



## IN MEMORIAM

Henry J. Fenech

Professor of Chemical and Nuclear Engineering, Emeritus  
Santa Barbara  
1925 — 2001

Henri J. Fenech, professor emeritus of chemical and nuclear engineering at the University of California at Santa Barbara (UCSB), died on Nov. 3, 2001. Hearing of the passing of his former professor, a UCSB alumnus sent to the College of Engineering an unsolicited recollection of a high moment in Professor Fenech's classroom, which conveys the man's remarkable talent as a teacher. That student, Matthew Parry (a 1992 graduate with a B.S. degree in nuclear engineering), wrote: "I will always remember Professor Fenech's NE 144 course, where one day, deep in the middle of explaining partial differential equations, he turned to the students and asked: 'You do know what this is used for, don't you?'" Parry recalled that he and the other students "all stared back with vacuous expressions on our faces. Professor Fenech then devoted the rest of that lesson to describing potential real- world uses for the seemingly incomprehensible mathematics. And the course," added Parry, "from that day on, did not seem quite so hard."

On six separate occasions (1984, 1985, 1986, 1987, 1991 and 1992), the Engineering Student Council selected Fenech "Most Outstanding Professor." UCSB colleague George Robert (Bob) Odette, professor of mechanical and environmental engineering, said, "Henri was very much appreciated by students. He had a genuine concern for their welfare, and they knew that he did. That concern showed in the quality of his teaching and mentoring. We didn't talk much about mentoring 30 years ago when I came to UCSB, but Henri was so good at it that he could have been a mentor for mentors. He cared about the professional development of his students and really worked at getting them jobs."

All of his faculty colleagues are quick to note Fenech's exceptional rapport with students. But equally they all note the high quality of his research in the area of heat conduction across contacting surfaces pertaining especially to nuclear fission reactors. They speak of his many key contributions to that field in its seminal early years during the decades of the 1950s, 1960s and 1970s when interest peaked. Quality in relationships was not limited to Fenech's interactions with students. Odette talks with feeling about the man who recruited him from MIT to UCSB as a "warm, supportive, wonderful colleague." Odette, in turn, recruited Glenn E. (Gene) Lucas to the nuclear engineering faculty at UCSB. Lucas went to graduate school at MIT to study nuclear engineering after graduating from UCSB with a major in that field. He took four courses from Fenech his senior year at UCSB — two in nuclear physics and two in nuclear engineering. Lucas said of Fenech, "He was a very likeable and loveable guy who had a genuine interest in students. At the end of my senior year, he asked me to work with him during the summer on a research project. Staying the summer in beautiful Santa Barbara was a student's dream come true. That summer project focused on building a system to creatively generate and use a radioactive tracer to determine flows in a tube. But when the system was finally up and running, it took so long to make the measurements that background radiation built up to where we couldn't distinguish the signal from the noise. Nonetheless, solving all the problems along the way was a tremendous educational experience."

Fenech joined the UC Santa Barbara faculty in 1969 as professor of nuclear engineering in what was then the Department of Chemical and Nuclear Engineering. His mission in coming to Santa Barbara was to set up and lead the nuclear engineering program, which was "housed" administratively in the Chemical and Nuclear Engineering Department. He had been an associate professor in the Department of Nuclear Engineering at

MIT, where he had served as assistant professor from 1960 until his promotion in 1963. Lucas discovered when he left UCSB for MIT that the content of his MIT coursework bore a striking resemblance to the courses he had taken from Fenech at Santa Barbara because Fenech had played a prominent role in setting up the nuclear engineering curriculum at MIT. Upon his return to UCSB in 1978, Lucas found his old professor to be “a welcoming colleague. It was always a pleasure doing business with Henri. I don't think I ever saw him angry. I never had a disagreement with him. He was a gentle, kindly soul who had a wry and delightful sense of humor. Even though our relationship was collegial for many more years than it was one of student and teacher, when I think of Henri now what comes to mind are the early days. I remember a party he gave for students my senior year. He lived at Hope Ranch, a pretty exclusive community of homes in Santa Barbara with its own beach. He hosted a picnic for us students at the beach. That is a good memory.”

