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Medwin Takes ASA's Gold

NPS NEWS June 6, 2001

by Barbara Honegger

Great oaks from tiny acorns grow, and great honors come from studying the smallest of things -- even the tiniest ocean bubbles.

On June 6, NPS Professor Emeritus of Physics Herman "Hank" Medwin received the highest honor awarded by the Acoustical Society of America (ASA), its Gold Medal, "for innovative research in ocean acoustics and leadership and service to the Society." Only one member each year is selected to receive the award, first presented on the occasion of ASA's 25th anniversary, in 1954. Medwin is also one of only two members to have received the Society's Silver Medal in Acoustical Oceanography, in 1997.

ASA is the world's oldest, largest and most prestigious professional association devoted to the scientific study of acoustics -- the generation and detection of sound. Acoustical Oceanography is one of the organization's thirteen scientific sections.

At the awards ceremony, during ASA's Spring meeting in Chicago, Medwin was introduced by Dr. Larry Crum, a senior scientist with the Applied Physics Laboratory of the University of Washington, Seattle and past president of the association.

"Hank, you are a man of many adjectives. You are creative and talented, persistent and resourceful, unselfish and genial, and, yes, at times, even stubborn and irascible, but most of all, you are generous. Generous with your time, your talent, and your treasure. You have been our teacher, our leader, our patron. We are honored to have you in our company of acousticians. Indeed, you are 'the' quintessential acoustician, and we are proud to honor you with our Gold Medal."

"This is the highest award I could receive in my field," said Medwin in a recent interview. "I'm really proud, especially since (Georg) von Bekesy, a Nobel Prize winner, and Philip Morse, a founder of Operations Analysis, were also recipients. When I first heard about it, I was shocked, and then really impressed. Now, I'm kind of getting used to the idea. I must say, it feels great. This is really an honor, both for myself and for the Naval Postgraduate School."

In fact, Medwin 'plugged' NPS in his acceptance remarks at the meeting.

"I cheerfully mention my principal co-mavericks in acoustics research -- about 30 Naval Officers, candidates for the Master's Degree in Physics at the Naval Postgraduate School, several of whom have risen to the rank of Rear Admiral or Vice Admiral. Could it be that their promotions in the Navy have been due to their thesis research in acoustics?" he asked with a characteristic wink and nod.

It all began when "Hank" Medwin, also known to his friends and colleagues as "Red," decided to pioneer a new field called acoustical oceanography -- using underwater sound to study the sea -- and became the world's expert on how huge numbers of tiny ocean bubbles absorb and scatter sound waves. Such "microbubbles" are produced by plant photosynthesis, gas emitted by decaying matter, and other marine biological processes; as well as by bubble bearing sea animals, breaking waves, and rain.

"I spun off acoustical oceanography from its parent science, ocean acoustics -- predicting underwater sound propagation from a knowledge of the sea, mostly used for locating submarines," he recalled. "When I discovered microbubbles, like anything new, they 'weren't supposed to be there,'" he laughed. "In fact, many scientists had gone so far as to proclaim that there could not possibly be any. So this rich and complex field lay dormant until people realized how important they were. I counted these bubbles acoustically (using sound waves), and showed that they're formed in huge numbers when raindrops fall on the ocean surface, and then oscillate to produce a sound called 'rain noise.' This noise, in turn, has important consequences for submariners in the Navy."

In his acceptance speech, Medwin explained it this way: "I demonstrated, through the use of laboratory rough surface scale models and ocean experiments, contrary to Pentagon dogma at the time, that Navy helicopter noise could easily be heard by the submarines they thought that they were tracking secretly," he told a rapt audience.

http://www.nps.navy.mil/PAO/News_Wire/June/Medwin_takes_ASA's_gold

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"In looking back, I'm particularly pleased with this work on the transmission of sound through rough sea surfaces," he noted. "The results were truly counterintuitive. Who would have thought, from the perspective of an underwater sonar detector, that a rough surface is in some ways actually a better medium for transmitting sound than a smooth, quiet one? But that's what we discovered, and it's one of the best examples of how NPS links up operational experience with lab research and scientific theory."

"In a way, it's remarkable that I got this award," Medwin noted, "as I've been a bit of a maverick throughout my career - that's an isolated calf, not labeled as belonging to any herd, that's good at kicking up the dust and, given the proper support, of starting a stampede. But mavericks are also pioneers and, in my career, I kept looking for things no one else looked for or even thought could be there, and also proved that a lot of things people thought were true, weren't. That doesn't exactly make you popular. My receiving this award shows that it really matters that you follow your own path, and do the work you know has to be done. And, also, to keep it simple. My whole career has been about finding really simple things that have been overlooked by everyone else."

Born and raised in Massachusetts, Medwin worked as a civilian Navy engine test inspector assigned to Pratt and Whitney Aircraft, which makes aircraft engines for the service, followed by enlisted service as a weather observer for the Army Air Force in Europe during World War II. He received a doctoral degree in physics from the University of California, Los Angeles, in 1954, before joining the NPS Dept. of Physics the next year. Medwin quickly took his physical acoustics laboratory out to sea, and built scale models of ocean environments in the lab.

"You also need a combination, and balance, of theory and experiment," Medwin stressed. "As my own thesis advisor, Isadore "Izzy" Rudnick, used to teach us so well, theory without experiment is sterile, and experiment without theory is just a jumble of numbers. And, also, be wary of simplifying assumptions. They're often wrong. Izzy also told me, "There are many pearls in the dust. I've been looking for pearls ever since."

After 25 years of teaching and research at NPS, where he became a full professor in 1960, Medwin continued his relationship with the School as an emeritus professor. Supported by the Office of Naval Research, he guided NPS student research until about five years ago. During his career, Medwin has also been a pioneer in more than just science. He was the first male student at the previously all-female Smith College, in 1942.

Medwin founded his own company, Ocean Acoustics Associates in 1980, and is working on applying the techniques of underwater acoustics to diagnosing and solving sound problems in auditoriums. There was a special session on this new application at the ASA's spring meeting in Chicago.

"This puts together two of my greatest loves -- acoustics and music," he said.

In addition to receiving awards, Prof. Hank Medwin makes them possible for others. At the June 6 Chicago meeting, Tim Leighton, a distinguished scientist from Southampton, England, was announced as the first recipient of the ASA's new Medwin Prize in Acoustical Oceanography, which he and his wife Eileen made possible through their donation to the ASA Foundation.

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