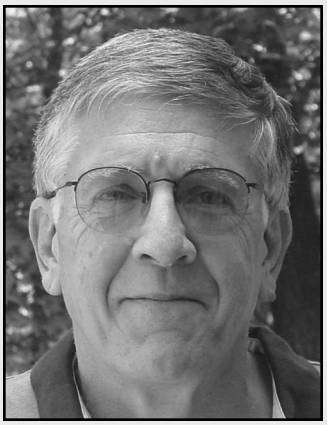
One of John's motives was to help the international community, whether it be a single individual, a complex government organization, or a major regional consortium, to achieve *its* geoscientific objectives rather than having the USGS doing it for them. Some of the principle successes of John's career include:

- Unification of Central Treaty Organization (CENTO) countries into a scientific and technical cooperative.
- Development of the Coordinating Committee for Joint Prospecting for Mineral Resources in Asian Offshore Areas (CCOP).
- Helped create the Circum-Pacific Council on Energy and Mineral Resources (CPC), served as CPC Executive Director, and received its Medal of Merit.
- Helped create in 1973 the Circum-Pacific Map Project (CPMP); served as lifetime Director.
- Member of the Board of the International Geological Correlation Program (IGCP).
- Treasurer of the International Union of Geological Sciences (IUGS).
- Helped create in the late1980s the Circum-Atlantic Project; served as a lifetime advisor.

Throughout his long career, John authored a number of research publications on the geology of the mineral and energy resources of the U.S. and of countries such as Pakistan, Turkey, Iran, and the Philippines. Also many administrative reports have been produced on the great variety of geoscience projects and problems that captured his attention. To recognize his significant contributions to furthering international geological research, especially in developing countries, John Reinemund received from the Department of Interior the Meritorious Service Award and the Distinguished Service Award, its highest honor. He also received the 2001 American Association of Petroleum Geologists Human Needs Award. The citation reads, "To John A. Reinemund, geologist to the world, for collecting and disseminating useful geologic information to fulfill human needs and promote collaboration between government, industry and academia." John will be remembered as a gentleman and a scholar who made an extraordinary contribution to the earth sciences in the international arena.

G.K. GILBERT AWARD

Presented to Roger J. Phillips



Roger J. Phillips
Washington University, St. Louis

Citation by Raymond E. Arvidson

It is with great pleasure that I introduce Roger Phillips, Professor of Geophysics and Director of the McDonnell Center for the Space Sciences, Washington University in St. Louis, as the 2003 G. K. Gilbert Award Winner. In reading Gilbert's papers I have been continually impressed by use of incisive field observations, followed by quantitative analyses of the observations that are designed to shed light on fundamental geological processes. Gilbert's study of the Henry Mountains, Utah, including field observations and modeling these laccoliths as "pistons" bounded by circular faults, is particularly appealing because of the nice interplay of geology and physics. Roger Phillips has followed and further developed this approach in ways that I think Gilbert would understand and approve of if he were still alive today. In fact, I suspect they would be great friends, with common interests in how planets work and how measurements of surfaces and interiors can be used to test and update quantitative, physically-based models for planetary evolution.

Roger's scientific accomplishments are extraordinary in both scope and depth, as demonstrated by publication of 135 peer-reviewed papers and book chapters covering the Earth, Moon, Mars, Venus, Mercury, and the icy satellites of the outer planets. Techniques that have been employed in his studies have focused on gravity mapping and geodynamical modeling, but have included magnetics, seismic, radar sounding, and image analyses. There are many highlights associated with his scientific career, including the first deep microwave sounding of the lunar crust as the Team Leader of the Apollo Lunar (Radar) Sounder Experiment, the first Bouguer gravity anomaly determination for Mars, developing the first gravity model and global stress calculation associated with the lithospheric load due to formation of the Tharsis Plateau on Mars, pioneering the development of Venus evolution models, leading the Basaltic Volcanism Project as Director of the Lunar and Planetary Institute, leading the Gravity Team associated with the Pioneer Venus Mission to Venus, carrying out the first Magellan analysis of the nature and distribution of impact craters on Venus, and most recently, laying out the evidence that formation of the Tharsis Plateau and associated massive volcanism controls the shape of Mars. Further, he demonstrated that the release of Tharsis volatiles fundamentally changed the climate of Mars to relatively warmer and wetter conditions. His interests and skills continue to expand, for example, as a Co-Investigator on the Mars Express MARSIS radar sounder and the Deputy Team Leader on the 2005 Mars Reconnaissance Orbiter SHARAD radar sounder. The objective for the two sounders is to map the subsurface structure of the martian crust and lithosphere, with a focus on finding evidence for water tables or horizons and mapping the distribution of subsurface ice. Roger is currently spending much of his time making sure that appropriate quantitative models will be in place and used in conjunction with the sounding data to detect and map subsurface structures and water-rock and ice-rock interfaces with a high degree of fidelity.

