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OBITUARY

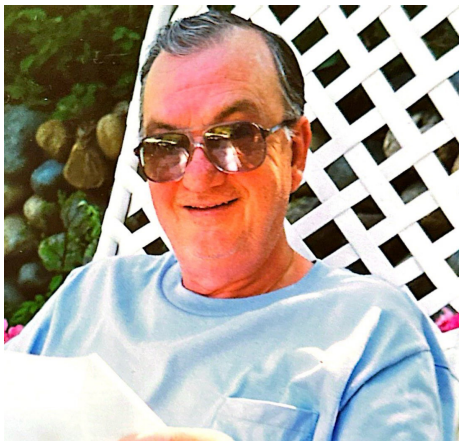
Domenico Bernoco: In Memorium

Domenico (Meco) Bernoco, professor emeritus at the University of California-Davis, passed away at home in Davis, California on 27 October 2023. He was 88 years old. During his long scientific career, Meco made major contributions in the field of immunogenetics through his work on the major histocompatibility complex (MHC) of humans and domestic animals.

Meco was born on 6 April 1935, as the youngest of one sister and two brothers in Cherasco, a small town in the Piedmont area of Italy with fewer than 10000 inhabitants. Piedmont is known for gastronomy and fine wines, including the famous Barolo made from the Nebbiolo grape. Cherasco is situated about 50 km south of the city of Torino (Turin), and within a short distance of the Italian Alps to the west. Meco was a true son of the region, enjoying the preparation, eating, and sharing of good food. Meco also enjoyed all kinds of sports, in particular soccer. During his first time in Davis in 1967, he organized an unofficial soccer team of mostly Australian and South American students at UC Davis, and he made sure they would win most of their games.

In 1959 Meco was awarded his Doctor of Veterinary Medicine degree (summa cum laude). After substituting for a friend in a private veterinary practice for 2 or 3 weeks, Meco decided that full time practice was not for him: "I was sick and tired holding hands with old women who fed their dogs chocolate!" Instead, Meco privately treated the dogs of neighbors and friends in return for a hare or pheasant hunted in the upper dry part of the hills (where they taste better). In the early 1960s, Meco and his friend Giuseppe Sartore joined the Osservatorio di Genetica Animale under Professor Pietro Dassat. After several years of teaching and conducting research on livestock genetics at the University of Torino, in 1971 Meco was awarded the Libera Docenza qualification from the University. From 1967 to 1969, Meco visited Professor Clyde Stormont at UC Davis while on a NATO fellowship.

Back in Torino, Meco had the great good fortune to become associated with Ruggero Ceppellini, one of the most accomplished and brilliant immunogeneticists of the 1960s and 1970s. Meco was recruited by Ceppellini to lead a research program on Human Lymphocyte Antigens and transplantation biology in Torino. Prior to starting work on this program, Meco was tasked with visiting UCLA for 2 months in 1969 to learn the new lymphocyte typing techniques developed in the laboratory of Paul Terasaki. Meco became expert in the new technology, but more importantly, he met his future wife, Marietta von Diepow, who was working with Terasaki.



DOMENICO (MECO) BERNOCO (APRIL 6, 1935 – OCTOBER 27, 2023)

In another stroke of good luck, in 1971 Meco moved to the Basel Institute for Immunology in Switzerland with Ceppellini, and there his research flourished. At that time the Basel Institute was a mecca for fundamental immunology research. One could not have asked for a more favorable environment in which to work as a young scientist. In Basel, Meco developed the technique of lysostripping, which uses antibodies to remove molecules from the surface of living cells through aggregation (capping) and subsequent endocytosis (Bernoco et al., 1972). Taking advantage of highly specific antisera developed in early human leukocyte antigen (HLA) workshops, and the availability of lymphocytes from individuals homozygous for the MHC, Meco was able to identify new HLA loci, an important advance in the field of human histocompatibility genetics.

After several successful years in Switzerland, in 1977 Meco was able to return to California to become part of Dr. Paul Terasaki's team at University of California, Los Angeles. At UCLA, Meco was an Associate Research Immunologist at the Tissue Typing Laboratory in the Surgery Department. He played an important role in the development of the lymphocyte microcytotoxicity assay that became the standard test for matching donors and

recipients in human tissue and organ transplantation (Terasaki et al., 1978). The assay was also widely used for genotyping large human populations in MHC-disease association studies. Meco was also a key participant in the human HLA Workshop series, where his ability to analyze large and complex datasets of HLA serology was fundamental to the success of those meetings.

