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Memorial to Oriol Riba i Arderiu 1923-2011

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Oriol Riba i Arderiu, born in Barcelona on the 29th of August of the year 1923, was the son of the Catalan writer and poet Carles Riba and the poetess Clementina Arderiu. Oriol Riba's life was imprinted by the vicissitudes of his family and his own, by his deep Catalan sentiment, and by his extreme curiosity, meticulousness and liveliness.

In the diary he wrote when he was a teenager who was leaving his country with his family to go into external exile towards the end of the Spanish civil war, we read "Because of the laziness I feel after the war's events, including the seizure of Vilafranca and of many other Catalan towns just a few kilometres away from Barcelona, I set aside my meteorological observations" (19 January 1939). He took up such observations again after many years at his house in Arenys de Munt, at Coll-sa-Creu, at the station named 251.B. This highlights other noticeable traits of his personality: perseverance, tenacity and the willpower to restart the activities he liked and that he felt he should continue doing despite the circumstances.

In the very same diary we can further read "In Girona,...in the same room there was a stock of food for the children's charity dining room, which consisted of three boxes of biscuits, or "panellets"[1], a bag full of the same, five boxes with fifty cans each of condensed milk, one bag of semolina, two of toasted wheat (ladies coffee), and one box of chocolate" (23 January 1939). Also "By chance, we found a handcart that allowed us to carry all our baggage, which comprised a small trunk, three cardboard boxes full of books, four large suitcases, two briefcases, bags, two billfolds and three folders with the most essential documents for my father to work" (27 January 1939, the day after the fall of Barcelona).

Once back in Spain, during the years of "internal exile" as he named them, and for many years, he applied the same spirit demonstrated in his diary extracts to Earth Sciences in general, and to stratigraphy in its greatest sense, resulting in a long and profitable academic career. Many people consider Oriol Riba to be a tremendously inquisitive naturalist.

After his elementary and secondary studies in Catalonia, he continued his schooling in France until August 1941. His sojourn in France during the Nazi occupation left a profound impression on Oriol Riba. Many years later, when referring to it in a relaxed atmosphere, his recollections of these times and the moments of anxiety he and his family went through clearly still evoked many emotions. After he finished his mandatory military service in Spain, he studied Natural Sciences at the University of Barcelona (1944-48), where he completed a Masters thesis entitled "Geology of the Palaeozoic hills of the city of Barcelona: Monterols, Putget, Carmel, Rovira, Peira", again a topic he took up many years later, during his retirement. In 1952 he presented his PhD Thesis entitled "Geological study of Sierra de Albarracín, Teruel" to the "Central" University of Madrid, under the direction of Dr. Lluís Solé i Sabarís. As Oriol Riba explained many times, in those days PhD theses could be "defended" only in Madrid, and in this fashion he obtained the first "Doctor in Geology" diploma in Spain and was honoured with the "Special Doctorate Award". Thanks to his PhD thesis, he enjoyed several stays at the universities of Angers and Rennes, in France, and at the "Landbouwhoogeschool" of Wageningen, in the Netherlands.

During the years immediately before and after the defence of his PhD thesis he took up a number of positions and commissions at the University of Barcelona, the Barcelona County Council, and at the "Instituto de Edafología" of the Spanish Research Council (CSIC)

in Madrid, until he won the competition for University Professor in December 1959, now 52 years ago. He was appointed in "Physical Geography and Applied Geology" to teach "General Geology with Basics of Geochemistry" in the Faculty of Sciences at the University of Saragossa where he remained for 10 academic years (1960-69). He combined this position with the Directorship of the "Sedimentology and Soils Department" at CSIC (1962-69). In 1965, he founded the Department of Geology at the University of Saragossa, where he served as Head of Department until 1969. That year he became Professor of Stratigraphy and Historical Geology at the University of Barcelona after a competition for transfer, and founded the academic department of the same name. The arrival of Oriol Riba to the then-named "Section of Geology" of the Faculty of Sciences was like a breath of fresh air. Oriol Riba ran the new department with wisdom and soundness until 1984. In parallel, at a time when the university and CSIC were closely interlinked, he chaired the "Section of Stratigraphy" of the "Jaime Almera" Institute of the CSIC. Together with Solé i Sabarís, Crusafont Pairó, San Miguel Arribas and Font Altaba he was one of the five professors that initiated the period of the modern Faculty of Geology. His academic career ended with his compulsory retirement in 1988 at the age of 65, and with his nomination as Emeritus Professor, a status that he maintained until 1995.