The planetary sciences are special in that many of the leaders in the field maintain strong relationships with NASA. The reason is that we depend on space-borne missions to acquire the data needed to understand the origin and evolution of the solar system and objects with it. In fact, NASA depends on the community and its leaders to provide the advice and guidance needed to ensure a program that is scientifically exciting and cost-effective. Roger has been a leader in providing advice and guidance throughout his career, including NASA and NRC advisory panels and panels that focused on review and selection of spaceborne instruments and experiments. In addition, he has held leadership positions at each of his home institutions, including Section Manager at the Jet Propulsion Laboratory, Director of the Lunar and Planetary Institute, Matthews Professor of Geophysics at Southern Methodist University, and Professor of Geophysics and Director of the McDonnell Center for the Space Sciences at Washington University in St. Louis.

Roger is, in my opinion, the ideal recipient of the C. K. Gilbert Award. He has a distinguished scientific track record that demonstrates a strong sense of where the new discoveries are to be made. He has combined observation and theory in ways that are very reminiscent of the approaches Gilbert used throughout his career. Further, he is a highly respected senior member of our community who is often asked and often serves in advisory capacities designed to ensure that the planetary exploration program maximizes science return and follows the most important scientific questions.

Response by Roger J. Phillips

Thanks for the very kind words, Ray. It is an honor and a privilege to receive the G. K. Gilbert award, and I thank the GSA, and the Planetary Geology Division, for this recognition. I am deeply privileged to have my name associated with G. K. Gilbert. Arvid Johnson of Purdue, a Gilbert disciple, has stated: "Perhaps Gilbert's most remarkable quality was his ability to interpret into mechanical theory what he observed in the field." I, too, have tried to work at the interface between geology and geodynamics, the former because it is the science I was drawn to first, and the latter because, in the end, I can solve equations better than I can make maps.

My path to the present has been long and tortuous. In a senior class home room in San Jose in 1957, I picked up a brochure that talked about an education in geology at the Colorado School of Mines. I had never thought of that, but I saw the possibilities of combining my interest in science and math with my love for hiking and backpacking. Besides, I (mistakenly) concluded that Golden, Colorado, was deep in the Rockies. I could go to school in the mountains! (This was the first of many geologic miscalculations that I was destined to make.) I was supposed to be headed to Berkeley, and leaving California did not please my parents, but this was offset (to them) by the financial benefits of a football scholarship. CSM was chock full of people interested in geology and geophysics, mining and petroleum, and Mines taught me how to be a problem solver in the Earth Sciences. My interests turned to mining geology, and many of my friends, including my good football/geology chum Art Pansze, went on to make careers of this. I was headed in that direction, too, and managed to do three summers of field

work in the Rockies. The people I worked for at Climax Molybdenum, all economic geologists from the University of Michigan, suggested that I needed to obtain a Ph.D. That had never occurred to me either.

In 1963 I set off finally to Berkeley to obtain a Ph.D. in Mineral Exploration. There in the Department of Mineral Technology, I discovered that the exploration geochemist was uninspiring, and the exploration geologist had just retired. That left the exploration geophysicist, the late Stan Ward, who influenced me to cross over to the dark side. Stan was an EM type, who at first befuddled me with upside down triangles in equations. For several years Stan immersed me in the nuances of the telluric and magnetotelluric methods, but in the mid-1960s, Stan got the idea of flying an electromagnetic sounding experiment from the Apollo spacecraft. Swept up by the national euphoria of going to the Moon, I signed up. In the span of three years I had moved from field work on a carbonatite complex in Powderhorn, Colorado, to solving the problem of low-frequency EM wave propagation in the plasma surrounding the Moon (and hopping around on Riemann surfaces). Welcome to the Space Program!

I trundled off to JPL in 1968, still with my eye on the Apollo EM sounding experiment (which we eventually flew on Apollo 17), but eager to work on the emerging Apollo data sets, which, unfortunately, the Apollo PIs were reluctant to part with. Go figure. The exception was Bill Sjogren, who had just co-discovered mascons, and who was more than willing to share his gravity data sets. Goodbye plasma physics, and the rest, as they say, is history.

I soon discovered that I needed to know more than simple gravity modeling, so I learned about lithospheric dynamics, mantle convection, thermal modeling, rock rheology, and so on. I have applied these geodynamical concepts to the planets and tried to tie them back, in the spirit of G. K. Gilbert, to the geology we observe at planetary surfaces.

