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## In memory of Federico Uruburu (1934-2003)

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Anyone who knew Federico Uruburu (Granada, Spain, 1934–Porto, Portugal, 2003) will remember him with affection and fondness. His kindness, expressed through his perpetual smile, was his greeting card. Honesty was also a major component of Federico's character. He never deceived anybody, and his actions were frequently motivated by his sense of duty. One could always trust him—he was what is commonly called a good sort. We remember Federico as a teacher and a friend, always full of enthusiasm and the desire to help others. We first met him in 1963, when we returned from our stay in Cambridge University. He was finishing his graduate studies, and had obtained a scholarship to join the research group we had established at the Institute Jaime Ferrán for Microbiology, part of the Center for Biological Research (CIB) of the National Research Council (CSIC), in Madrid.

Federico was born in Granada in 1934. His family moved soon to Figueras, in Catalonia, where he attended a prestigious Catholic high school. He studied Pharmacy in Madrid (1957–1963), graduating in 1964 with the top qualification of

Extraordinary Achievement. Federico joined our research team and, following what was a non-written rule in our group, made several stays abroad, as a graduate student, to learn new microbiology techniques. He participated in a microbiology course at the Pasteur Institute with other members of our group and spent some time also at the Electron Microscopy Laboratory of the Federal Polytechnics School (ETH) in Zurich, Switzerland. There he worked under the guidance of Frey Wyssling and F. Mühlethaler, and also attended a course on electron microscopy directed by H. Moor. Federico had started doing research on protoplasts and the synthesis of cell wall with one of us (JRV), and was a pioneer in the application of several novel electron-microscopy techniques, including cryofracture or cryocorro-

sion, in that field in Spain. He did most practical work for his doctoral thesis in Zurich, applying cryofracture to the study of the yeast *Pichia polymorfa* ultrastructure. Back in Madrid, he completed and wrote his doctoral thesis under the direction of one of us (JRV) at the Institute Jaime Ferrán. At his thesis defense at the Complutense University of Madrid he



Fig. 1. Federico Uruburu (1934–2003).

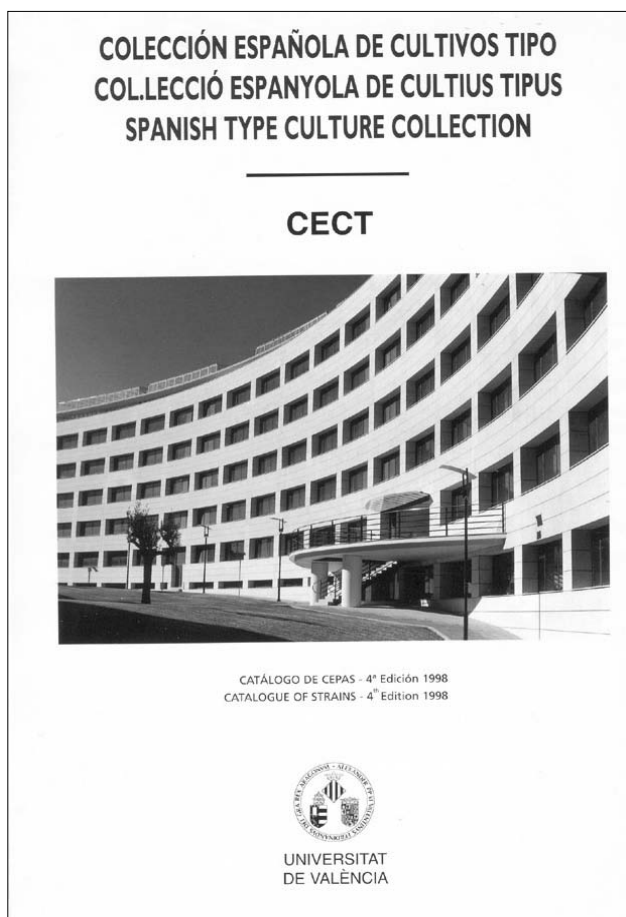


Fig. 2. The Spanish Type Culture Collection's 1998 Catalogue.

was awarded the highest degree, *Cum laude*. Although he was a junior researcher, he gave seminars at several laboratories on the novel technique of cryofracture. By using such a technique he had obtained excellent beautiful micrographs, one of which was in his wallet when he died.

When one of us (JRV) assumed the chair of Microbiology at the School of Biological Sciences of the University of Salamanca, Federico, who had by then received a scholarship to work in our laboratory, moved with us and helped in the difficult task of organizing the department. At the time, microbiology was a new subject in a brand-new school, even though the University of Salamanca (1218) had been in existence for more than 850 years. In 1973, one of us (JRV) took part in an international symposium on yeasts held at the University of Bratislava, Czechoslovakia, and presented a collection of micrographs made by Federico. These were awarded the first international prize, and Federico was immensely proud of it.

During his stay in Salamanca, Federico collaborated with us in teaching microbiology and doing research. He was a

dedicated person, committed to his work in both the theoretical and practical aspects of microbiology. Biotechnology was a topic of great interest to him. When industrial microbiology was introduced in undergraduate studies of Biology, he was among the first to teach this subject in Salamanca. He was very much appreciated by his students and was always ready to help them in solving problems or by providing them with supplementary information and references that he had obtained from articles or books. In the field of improvement of wines, he had excellent students such as Enrique García Maiquez, from González Byass, Jerez. Federico published several works in this field, directed several theses and carried out several research projects, including one with Bodegas Torres, from Vilafranca del Penedès (Barcelona).

