

In accordance with the resolution passed at the New Orleans meeting to pay tribute to members passing away during the year, Chairman Harshbarger asked the members to stand for a moment of silence in memory of J. Hoover Mackin.

Bill Back announced details on arrangements for the field trip on Thursday, November 14.

Leo Heindl spoke briefly about what is going on in the United States concerning the International Hydrologic Decade and distributed pamphlets concerning the I.H.D.

Chairman Harshbarger announced the newly elected officers for 1969 and introduced those present at the meeting. 1969 officers are: C. V. Theis, Chairman; James J. Geraghty, First Vice-Chairman; Paul Hilpman, Second Vice-Chairman, and Robert E. Bergstrom, Secretary-Treasurer.

Chairman Harshbarger turned the meeting over to the 1969 chairman, C. V. Theis. Chairman Theis adjourned the meeting at 4:50 p.m.

Respectfully submitted,  
JAMES H. IRWIN  
Secretary-Treasurer

## Presentation of the O. E. Meinzer Award to Mahdi S. Hantush

CITATION BY JOHN W. HARSHBARGER

The Hydrogeology Division of the Geological Society of America presents an annual award in memory of O. E. Meinzer, who is regarded as the father of ground-water geology and hydrology. We honor this outstanding scientist for the framework of ideas and concepts he has given us on which to build a basic earth science. Many persons have made significant contributions to Dr. Meinzer's fundamental pattern in the development of a more sophisticated and exacting foundation of ground-water hydrology. It is appropriate that the O. E. Meinzer award is based on outstanding hydrogeological publications without restrictions as to publisher, or nationality of the recipient.

The 1968 Award Committee, under the Chairmanship of Raymond M. Richardson, unanimously selected Professor Mahdi S. Hantush, author of *Hydraulics of Wells*, Advance in Hydrosience, Academic Press, p. 281-432, 1964, to receive the O. E. Meinzer award this year.

Mahdi Hantush was born in Hit, Iraq in 1921; he is married and has five children. He is fluent in Arabic and English with reading capability in French. He completed his undergraduate studies at the American University, Beirut, Lebanon, majoring in Civil Engineering; a Master of Science degree in Irrigation Engineering at the University of California at Berkeley; and completed his graduate education at the University of Utah where he received a Ph.D. in Civil Engineering with a major in Ground-Water Hydrology in 1949.

Mahdi has an outstanding and impressive list of publications in leading scientific journals, which attests to his competence and untiring pursuit to further knowledge on ground-water flow behavior. He has a wide understanding of the many factors and relationships associated with flow dynamics of aquifers, pertinent to the development of solutions to complex ground-water problems.

His experience as Senior Hydrologist with New Mexico Institute of Mining and Technology in Socorro, New Mexico; Dean of College of Engineering, University of Baghdad; Technical Advisor to the Ministry of Education in Iraq, association with the University of Utah, and as a ground-water consultant in the Middle East, have served Professor Hantush well to provide a broad scope for his paper *Hydraulics of Wells*. We appreciate the growing importance of many ground-water supply problems that confront the hydrologist and the effective use of wells for optimum water production and management. These include drainage problems in irrigated lands, control of salt-water encroachment, water-pressure relief for construction of dams, recharge to ground-water reservoirs and mine drainage. Professor Hantush recognized the manifold array of hydrogeological conditions and assumptions the hydrologist must make in dealing with an analytical solution of subsurface water-flow behavior. He has developed and presented theoretical mathematical models on well hydraulics, which make his paper a recommended reference for students and investigators working toward solutions of complex conditions pertaining to ground-water utilization and management.

To meet the challenge of reorientation of basic concepts one must often advance into purely theoretical considerations to obtain insight and perspectives to solve pragmatic problems. Professor Hantush has consolidated various theories along with his extensive experience, which gives us a broader vision and capability to advance our knowledge of ground-water hydrology.