The long period of 35 years at the universities of Saragossa and then Barcelona was extremely productive and particularly rich in the foundation of new academic structures, the introduction of new methods of work and innovative research topics at the time, attainment of scientific achievements, establishing close collaboration with companies and administrations and, very specifically, in the exercise of his mastery as university professor. In all these fields, "Doctor Riba", as all of those who dealt with him respectfully referred to him, or also "el jefe"[2], as we called him when talking amongst ourselves, was a pioneer, a founder and a person ahead of his time. It is, however, out of the question to summarize in a few paragraphs the outcomes of those years of seamless activity. We will report only some of them.

Oriol Riba introduced to Europe, together with Carmina Virgili, the modern concept of stratigraphy, in which the study of sedimentary processes is a key topic. This new concept first appeared in the United States and, thanks to Oriol Riba's drive, it arrived in Spain earlier than in France, the United Kingdom and other European countries, where the concept of stratigraphy simply consisted of lithological descriptions combined with biostratigraphic and paleontological additions. Oriol Riba stressed the significance of the understanding of sedimentary and tectonic processes in the formation of depositional units and sequences, thus initiating a conceptual trend in our country that, during the late second half of the XXth century, led to the introduction and development of disciplines like sedimentology, and sometime after, marine geology in Catalonia and Spain.

Riba's studies on progressive or syntectonic unconformities represent, nationally and internationally, his most recognised contribution to the corpus of Geology. The first work on this topic, focused on the syntectonic unconformities of the Alt Cardener, was published in 1973 in the journal *Acta Geologica Hispanica* (now *Geologica Acta*). Up until the 1990's, he wrote a large number of papers on syntectonic unconformities (along with many other topics), of which the one published in 1976 in *Sedimentary Geology* is probably the most outstanding. Overall, this was a seminal contribution that attracted the attention of the scientific community, though did not do so immediately, because its numerous strong conceptual and methodological implications required thorough field and photogeological effort. Oriol Riba succeeded in presenting, for the first time ever, a coherent, well-organized and systematic interpretation of the geometric relationships of the deposits resulting from the interaction of sedimentary processes and the deformation of the upper layers of the Earth's crust. Riba's concept of syntectonic unconformities is today a lively study topic by experts in the field of the interactions between tectonics and sedimentation. Such a contribution by Oriol Riba is a perfect illustration of the qualities that emerged during his teenage years: he was, as we've already mentioned, an exceptional observer driven by curiosity, meticulousness, perseverance and tenacity. During his life, Riba produced more than two hundred scientific publications, many of them of international reach, something quite exceptional at the time.

Oriol Riba also pioneered the Spanish participation in expeditions in search of natural resources. His work in the field of hydrocarbon exploration took him to the Sahara and Equatorial Guinea, and he carried out intense research in several Spanish sedimentary basins in collaboration with companies like CIEPSA, CEPSA, Gulf Oil and CGS, amongst others. He also investigated the potash fields of Catalonia, authoring numerous geological reports on underground waters and geothermalism, and on subsurface geology in relation to the construction of large infrastructure, such as the Spanish Fast Speed Train. In the field of "urban geology" – a very appropriate term - he was involved as an expert to disentangle the causes of the catastrophic failure of the Carmel subway tunnel in Barcelona in 2005. As recently as 2009, he published, together with Ferran Colombo, the work "Barcelona, Ciutat Vella and Poblenou[3]. An essay of urban geology", edited by the Institute of Catalan Studies - a splendid,

rare and amusing piece of work that highlights the links between geology and society, which is of interest to every lover of Barcelona, its setting and its history. Further additions to his achievements are the geological mapping syntheses and individual maps made for the Spanish Geological and Mining Institute (IGME) and field exploration projects for the Uranium National Institute of Spain, amidst many other activities representative of the interactions amongst geology and society. The transfer of his experience in the fields of geological resources exploration and "geology for society" into education tremendously enriched his lessons, in terms of both practical knowledge and amusing stories for the pleasure of hundreds of Geology students.

Oriol Riba's classes are still remembered by his students due to his rigor in preparing and teaching them. He was, like others of his time, a professor of flashcards and blackboard, extremely accurate with language, which he liked to be precise and understandable. His collections of flashcards, written in minute letters, with every little thing he wanted to transmit carefully noted, were and still are unique pieces. The attention of his students was ensured when in the midst of their lectures he referred to his fieldwork experiences from the exotic locations he had visited...or from Navarre, La Rioja or Aragon. The cold of desert nights, the Guinean ammonite fossils soaked in oil and the "no pay, no pay" claim of the drillers, the tracing of kilometre-long key horizons on a motorbike, the escort of "la pareja" of the Guardia Civil[4], the curses of an Aragonese farmer against a Catalan donkey and the "side arabesque" are part of a rich and charming collection of stories. Under the mastery of Oriol Riba the field camps with students at Sierra de Albarracín, the old "Sierra" from his PhD thesis, became a tradition. Therefore, that thesis can also be considered outstanding as a result of its legacy in the training of new generations of geologists. A further demonstration of the training capabilities of Oriol Riba are the twenty-odd PhD theses that he directed in the fields of sedimentology, stratigraphy and marine geology: Benayas, Pinilla, De Leiva, Quirantes, Aguilar, Villena, Garrido, Maldonado, Torras, Puigdefàbregas, Serra Raventós, Anadón, Marzo, Colombo, Cabrera, Canals, Sáez, Jurado and Martí Bono.