The JPL days with Fraser Fanale, Doug Nash, Jim Conel, Steve Saunders, and others were exhilarating. It was there that I met a young Ph.D. from Caltech named Mike Malin, and he and I began a long collaboration, mostly trying to figure out Venus, although his most recent contribution was helping me dig my truck out of the snow last winter in St. Louis. In 1979 I moved on to became Director of the Lunar and Planetary Institute in Houston. Those were the "urban cowboy" days, and my most lasting contribution to LPI was the invention of the LPSC chili cook-off and barbeque, an act I now profoundly regret. I assembled an eclectic group of scientists there in the early 1980s, including Ric Wendlandt, Lew Ashwal, Matt Golombek, and the late Graham Ryder.

Somehow concluding that Texas was still the place to be (perhaps it was the heat or the bluebonnets), I accepted an offer in 1982 to become the Matthews Professor of Geophysics at SMU in Dallas. Lacking planetary science companions, I hung out with an unlikely though friendly crowd (e.g., vertebrate paleontologists Lou Jacobs, Dale and Alisa Winkler; palynologist Bonnie Jacobs; and archaeologist David Meltzer), and even fiddled with archaeological geophysics. In the late 1980s we recruited Vicki Hansen as our structural geologist, and she and I came to have, after I left SMU, an enjoyable collaboration trying to unravel post-Magellan Venus. I was recruited to Washington University in the early 1990s by my citationist, Ray Arvidson, who has been a good colleague and friend over the years, is a geologist who knows physics, and has made life easy for me at Wash. U.

I have now come full circle to my graduate school days, returning to my roots in EM theory by working on the MARSIS and SHARAD Mars radars. I appreciate Roberto Seu and his comrades for introducing me to radars, the Italian way, as well as for giving me the opportunity to learn about Italian culture.

When I think back over the 40 years since I left Mines, several overriding themes come to mind. First, I was extremely fortunate in being there at the start of planetary exploration. It has been a heck of a ride, though much more is in store for me. Second, I have always tried to follow the scientific problem, paying no attention to discipline boundaries. This to me is the great joy of doing science, of trying to solve a problem. Often this has gotten me into trouble, but just as often a knowledgeable colleague has bailed me out.

But the most memorable aspect of all of this has been the camaraderie. It's the friendships across the country and across the planet that make planetary science so enjoyable. We are a strange lot, driven hard by our quest to understand the planets, exchanging e-mails at two in the morning, whining about proposal writing and proposal reviewing, and not quite believing that they would actually pay grownups to do this stuff. We are always glad to see each other, to talk science and to swap stories. My planetary friendships go back decades and this includes Sean Solomon, who always sets a rigorous tone for scientific inquiry, remembers everything, and never met a sentence he couldn't improve. Norm Sleep, Kurt Lambeck, Gordon Pettengill, and Stan Peale have been good geophysical mates along the way. And we all miss Bill Kaula, who set a standard for planetary geophysics that all of us have strived for. Catherine Johnson, a friend and collaborator, has made IGPP at Scripps a welcoming place for me. Bruce Jakosky and Mike Mellon have made me feel at home at LASP in Boulder, and have opened up my eyes to a Mars evolution that involves more than interior geophysics and tectonics. Bruce has also introduced me to the concept of a Bombay Sapphire martini, best consumed at the Hotel Boulderado on a Friday afternoon while trying to figure out what makes planetary scientists tick. John Dvorak, Sue Smrekar, Mark Wieczorek, Steve Hauck, Rich Albert, and Brian Hynek were great graduate students and taught me a lot. So did step-graduate student, and presently my post-doc, Andrew Dombard.

For more than a decade, the MOLA science team on the Mars Global Surveyor mission has been a bastion of affability, with a team spirit and enthusiasm that has gotten the best science out of the topography data set derived from the orbiting laser altimeter. It has been a privilege to be on this team, and I warmly thank Dave Smith and Maria Zuber for providing such excellent leadership. We will all carry on the party, led by Sean, as we start the journey to Mercury next year.

In closing I would like to acknowledge two really fantastic people, my daughters Kristina and Kimberly. As for my wife Rosanna, she is my best buddy, the love of my life, and, thankfully, works hard at removing my head from the planets when necessary and re-rooting me in reality.

KIRK BRYAN AWARD

Presented to
Michael R. Waters
and
C. Vance Haynes

Citation by Lee Nordt

It is with great pleasure that I present the citation for the 2003 Kirk Bryan Award to Dr. Michael R. Waters (Professor, Texas A&M University) and Dr. C. Vance Haynes (Professor Emeritus, University of Arizona) for their benchmark paper entitled: "Late Quaternary Arroyo Formation and Climate Change in the American Southwest". This paper, published in *Geology* (2001, v. 29, p. 399-402), is a culmination of four decades of work by Waters and Haynes studying late Quaternary stream dynamics in the North American Southwest. Do not be deceived by the papers length, a mere four pages. From data collected during a period of nearly 40 years, it represents a synthesis of over 200 radiocarbon ages and numerous stratigraphic descriptions from several major drainage basins. Kirk Bryan was keenly interested in arroyo formation and I am certain that he would have enthusiastically embraced this paper and the selection of this years awardees.

