



**Enzo O. Macagno
(1914-2012)**

Noted hydraulician Enzo Oscar Macagno died in Iowa City, Iowa, on September 9, 2012, at the grand age of ninety-eight years. He was professor emeritus at the University of Iowa's well-known institute, IIHR-Hydroscience & Engineering (formerly known as the Iowa Institute of Hydraulic Research).

Enzo Macagno was born in 1914, to Italian immigrant parents settled in San Vicente, Argentina. He attained the baccalaureate degree in hydraulics and civil engineering at the National University of La Plata, Argentina in 1939. Following about a decade as hydraulics faculty member of this university, and then the National University of Cuyo, Argentina, his career in hydraulic engineering began in earnest. He won a French fellowship in 1950, which allowed him to continue his academic education at the University of Grenoble, France, where he was awarded the doctorate in physics (fluid mechanics) in 1953. His doctoral research involved a novel study of unsteady flow in open channels, and stimulated his interest in experimental fluid mechanics. Grenoble's collection of historical manuscripts on engineering stimulated a companion interest in the history of fluid mechanics and hydraulics, especially the early works of Italian engineers. Macagno's fluency in Italian, Spanish, French, and English, and fair grasp of German, made the content of these and other manuscripts remarkably accessible to him.

After a few years back in Argentina working as a faculty member at the University of Cuyo, Macagno was recruited in 1956 by Hunter Rouse, IIHR's

director, to join IIHR as a research engineer. Rouse, a Fulbright Fellow at the University of Grenoble during 1952-53, had met Macagno and was impressed by his doctoral research and polyglot fluency. Macagno subsequently began his U.S. academic career as an assistant professor at The University of Iowa in 1961, becoming full professor in 1967. His expertise in experimental fluid mechanics quickly developed to include aspects of environmental fluid mechanics and fluid mechanics associated with (human) “biofluids.”

Macagno and Rouse were among the first engineers to recommend the application of hydraulic engineering to the study of blood flow in the human body, and to biofluids generally. At a conference in 1966, they presented an early paper describing how similitude principles and a hydraulics laboratory could be used to conveniently study blood flow. This effort built on Macagno’s extensive thinking, and prior writings, about similitude; and, his skill as an experimentalist. Macagno pursued this research, broadening it to include extensive investigation of fluid flow in the human intestine. In this effort, he studied fluid flow in complex geometries, and applied early computational fluid dynamics methods to model intestinal flows.

His work on environmental flows included investigations of thermally stratified flow, and the wintertime cooling of flows in rivers. Macagno’s paper with student Poothrikka Paily and colleague Jack Kennedy, *Winter-Regime Thermal Response of Heated Streams*, received the 1977 Karl Emil Hilgard Prize from the American Society of Civil Engineers.

Throughout his career, especially during the 1960s and 70s, Macagno promoted fluid mechanics and hydraulics education in Latin American countries. He wrote several, Spanish-language books on fluid mechanics and hydraulics, and served as a visiting professor at universities in Argentina, Chile, Venezuela, Dominican Republic, and Brazil. He also spent time in Europe at Karlsruhe University and the University of Paris. During the 1970s he was particularly active in Latin America and Europe promoting the biofluids connection between engineering and medicine.

Though well known for his research into diverse aspects of hydraulics, in later years Macagno became best known for his work deciphering the fluid-mechanics insights and musings of Leonardo da Vinci. Working with his mathematician wife, Matilde Macagno (1918-2010), he became an

international expert on da Vinci, and published a series of monographs and articles interpreting the fluid mechanics and water facets of da Vinci's numerous codices and manuscripts. He could read and understand Leonardian script, and the Macagnos used IIHR's facilities, as well as the dining room table in their home, to replicate several of da Vinci's experiments. He spent much time interpreting the Madrid Codices, Codices Atlanticus, Forster, Arundel, and Hammer, and the Institut de France manuscripts. He also compiled da Vinci's Libro del Acqua. Matilde Macagno's own publications include studies of flow and its representation in art. Enzo Macagno's last da Vinci monograph was published in 2006, when he was ninety two.

I was to have visited Enzo for a glass of wine when I was back in Iowa City later this year. We had been in recent communication on a technical matter involving his former IIHR student, Cesar Fernandez, who had been dealing with a difficult bridge in the Dominican Republic. I am sure it would have been a very pleasurable glass of wine, as Enzo was a discerning connoisseur of wines and hydraulics.

-- Rob Ettema on behalf of friends and former colleagues at IIHR, and with the help of Enzo and Matilde's son and daughter, Eduardo and Laura