Oriol Riba's reputation earned a wide recognition amongst the main cross-disciplinary academic institutions of Catalonia and beyond. In 1973 he became a permanent member of the "Reial Acadèmia de Ciències i Arts de Barcelona". In 1978 he was elected associate member of the "Institut d'Estudis Catalans", becoming full member in 1985 and emeritus member in 1993. From 1992 to 2003 he was a corresponding member of the "Academia de Ciencias Exactas, Físicas, Químicas y Naturales de Zaragoza". In 1991 he was awarded the "Narcís Monturiol" medal to honour his contribution to the scientific and technological progress of Catalonia. His constant and humble task of collecting meteorological data was recognised by the Spanish National Institute of Meteorology who, in commemoration of the World Meteorology Day, awarded him a diploma for achieving his 23rd year of continuous observations at the Arenys de Munt station on the 23rd day of March, 2000. Oriol Riba was, in addition, a member of a large number of national and international scientific societies, and his illuminating presence in conferences and meetings was anticipated with excitement and is still in the memories of many. Known and esteemed by his colleagues from everywhere, his knowledge of foreign languages such as French, German and English eased relations with distinguished foreign geologists (an activity we would now term "networking") and the dissemination of his most outstanding works.

Last but not least, we must refer to Oriol Riba's concern for scientific lexicon and conceptual and terminological clarity in the field of Geology in Catalan language. Following an invisible thread that connected Riba's entire life to his roots, we are indebted to him for three masterpieces: "Una taula dels temps geològics" (1986), the vast "Diccionari de Geologia" (1997) and the "Vocabulari de Mineralogia"[5] (2000), of which the last two were publishd after his retirement. Some of his most outstanding qualities reappeared within these works: meticulousness, perseverance and tenacity up to almost the very last moment. In particular, the "Diccionari de Geologia", edited by "Institut d'Estudis Catalans" and "Enciclopèdia Catalana", is a tremendously rigorous work that represents the culmination of years of personal effort and coordination of a large group of collaborators from different fields. The "Diccionari" has 24.000 entries, which correspond to the very same number of cards filled in by hand, one after the other, and subsequently transcribed to digital format. The "Diccionari" made a rich and precise geological terminology available to the entire Catalan-speaking scientific community, and it is consulted widely by both experts and non-experts. This was a true achievement, one amongst many others, that goes beyond Geology as it enriches the Catalan culture in the broadest sense. It is our conviction that the previous paragraphs give full sense to the heading of the obituary signed by Pere Santanach that was published in "La Vanguardia" newspaper on the 2nd of June 2011: "Geology and Catalanity".

The legacy of Oriol Riba, of "Doctor Riba", is exceptionally rich. However rooted in stratigraphy and sedimentology it extends to the majority of geological disciplines and far beyond. It constitutes an outstanding scientific task, only achievable within the reach of an extremely curious, sharp, thorough and tenacious spirit.

Oriol Riba was a scholar of his time, an innovator and a provocateur that promoted new procedures and research topics, raised vocations and helped sustain motivation. His heritage is equally rich in disciples, and in disciples of his disciples, which altogether form a very large family.

And that gaze, those eyes so blue, so blue that they seized you.

In memoriam, from his disciples and friends[6].

1 "Panellets" are typical Catalan cookies whose main ingredients are almonds and sugar, which are usually eaten during the All Saints' Eve.

2 Literally, "the boss".

3 Ciutat Vella and Poblenou are districts of the city of Barcelona. Both are located downtown and their literal translation would be "Old Town" and "New Village", respectively.

4 "La pareja", literally "the couple", is an expression that became popular in Spain to refer to Guardia Civil agents as they usually patrolled in pairs. Guardia Civil is a public national security body of Spain, which at the time had a strong presence in rural areas.

5 The titles of these three works should be translated as follows: "A geological time table", "Glossary of Geology" and "Wordbook of Mineralogy".

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- Vikki Gunn and Adriana Currin revised the English version.