Dr. Haynes began investigating temporal aspects of late Quaternary alluvial stratigraphic successions in the Southwest during the early 1960s using the new radiocarbon dating technique. Although now retired as a professor, his work in the area has continued to this day. Michael Waters, under the direction of Dr. Haynes, began his Ph.D. studies in the early 1980s on the alluvial stratigraphy of Whitewater Draw in Arizona. After receiving the doctoral degree, Dr. Waters continued to examine arroyos and rivers in the region compiling a large number of stratigraphic sections and radiocarbon ages contributing to the reservoir of data already collected by Dr. Haynes.

It should be pointed out that although arroyos are widespread in the Southwest, their formation has been an enigma. The 2001 manuscript upon which this award is based, concisely and unequivocally establishes a 7.5 ka year history of arroyo deposition and incision. It is noteworthy that for the first time we know when arroyo formation began, that it accelerated during the last 4000 years, and that its formation is largely linked to post-glacial climates accompanied by changing El Nino-Southern Oscillation patterns, vegetation, groundwater conditions, and human land use. We now also better understand prehistoric settlement patterns, prehistoric preservation potentials, and subsistence strategies in an area rich in important archaeological sites. Perhaps most importantly, this paper resolves the century-old debate about the influence of human impacts on arroyo cutting because it is now clear that another cycle of incision would have occurred regardless of land use.

Both Waters and Haynes have won numerous teaching and research awards, both have become members of important societies, and both have received numerous grants based principally on their work dedicated to alluvial histories of the Southwest. They greatly deserve this important award: to Dr. Haynes for life-time achievement and to Dr. Waters for bringing four decades of work to its final fruition. There is no doubt this is a landmark paper that will be cited for years to come. Thanks to both of you for your dedication and significant contribution to understanding a long-standing problem in the field of Quaternary Geology and Geomorphology.

Response by Michael R. Waters

Michael R. Waters
Texas A&M University

It is an honor to receive the Kirk Bryan Award. I am especially please to share this award with my mentor, Vance Haynes–who gave me my start in Quaternary geology and geoarchaeology.

I first learned about desert streams and their complex stratigraphy at the Lehner Clovis archaeological site in southern Arizona. At that time, I was an archaeology major. While working as an excavation hand for Vance Haynes, I was able to see the stratigraphy of this and other sites in the San Pedro Valley. I saw the black mat, buried Holocene arroyo fills, and paleosols. I was hooked. With the support of Vance Haynes and Ted Smiley, I switched my major from archaeology to geology which has taken me down the path of marrying my interests in these two disciplines.

My first hands-on encounter with desert streams came with my dissertation work on Whitewater Draw. There I was working on the archaeological problem of the age of the Sulphur Spring stage of the Cochise Culture. To resolve this issue required putting these sites into a dated geological sequence. This led me to establish the alluvial stratigraphy of the Draw.

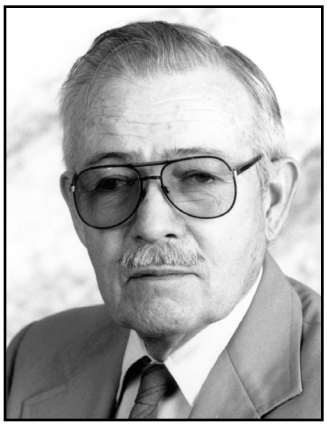
After completion of my dissertation, I had the good fortune to meet John Ravesloot. At the time, he was working on a site in the floodplain of the Santa Cruz Arroyo south of Tucson. There, he had a complex and confusing stratigraphic record of arroyo cutting and filling. Combining this project with others along the Santa Cruz River, as well as building on the research of Haynes, Freeman, and others, I was able to reconstruct the complex late Quaternary stratigraphy of this arroyo.

I would like to point out that much of our arroyo research has been funded by archaeological contracts and grants. This research likely would not have been possible without the support of archaeologists who believed that understanding the geology of their sites and the surrounding area was important to their research. The noted Kirk Bryan also worked extensively with archaeologists. Archaeological research and contract projects have provided much information on the late Quaternary history of many regions and this contribution deserves credit. Over the years, I have worked with many wonderful archaeologists in an effort to understand arroyos and the operation of fluvial systems in southern Arizona. This collaborative research was done to determine how fluvial landscapes changed over time, what triggered these changes, and how these landscape changes influenced the prehistoric people who lived along and depended on these streams.