Federico's own research was mainly devoted to using electron microscopy to elucidate yeast cell structures. He left Salamanca to become an Associate Professor ("Profesor Agregado") at the University of Bilbao, where he also chaired the Department of Biology from 1973 to 1976, and served as Dean of the School of Biology. In Bilbao, Federico, along with his wife, worked on a research field that he had already started in Salamanca: the dimorphism of the fungus *Aureobasidium (Pullularia) pullulans*. In 1980, he moved to the University of Valencia as Full Professor ("Catedrático"). It was in Valencia that he spent the most fruitful years of his professional life. He was Dean of the School of Biology and directed the Electron Microscopy Service until 1988. During his time in Valencia, he trained several generations of microbiologists and directed several doctoral theses. The School of Biology moved to the Burjassot Campus (a few kilometers outside the city of Valencia), where Federico established the Spanish Type Culture Collection (CECT, Colección Española de Cultivos Tipo). We had started this collection in Madrid, in 1960, by gathering different collections and microbial strains from several research laboratories. In 1968, the incipient collection moved with us to Salamanca and remained there until we passed the torch to Federico and his wife Loly—Dr. María Dolores García López, a microbiologist like himself, whom he met during his stay in our laboratory in Madrid, and with whom he had four children. The CECT joined the World Federation of Culture Collections (WFCC) in 1977 and the European Culture Collections Organization (ECCO) in 1983 [3].

We must also point out the major role Federico played in the development of electron microscopy in Spain. From 1980 to 1993, he collaborated with the Spanish Society for Electron Microscopy, which elected him an honorary member, and participated in many international meetings on electron microscopy. He also worked closely with the Fundación Valenciana de Estudios Avanzados and was a member of its



**Fig. 3.** Federico Uruburu, at the working bench. [Courtesy of the Department of Microbiology, Faculty of Pharmacy, Complutense University of Madrid.]

Scientific Council from 1983 to 1986. In addition to his outstanding research efforts at the University of Valencia, Federico was a great teacher and mentor, and an excellent organizer of microbiology-related activities.

He collaborated with the Spanish Society for Microbiology (SEM), whose membership comprises over 1600 microbiologists from all over Spain. Federico launched the SEM Bulletin in 1972, during his stay at the University of Salamanca, and was also elected a member of the SEM Executive Board. He also contributed to the SEM journals with several articles (see list of Selected publications at the end of this text). Nevertheless, his most impressive work, always with the highly valuable assistance of his wife, was in setting up and promoting the CECT at the University of Valencia (Fig. 2). Since its inception in our laboratory as a collection of microbial strains, it has grown to become the current CECT, providing strains of microorganisms to medical, academic, and industry laboratories. The CECT Catalogue, prepared by Federico Uruburu and María Dolores García López, offers priceless services. Federico and the CECT organized courses for microbiologists working in different fields including industrial and medical microbiology, who may be faced with the loss of cultures that cannot be replaced. He taught them how to maintain and preserve microbial cultures (Fig. 3).

In October 2002, at the Botanical Gardens of Valencia, Federico held an international symposium, “Conservation and control of microbial strains”, which was sponsored by the Fundación Ramón Areces. There, European and American researchers described their international collections of microorganisms. Three contributions to this symposium, including Federico’s own, were later published as review articles in *International Microbiology* [1–3].

In May 2003, Federico chaired the 7th SEM course, “Introduction to Research in Microbiology.” These courses are aimed at acquainting undergraduate students with the world of research in microbiology through lectures by scientists working in different fields of microbiology in universities and research centers. As always, Federico was able to convey his enthusiasm to students attending the course from universities throughout Spain.

Federico was an excellent photographer and, thanks to the photographs he took and then distributed to the people in them, many of his colleagues have visual memories of the scientific meetings they attended. Due to his kindness and well-known honesty, we often asked him to act as the treasurer of professional organizations and activities. His accounting was impeccable; everything was recorded in his small, clear handwriting in his neat notebook. Every last cent was documented, and he sent us the records along with interest-

ing stamps, which we both collected. To ask Federico to do something meant to no longer have to think about it; one was always sure he would do his best. He was thorough and tidy, and had a prodigious memory. While demanding of himself, he was tolerant, sympathetic, and forgiving of other people, always able to find their positive qualities. In this, he was a wonderful colleague and friend.

Federico took pleasure in all the things he did. He very much enjoyed traveling, and planned his trips in great detail. He always knew the sights worth seeing, the best hotels, and where he would enjoy the food. He was quite the gourmet, and we took much pleasure in watching him indulge himself in his favorite dishes. On the occasion of the above-mentioned international symposium on culture collections, he organized a memorable dinner. He prepared what was to be his last trip with great excitement: first Porto, Portugal, then a good hotel in Guarda, followed by a trip to Santiago de Compostela, where he would have met his colleagues at the 19th Spanish Congress on Microbiology. Unfortunately, he never joined them. Death caught him on duty, while he was attending a meeting of directors of microbial collections that was being held at the University of Porto.

Federico died at the peak of his career. In addition to being in charge of the CECT, for which he was mainly well known, he started several research lines that have been followed by his disciples. He was so generous and disinterested that some times refused to sign the works he had directed for the fear that they were credited to him and not to his young collaborators. After Federico's death, Dr. García López, his wife, will continue the task that she shared with her husband for many years. Her knowledge and experience guarantee the maintenance of the collection, and this is the best homage we can pay to the memory of Federico Uruburu.

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