Another UC Santa Barbara colleague Sanjoy Banerjee, professor of chemical and mechanical engineering, also singles out as memorable “Henri's special sense of humor. It was European, dry and ironical. But he was a very kind person. He didn't say anything bad about anybody. When I arrived here in 1980, he helped me a lot. He was just a wonderful person. We used to have these biweekly dinners: good food accompanied by long and leisurely discourse. That was only 20 years ago, but those dinners seem to belong to another, more gracious era.”

Henri Fenech was born March 14, 1925, in Alexandria, Egypt. His mother Alice Fitte Fenech was a French diplomat's daughter. His father John Fenech was of Maltese origin. When he was two, his mother took him and his older brother, Louis, to the south of France, where the boys grew up. Financially, life there was very difficult for them, even before the war years began. A Fulbright Fellowship enabled the 29- year- old Fenech to come to the United States to study at MIT. Having received a Diploma of Ingénieur Arts et Métiers in France in 1946, Fenech earned an M.S. degree in 1957 and a Sc.D. degree in 1959, both in nuclear engineering from MIT.

He was twice (1969 and 1974) awarded a Senior Science Fellowship by the National Science Foundation. A fellow of the American Nuclear Society, he was for over a decade a member of the editorial board of Nuclear Technology and Annals of Nuclear Energy. His 70 publications include two book chapters (co- authored with his frequent collaborator Warren Rohsenow) and an edited text entitled Heat Transfer and Fluid Flow in Nuclear Systems (Pergamon Press, 1981). His research focused on heat transfer and fluid flow in conventional and nuclear heat sources; overall energy systems design, safety and optimization; heat conduction and convection governed by thermal and materials limitations; and reactor physics and fuel performance.

His most significant research findings pertain to the determination of temperature distributions in relation to nuclear fuel pins and coolant conditions. Typically, metal- clad nuclear fuel pins contain ceramic fuel pellets. A gap exists between the exterior of the fuel pellets and the interior fuel cladding, which is first evacuated and then back- filled with helium. The heat generated by fission (splitting the nucleus of an atom of, say, uranium or plutonium) is transferred from the ceramic pellets across the helium gap through the metal cladding to the surrounding water. The heat content of that water is the usable energy generated by a fission reactor. The fuel cladding is sealed so the fission products and their radioactive daughter products cannot escape the fuel pin. The movement of the heat outwards generates a temperature profile such that the highest temperature occurs in the middle of the fuel. Then the temperature drops as heat is conducted outside the fuel through the helium- filled gap and through the cladding. Peak temperatures in the fuel and in the metal cladding limit operating conditions. Temperature cannot exceed certain values in the cladding because its strength then diminishes. Temperatures above a certain value in the fuel lead to unacceptable fission product release or "melting." Fenech did much of the early research that determined that temperature distribution — i.e., how it is affected by heat flux, water conditions, and particularly the jump across the helium- filled gap.

In addition to conducting his own research, Fenech built a topnotch nuclear engineering group at UC Santa Barbara. Having pioneered the technology, he was in a particularly good position to assemble a team of experts to advance the field. Said Lucas, “Had the environment been different in this country in terms of growth of nuclear power, UCSB would have become one of the country's dominant programs. We had the right people.” But reflecting trends across the country, enrollments began to decline in the 1980s. Professor Fenech transferred to emeritus status in 1991. Shortly thereafter, the remaining faculty decided to discontinue the program in nuclear engineering. Professor Fenech consulted for both electric utilities (Southern California Edison and Yankee Atomic Electric) and research centers (General Atomic and Brookhaven National Laboratory).

Having served two terms as a member of the Education and Research Council of Associated Western Universities, he acted as chairman of that organization's Council in 1990. Also in that year he began a one-year appointment as director of the Education Abroad Program for the University of California at its Lyon-Grenoble Center in France. In 1994-95 Fenech served as president of the UCSB Emeriti Association.

He is survived by his wife of 49 years, Inger Goranson Fenech; two daughters, Annick Shipley and Claire Fenech; and their husbands, Randy Shipley and Joseph Poirier. He had five grandsons — Jared, Mark and Andrew Shipley; and Elliot and Alex Fenech — and one granddaughter, Natalie (Jason) Mula. His family invokes images of the last few years of the man who was their beloved husband, father, grandfather: "He enjoyed walks to the Santa Barbara harbor. Most afternoons, he would sit on his patio, where he would listen to and watch the birds and ground- scuttling wildlife on his property. And on Thursday evenings, there was the opera class."

Jacquelyn Savani