In closing, I thank Lee Nordt for his kind words and for nominating our paper. I thank the awards committee for choosing our paper. I thank my parents, John and Jane Waters, for their lifelong support. Most importantly, I thank the two unmentioned coauthors of the paper–my wife, Susan, and daughter, Kate, for their support of my many wanderings. They keep the home fires burning and are the most important members of my research team.

Thank you.

Response by C. Vance Haynes



C. Vance Haynes, Jr.
University of Arizona, Tucson

It was a complete surprise when Mike Waters called me to say we were to receive the Kirk Bryan Award for 2003. This is indeed both a great pleasure and honor because I have always considered Kirk Bryan to be a mentor in absentia. It is unfortunate that Bryan did not live to see the full application of radiocarbon dating to his alluvial chronology of the American Southwest that led to my 1968 syntheses, The Geochronology of Late Quaternary Alluvium, as well as to the paper for which this award is presented to Mike Waters and me. To share this award with Michael Waters is a special privilege. Many thanks to Lee Nordt for nominating us.

Mike started out in anthropology studying to be an archaeologist when a crewmember on the 1974-75 reexcavation of the Lehner Clovis site, Larry Agenbroad and I introduced him to archaeological geology first hand. Mike picked up on geology and the rest is history, as they say.

When I came to the University of Arizona in 1961 to seek the Doctorate in Quaternary geology, it was my intention to attempt to resolve the question of the relative age and potential relationship of the Sulphur Springs phase of the Cochise Culture of Whitewater Draw, Arizona, and to determine the potential relationship of the phase to the Clovis technocomplex at the Naco and Lehner sites. After Peter Mehringer and I discovered the Murray Springs Clovis site in 1966, it became apparent that this and the return to the Lehner site was all I could handle. Mike's Master's thesis on Paleolake Cahuilla in southern California is a masterpiece, and it demonstrated the late Holocene ages of artifacts that some thought to be late Pleistocene. After seeing Mike's progress and dedication to archaeological geology, it became obvious that he was the right person to tackle the Whitewater Draw Quaternary geology for his doctoral dissertation. This work on the alluvial chronology of Whitewater Draw in the Double Adobe area clearly demonstrated the post-Clovis stratigraphic position of the Sulpher Springs phase.

Mike's study of the Santa Cruz alluvium of the Tucson Basin resulted in the clearest evidence yet for the impact of alluvial processes on cultural changes in the prehistoric record. Put all of this together with his integration of the works of others and we have the first definitive text on the Principles of Geoarchaeology by none other than Michael R. Waters. It is Mike's interpretation of arroyo formation linked to dry-wet cycles as also linked to El Niño and non-El Niño conditions that led to the paper for which we receive this award. It is an honor to share this award with such a distinguished scholar and colleague.

LAURENCE L. SLOSS AWARD

Presented to Robert J. Weimer

Robert J. Weimer
Colorado School of Mines

Citation by John W. Robinson

Robert J. Weimer has been active in the geosciences, either as a consultant, educator, or businessman for over 50 years. Bob's accomplishments are many and he continues to work on geologic problems with the same gusto as a graduate student. Let's review the background of one of the foremost geologists of our time.

Bob was born in Glendo, in east-central Wyoming, on the Hartville Uplift and within walking distance of some economically important Pennsylvanian strata. After service in the U.S. Navy, he received a BA and MA in Geology from the University of Wyoming in 1948 and 1949 and then headed west to Stanford and completed a Ph.D. in 1953. During this time he met and married Ruth Adams who has been a lifelong supporter and partner in Bob's career. In 1949 he began to work for Union Oil Co. and five years later decided to go out on his own as a consulting geologist. As a consultant, he was instrumental in the discovery of the Arch Unit, which is now the north half of Patrick Draw oil field in Wyoming. The discovery was an outgrowth of detailed field work and stratigraphic intuition. The discovery established a new area of production and advanced the use of stratigraphic principles as a predictive tool in petroleum exploration.

With work experience and a dose of exploration success under his belt, he joined the Department of Geology and Geological Engineering at Colorado School of Mines in Golden in 1957. It was during his time at CSM where he made many of his lasting contributions to geology. He was head of the department from 1964-1969 and "retired" in 1983 as Getty Professor of Geological Engineering. As Professor Emeritus, he continues his involvement with the school as an active participant in their academic programs. He is currently supporting the preparation of a book documenting the 129-year history of the school. Bob is first and foremost a teacher. Hundreds of undergraduate and graduate students at CSM and industry professionals have benefited from the courses he taught in stratigraphy, sedimentology and petroleum geology.