We are pleased to have Dr. Hantush attend our meeting today to receive the O. E. Meinzer Award. The accompanying trophy, a silver bowl presented to the Hydrogeology Division by Mr. John Birdsall, is inscribed with his name as the fourth recipient of the O. E. Meinzer award.

I take great pleasure in presenting this award to Professor Hantush who has come from Baghdad to be with us today.

RESPONSE BY DR. MAHDI S. HANTUSH

*Mr. President, Mr. Chairman, Gentlemen:*

I am honored and pleased to be among the recipients of the O. E. Meinzer Award. It is most gratifying to find that the things I have done, or tried to do, have been appreciated by colleagues in the fields of Hydrogeology, Geohydrology, and Ground-Water Engineering.

Looking back at the diary of my progress in applying mathematics to ground-water problems, I find much that should be detailed or clarified. It is fortunate that the terms of the O. E. Meinzer Award are in part to inspire further effort, and I hope that some day I may perhaps be more truly worthy of this honor.

Ground water has been and will continue to be an important source of water for irrigation, industrial, and domestic uses. Ground water is invariably moving. This movement is governed by established hydraulic principles and by the nature of the conducting subsurface strata. Quantitative formulation of such movement is important not only in



Mahdi S. Hantush, 1968 Recipient  
of the O. E. Meinzer Award

determining the value of ground-water reservoirs as sources of water supply, but also in other fields of endeavor, such as draining agricultural lands, controlling salt-water encroachment, relieving pressures under dams and levees, recharging ground-water reservoirs, and disposing of chemical and radioactive wastes.

Because of the importance of ground-water hydraulics to water economy in many regions of the world, the study of this branch of science has occupied the attention of many investigators. To obtain solutions for ground-water problems, assumptions regarding type of flow and boundary conditions have to be made. Although such solutions often only approximate field conditions, they have yielded results that, in many instances, have been confirmed by laboratory and field observations. It is true that in the analytical approach of solving ground-water problems one tries to describe nature by making some kind of a mathematical abstraction or over-simplification of what nature really is. However, one should remember that homogeneity of a geologic complex and the nature of flow therein are a matter of scale. The degree of relative heterogeneity depends on the size of the strata considered. In waste disposal and dispersion problems, for example, one has to look at the details, but very often one gets lost in the details where they are not too highly involved. One's preconceptions about the complexity of nature should not exclude the value of simplified assumptions. No model, mathematical or otherwise, can duplicate what nature really looks like. It is true that some models approximate nature better than others, but not every project or investigation can justify the expenditure or the time involved in obtaining absolutely precise answers. Frequently, preliminary studies are concerned with reasonable answers only. Consultants, very often, are asked to give an answer now or next Monday. Instead of the rule-of-thumb, the use of rational approaches in the hands of qualified men will produce a more reliable answer.

Many a solution that is based on simplified assumptions has proved to be a valuable tool in the hands of experienced hydrogeologists and ground-water engineers; consequently, and notwithstanding the many simplified assumptions on which theoretical and experimental solutions are based, these solutions have and will continue to contribute much toward a better and more economic development of ground-water resources.

In accepting the O. E. Meinzer Award, I feel that I must share it with many of my colleagues who have helped so much. It is not possible to thank all of them adequately here. However, I feel especially indebted to three men for their inspiration and encouragement when it counted most: First, to my professor, C. E. Jacob, who is well known to all of you, whose superb demonstrations of the power of thinking and of observation in the laboratory as well as in the field have been and will continue to be important guidelines in my work; secondly, to Dr. E. J. Workman, former president of New Mexico Institute of Mining and Technology, for encouragement and interest when I might not have continued, and for an attitude of ardent support and belief in the mathematical approach in solving ground-water problems; last but not least, to Dr. C. V. Theis of the

United States Geological Survey, who is universally known as the founder of the modern concept of ground-water transients, for his continued interest in my work in the field of ground-water hydrology.

Thank you, and may the Lord bless you all.