Fortunately, Meco always retained his ties to the veterinary profession, and in 1981 he was recruited to join the laboratory of Dr. Clyde Stormont, University of California Davis here. By that time, research on HLA attracted interest of livestock geneticists because of many discoveries during the previous decade showed associations of HLA antigens with a wide variety of diseases. Therefore, as a veterinarian and a leader in HLA research, Meco was recruited by Professor Clyde Stormont and Professor Bennie Osburn to initiate a program to identify and use this genetic system at UC Davis in the Department currently known as Population Health and Reproduction. Meco was an early leader in MHC research and typing in animals and led research on cattle and horses in that field before he retired as Professor Emeritus from the University in 1993. He continued as co-owner of the private Stormont Laboratories in Woodland, California, typing blood groups in cattle and horses for breeding purposes until 2006, when the laboratory closed. Meco also became an active participant in the horse genome workshop at its outset in 1995 until his full retirement in 2006.

At Davis, Meco became involved in many genetic projects, but his greatest contributions were in the early international workshops to define the equine MHC haplotypes of the equine leukocyte antigen region (Bailey et al., 1984), bovine MHC class I antigens (Davies et al., 1994), and then later as part of the Horse Genome Workshop (Penedo et al., 2005).

Meco made other contributions while at Davis, including population studies of the mutation causing severe combined immunodeficiency disease of Arabian horses (Bernoco & Bailey, 1998), characterizing the gene that causes hyperkalemic periodic paralysis in Quarter horses (Rudolph et al., 1992), and defining genetic aspects of bovine leukemia virus infections (Bernoco & Lewin, 1989).

Meco did not mentor many students at Davis, but quality is more important than quantity. Two of Meco's former trainees went on to outstanding independent careers. Dr. Ernie Bailey became a professor at the Gluck Equine Research Center at the University of Kentucky, and the leader of the Horse Genome Project. Dr. Harris Lewin became an expert in bovine immunogenetics, and then a leader in bovine and comparative genomics, and was elected to the National Academy of Sciences.

Meco's career occurred during a revolution in genetics, beginning with the challenges of identifying variation or individual genes and extending to the challenge of simultaneously evaluating thousands of DNA variants for construction of gene maps. Meco had an intuitive and brilliant grasp of the principles of genetics, immunology, cell biology, and statistical analyses. He made key contributions to medical genetics involving characterization of the complexity of the HLA system and variation in HLA expression. Later he led workshops designed to understand the MHC of cattle and horses, and then, even later, to create and use a gene map for the horse. Meco was a proponent of scientific workshops, specifically, the collaboration by groups of scientists on projects larger than could be accomplished in any one laboratory.

Ernie Bailey participated in many of the workshops and reported, "At the end of a workshop, participants would typically spend an hour discussing what might be the next logical step. And, after the hour, we might have a rough idea of the challenges ahead. Then, Meco would concisely propose the structure we would adopt for the next workshop activity." Meco found discovery easy and delighted in guiding younger scientist in their own paths of discovery, using the tools from the workshops. In this fashion, Meco facilitated the discovery of Mendelian genes for many disease and coat color traits.

Doug Antczak, another member of equine MHC and Horse Genome communities, fondly recalled the verbal jousting in which he and Meco engaged over the years in spirited workshop discussions. "It was a badge of honor for me that Meco kept my photo on his bulletin board with the caption: Enemy Number One!"

Meco had several pat phrases for his students. "*Show me the data!*" was an invitation for consultation. "*Garbage in garbage out!*" was the demand to see the controls for any set of data. "*You are not a complete idiot!*", was recognition of success. All the while, he cared deeply for the people he met and lives he touched. His care was often shown in teasing words that made everyone laugh.

Besides Meco's love for science and his wife, he enjoyed his garden and the harvest of pomegranates, figs, and lemons. With the latter he made "Meco cello", his own type of limoncello, that his guests always appreciated. He also liked traveling. When conferences were organized in interesting parts of the world such as the Kruger Park in South Africa, Perth and Brisbane in Australia, Rio de Janeiro and Porto Seguro in Brazil, and places in Europe he took advantage and added some vacation weeks for himself and his wife, Marietta.

All those who knew or worked with Meco were enriched by those associations. He was a true friend, and he made our lives better.

AUTHOR CONTRIBUTIONS

All authors shared equally in drafting, writing, reviewing and editing.

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