Bob has served in many capacities for professional and technical organizations. He was President of AAPG (1991-1992) and has received their highest honor, the Sidney Powers Medal (1984). He was President of SEPM (1972-1973) and has received their highest honor, the Twenhofel Medal (1995). At Colorado School of Mines he was awarded the Mines Medal in 1984 and the Brown Medal in 1990. He is past president of the Rocky Mountain Association of Geologists and the Colorado Scientific Society. In 1992 he was elected to the National Academy of Engineering for his application of stratigraphic principles to exploration and for promoting continuing professional education.

Bob has been an active member of GSA as a guidebook editor, chairman of the Rocky Mountain Section, and member of numerous committees. He is currently on the Foundation Board. His most notable effort for GSA was serving as General Chairman of the 1988 Centennial Year Meeting in Denver.

Bob has given lectures at numerous universities around the world. He has been a distinguished lecturer for AAPG (3 times) and SEG, was a Fulbright lecturer at the University of Adelaide and a visiting professor in Indonesia and Canada. He has published nine books and was senior author on over 100 papers and numerous abstracts.

As many of us in the Rockies know, Bob was using sequence stratigraphic concepts long before the use of such terminology became vogue. His geological papers have been diverse with topics ranging from modern coastal sedimentation, deltaic sedimentation, paleotectonics, petroleum systems, sequence stratigraphy, sea-level change and professional ethics.

Figures from his 1960 *AAPG Bulletin* paper on Upper Cretaceous stratigraphy in the Rocky Mountains are still a standard reference point for many researchers. In the early 1970's his research focused on deltaic systems and their facies associations. By the late 1970's and early 1980's he was investigating the interaction of paleotectonics and valley-fill deposits. In the mid 1980's he was senior author on a paper that discussed the relationship of unconformities, tectonics and sea-level change on Cretaceous strata in the Western Interior. In the 1990's his papers dealt with sequence stratigraphy, fractured reservoirs and the history of oil and gas development in the Rocky Mountain region. These were all important papers and advanced our understanding of the nature of the stratigraphic systems in the western U.S.

Based on his lifelong contributions as a scientist and mentor, Bob is certainly deserving of recognition by the Sedimentary Geology Division of GSA. It is an honor to present this year's Laurence L. Sloss Award to Robert J. Weimer.

Response by Robert J. Weimer

My selection as the 2003 recipient of the Sloss Award by the Sedimentary Geology Division is indeed a high honor for which I am most grateful. To receive this prestigious award, named after a long-time friend and professional colleague, is indeed a most pleasant surprise. I thank the GSA officers and committee for this recognition, and John Robinson for his kind words about my career.

I first met Larry Sloss when I was a student attending the Wyoming Geological Association's Field Conference on the Big Horn Basin in August 1947. As a sidelight, this conference was the start of planning for the GSA Rocky Mountain Section, which was organized the following spring at a meeting I attended in Laramie. Larry was near the end of several years at the Montana School of Mines at Butte, where he had studied the Paleozoic carbonates and unconformities of Montana before moving to Northwestern in 1947. This work was later expanded to all of the craton and, in collaboration with Krumbein and Dapples, gave birth to the sequence stratigraphy paradigm. My last conversation with Larry was at the 1996 GSA meeting in Denver, October, where we were engaged in an informal planning session for a 50th Anniversary Big Horn Basin Field Conference, July 1997. Larry was enthusiastic about the meeting in Cody and hoped to attend, although he didn't tell us of a terminal illness. This giant of stratigraphy died shortly after on November 2, 1996.

We had one other item of unfinished business. Previously, I sent Larry some

comments I had written about the important advances in geologic concepts from industry research laboratories and operations, and their financial support to geology departments in general, and stratigraphic programs in particular. At the time, I was reminded of John Fuller's classic paper on the "Industrial Basis for Stratigraphy". Larry agreed with my comments and replied that a conference should be organized to elaborate and document this under-appreciated part of our history, but this never happened.

I have always had broad interests in geology, but made early commitments to structural geology in a Masters thesis, under Don Blackstone, (for whom Sloss worked at one time in Carter Oil Co.). In later work for Union Oil Co., I handled a play in the thrust belt of northwestern Montana and Alberta. Understanding stratigraphy became important in order to decipher structure, paleotectonics and unconformities, and I wanted to know more about the subject. As a graduate student at Stanford, I was exposed to the details and tedious background of the dual classification of rocks as advanced by Schenck, Muller and Hedberg. After much invited and published discussion, the lithostratigraphic and chronostratigraphic terms were formalized by stratigraphic code committees chaired by Hedberg. As an undergraduate at Stanford (BA'34), Larry found the historic views of the time-rock units rather boring but, when I attended Stanford 17 years later, I regarded the dual approach as exciting and innovative. I was easily converted to my career of unraveling the intricacies of sedimentary rocks, and to searching for cleverly hidden natural resources.

As a consultant, my work incorporated results of API Project 51 on modern shoreline sandstones of the Gulf of Mexico and utilized new concepts in recognizing Cretaceous shoreline sandstones as reservoirs for stratigraphic petroleum fields. This approach led to basin and facies analyses with emphasis on traps, seals, and migration.

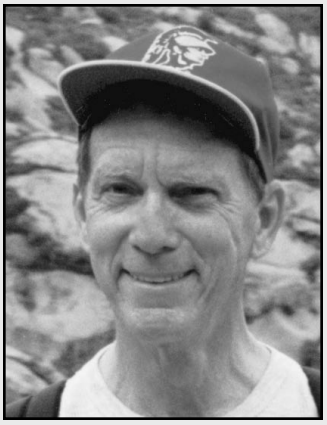
Success in finding oil and gas fields, with reserved royalty interests, laid the foundation for me to fulfill an ambition to teach, and I accepted an appointment to a position at the Colorado School of Mines vacated by the retirement of J. Harlan Johnson of calcareous algae fame. Mines proved to be a wonderful base for working with outstanding students, for conducting both applied and basic research, for interaction with dedicated and talented colleagues, and for making industrial and academic contacts for teaching and lecturing throughout the world. The dedication at Mines to train students in geology, geophysics and geochemistry to find and develop natural resources globally was an excellent fit for me. To demonstrate the application of new concepts in exploration and development, I originated continuing education courses for industry personnel.

I owe a debt of gratitude to many people who supported by career and gave me the opportunity for professional development and service to geological societies and employers. My greatest appreciation is to Ruth, my wife of 55 years, who was the silent second worker—"they got two for the price of one".

Here are a few thoughts for the future gathered during a long career: never stop dreaming and planning; never stop thinking and creating; never stop doing and expressing; and never stop being grateful to those who paved the way. At every point in time, mankind accepts as truth some dogma that is wrong. The challenge for each new generation is to identify the incorrect dogma and make changes; the challenge for the older generation is to guide, encourage, but not to obstruct change. And finally, books are written by men and women but they are sometimes wrong; the field is always right if you can read it. Or, as the philosopher Bertrand Russell wrote "even when the experts all agree, they may be mistaken".

STRUCTURAL GEOLOGY & TECTONICS DIVISION CAREER CONTRIBUTION AWARD

Presented to Gregory A. Davis



Gregory A. Davis
University of Southern California

Citation by B. Clark Burchfiel

Greg and I first met as undergraduates at Stanford where he graduated with a BSc in l956 and MSc in l957 then deserted the "Farm" to migrate across the bay to U. C. Berkeley where he received his PhD in l961. His early work followed from his dissertation studies in the Klamath Mountains on a detailed study of the Caribou Mountain pluton, westward thrusting within the Klamaths, and the metamorphic and granitic history of the Klamaths. From this early work came several very important syntheses, perhaps the most important of which was the tectonic correlation of units between the Klamaths and the Sierra Nevada in l969 which influenced all our thinking about Paleozoic and Mesozoic accretion tectonics of the Cordilleran orogen. In the early 1960s Greg and I began work in the Cordilleran thrust belt along the east side of the orogen and began to think about how his work in the Klamaths related to the thrust belt in Nevada, Utah and California. From this joint effort came a synthesis paper with a troubled history, "The two sided nature of the Cordilleran orogen and its tectonic implications."

The early l960s and 1970s were a great time for our cooperation, and in my opinion were some of the happiest and most productive times for both of us. Two papers on the interpretation of the evolution of the Cordilleran orogen in l972 and 1975, the paper on the Garlock fault as an intracontinental transform structure in l972, the comparison of the Mesozoic Cordillera with the modern analog in the Andes in l976, and the Mesozoic construction of the Cordilleran collage in 1978, where Greg put forth an interpretation of doubling of the orogen by strike slip faulting the NW Cascades and adjacent Canada, were published. Our work together continued for about ten years when he began his now classic studies of extensional tectonism in the southern Colorado River area.

His first papers on the extensional system came out in l979. This work followed on the heels of earlier work of Dick Armstrong, Ernie Anderson, and John Profit who had begun to recognize the presence of Cenozoic extension on low-angle normal faults. The late 1970s were a time of great debate about the existence of low-angle normal faults and related core complex formation, but in my opinion, it was the very careful mapping and attention to detail of Greg and his students working in the Colorado River terrain that documented and clarified the existence, magnitude and importance of these structures in a series of papers from l979 to the early l990s. His two papers with Gordon Lister on the nature of detachment faults and core complex formation in l988 and l989 are classics that still are required reading.

In l987 Greg began work to document large magnitude extensional tectonism in China north of Beijing with his colleague Zheng Yadong. Subsequently Greg and Yadong moved west into Inner Mongolia where published maps suggested important Early Cretaceous extensional structures were present but unrecognized; now documented and shown to have developed within a few million years of major crustal shortening. This work has fully opened the floodgates for widespread extensional tectonics in China, but the extent and relation of this extension to plate boundaries has been very challenging in explaining its tectonic origin. What makes this work so important is not just the major contribution to Chinese tectonics, but the fact that it is very difficult to explain the tectonic setting of Early Cretaceous extension and core complex formation more than 1000 km removed from any major plate boundary. These studies break new ground and are producing results that are challenging all our concepts for the dynamics of large magnitude extensional faulting.

Greg's work of more than 40 years has had enormous global impact on structure and tectonics from well-documented field studies to geodynamic analysis. It is only fitting that he is the 2003 recipient of the SG&T Career Contribution Award.

Response by Gregory A. Davis

This award is a dream come unexpectedly true. I am extremely grateful to the Division, to GSA, and to those who nominated me for making it happen. My review of the 15 Career awardees who have preceded me leaves me feeling appropriately humbled to be included amongst them, and happily aware that one of them was my teacher —Ben Page at Stanford, another my grad office roommate at Berkeley—Win Means, and still another, my oldest friend and longest interacting colleague—Clark Burchfiel. My need to respond to Clark's overly kind citation has prompted my analysis of how this honor may have came about. Hopefully, in part, because of moderate intelligence and, in earlier years, strong legs. However, of no lesser importance in my being here today has been the influence of, and interactions with, others. My father, Rodney Davis, a Portland fireman, started the process by encouraging in many ways a 10 year-old boy to develop his budding interests in geology-rich Oregon. I cherish those memories. Later came my association with superb geologists, some of whom profoundly influenced my education, and others who worked with me as research colleagues over the years. Ben Page, my undergrad structure professor, and Lionel Weiss, with his pioneering work in structural analysis at Berkeley and before, were the most influential contributors to my education. Subsequently, much of my tectonics research has been co-authored with stellar individuals who either deserve a Career award in their own right—Jim Monger, Gordon Lister, and Darrel Cowan lead that list—or, in the case of my citationist, have already won it.

Another factor contributing to my presence here today is simply repeated good luck! I had wanted to conduct Ph.D. research in northeastern Oregon, but was informed by a professor at another university that the area in question was his. I therefore turned to my second choice, the Klamath Mountains of northern California. It was pure serendipity! Doctoral and subsequent field studies there led to my rediscovery (long after the forgotten

work of Oscar Hershey in ca. 1905) of major Mesozoic west-directed thrust faulting.

In 1964, Clark and I began Mohave Desert mapping in the east-directed foreland thrust belt and pondered over the divergent thrust geometry of the Cordilleran orogen. We submitted a "two-sided orogen" paper in the mid-1960's to *Science*, but it was twice rejected as unsubstantiated. Although later published in the obscure proceedings of the 1968 IGC meeting in Prague (ended abruptly by the Russian invasion), its core ideas led us to *AJS* papers in 1972 and 1975 on possible plate origins of the US Cordillera.

The Klamaths and their fault-bounded counterparts in the northern Sierra Nevada also provided fodder for early tectonic correlations between Canada and the US within what we now call the accreted terranes. A 1978 gray literature paper co-authored with Jim Monger and Clark on this Cordilleran "collage" remains one of my favorites.

It was more good fortune that I was introduced in 1975 to the Whipple Mountains of southeastern California by a San Diego State master's student, Ann Terry. Her discovery of enigmatic subhorizontal faulting in that range led to a decade-long USC field and petrologic effort there with my colleague Lawford Anderson, a dozen of our students and, later, Gordon Lister. In 1981, Brian Wernicke, a USC undergrad then at MIT, published in *Nature* a conceptual breakthrough on the nature of low-angle normal faults and the "metamorphic core complexes" of George Davis and Peter Coney that contained them. Our understanding of continental crustal extension would never again be viewed in conservative ways, and evolves still.

My recognition on a one-day fieldtrip north of Beijing in 1985, of a Whipple-like core complex underlying the Great Wall was continuing good luck and led to research in China that continues to this day. Again, collaboration with others, among them Peking University's Zheng Yadong and Qian Xianglin, and Arizona's George Gehrels, has provided new insights into the complex Mesozoic mountain systems of northern China. My appointment, since 2000, as a Guest Professor at Beijing's China University of Geosciences is a most welcome one and greatly aids this research.

I must close this response with mention of the many students, some 45 or so, who trusted me to be their graduate adviser at USC. They sometimes found me over-demanding, but, I hope, always fair to them and interested in their projects. They, too, have contributed in many different ways to who and where I am this day, and I collectively thank them for that. It's very clear that my appreciation for this award is owed to many.