
Doctor Reguant's thesis in context

O. RIBA i ARDERIU

**Emeritus Professor of Stratigraphy and Historical Geology, University of Barcelona
and Member of the Royal Academy of Sciences of Barcelona**

Facultat de Geologia, Departament d'Estratigrafia, Paleontologia i Geociències Marines, Universitat de Barcelona.
Zona Universitària de Pedralbes. 08028 Barcelona

I have been asked to write a short review of the thesis of Salvador Reguant i Serra. This is a commission that I am more than happy to undertake in the light of the bond of friendship that unites us, though it is also a commitment that involves some risks, since we were not very close at the time he was producing his Doctoral thesis.

I would also like to place on record the fact that I have drawn on the work of our friend, Jaume Truyols, who has already written on Reguant's thesis.

The 1950s were years of fundamental importance for Catalan geology, and in fact for geology throughout Spain. I would like to focus on three aspects: one which is professional in nature, a second which is more practical, and a third that deals with the development of geological knowledge of our subsoil, in Catalonia.

1). With regard to professionalism, there were hardly any geologists in Spain. The very few natural science graduates who specialised in geology were unable to compete, professionally speaking, with the Mining Engineers who emerged from the only 'special' school that existed at that time, in Madrid. Those qualified engineers were immediately employed in companies involved in the extraction of minerals and very few of them did any geology. The university graduates, on the other hand, had almost no alternative to working as university teachers, or as secondary school teachers in the few High Schools that there were.

Professionally speaking, the university graduates of the 1940s were able to study for a Doctorate in Geology. However, it was necessary to study for the doctorate, during two years in Madrid, and to present the thesis there.

For this reason, the *Complutense* was entitled the "*Central University*". By the end of the '40s, it had become possible to study in the students' own centres and to apply for the qualification of Doctor specialised in Geology. The first student to qualify in this way was the author of this article. The 'provincial' students, however, were required to present their thesis before May 1st, a discriminatory requirement that the author fell foul of.

Accompanied by my father Carles, I pleaded my case before the Director General of University Education, Señor Joaquín Pérez-Villanueva. He was a man of fairly open-minded disposition who took note of my request – Sr. Pérez-Villanueva was in fact the person who authorised the first poetry congresses in Segovia 1952, which attracted an extraordinarily large audience of Catalan literary figures such as Carles Riba, Marià Manent, Josep Vicenç Foix and others, at a time of extreme control and repression. A few months later, in 1953, an official decree conferred on all universities the right to award doctoral qualifications to their students.

The first doctorate student to qualify from Barcelona University was Carmina Virgili, with her monumental thesis on the *Triassic* of the Catalan Coastal Ranges (December 1954).

We should remember that the Natural Sciences degree of those days was a real ragbag in terms of the subjects taught. Despite the course having been extended to five years in length (1944), the geological content was minimal. From 1953 onwards, as a result of a Decree published on 29th August of that year, two separate degree faculties, Biology and Geology, were established. Our friend Reguant, together with three others – J. Assens, J. J. Irao-

la and A. Vila – was one of the first students to register for the new course, as well as being the first to graduate, and with all the honours that might be expected for a brilliant and hard-working student.

Another fact of fundamental importance was the creation of two new Geology sections at Oviedo and Granada Universities. The two professors fortunate enough to be appointed to head these departments were Noël Llopis and Josep M. Fontboté, respectively. Some years later these developments led to the promotion of many geologists who had completed their doctoral theses to the position of Professor, via the unfortunate method of competitive exams (called oppositions).

2). In the practical realm, there was a significant sense of excitement, of a reawakening. The ending of the Second World War did not lead to a significant opening up of the Spanish borders, but it did allow the gradual reestablishment of international relations. For those of us involved in the production of theses based on fieldwork, such as Fontboté, Carmina Virgili and myself, in the laboratory of the Department of Geology at Barcelona University, it was necessary to apply for very special permits in order to gain access to the so-called 'Pyrenean frontier zone'. This area was completely sealed, and off-limits to internal tourists. To go wandering around the Pyrenees with a map and a geological hammer in your hands was seen as being tantamount to an act of espionage. We were pursued by the *Guardia Civil* as if we were resistance fighters (the "maquisards"). That was far from being the only difficulty we had to labour under, however. The 1:50,000 topographical maps, where they existed, were of such poor quality that following them inevitably meant getting lost! And, on the other hand, access to the collection of maps held by Dr. Solé at the laboratory was restricted to a degree that seems absolutely incredible these days, when the World War was over!

Remember that throughout the '40s and a good part of the '50s food was still scarce and rationed; to put it more simply, people were hungry, languishing away. Moreover, many roads were unusable – the road from Setcases was washed away by the floods of 1940 and by 1947 it had still not been reconstructed. In the '50s and '60s there were roads that were impassable, like the regional routes from Olot to Figueres, or that which runs from Solsona to Berga, and the majority of roads were not tarred. The pavement was an unending series of potholes; they were roads swept by torrents every time it rained. It was necessary to do everything on foot, or if you stretched your luck, by bicycle. This represented an additional source of fatigue to that involved in geological fieldwork and evidently it meant wasting time, which in turn meant that the productivity of research workers was very low. Nobody could even dream of having a motor car. It was necessary

to wait for the 'Stabilisation Plan' of July 1959 before such 'luxuries' became possible.

There was another notable deficiency that slowed down our work, the absence of aerial photographs. The combatants in the World War had already made use of them and the Dutch had discovered their geological usefulness when combined with stereoscopic analysis. In 1951 and 1953 the Dutch scientific journals were full of them. I wrote an article calling for their use in 1957, but I was not able to use them professionally until 1959.

3). The facts I have briefly outlined above spanned almost two decades. Towards 1959, the period we might term the 'post-war' finally came to an end, a period dominated by autocratic government and inferior practical conditions, shortages of personnel, restrictions and a crushing lack of financial support.

This was, then, the prelude to the '*Great Leap Forward*' in geological knowledge of our country. Geologists began to be churned out by the four universities previously mentioned. The 1959 Decrees that had progressively liberalised the search for hydrocarbons led an avalanche of foreign companies to enter the hunt for oil in both peninsular Spain and the '*African provinces*'. Remember that, until 1953, the whole territory of Spain was the private reserve of the Spanish State, and unfortunately almost no prospecting was undertaken. There was a lot of work to do. Many newly qualified geologists took advantage of the situation. The search for oil meant work in geological cartography, in stratigraphy and micropaleontology, and well as in geophysics and the drilling of bore holes.

The geological landscape began to take on a more definite shape as the 50s drew to a close. It was like the smiling faces – never seen before – of our "Caudillo" and President Eisenhower that beamed out of the posters announcing *Twenty-five years of peace* that littered the sides of the main roads in 1965.

For example, during the '60s Professor Fontboté began to churn out shoals of graduate geologists from Granada University. They presumed to be the best, the best prepared, the *crème de la crème*, the wisest of all. Basking in the reflected prestige of their mentor, they came to occupy a large number of university teaching positions, and prime posts in research companies. Six of them 'landed' in my university in Zaragoza; and the new University of the Basque Country was 'occupied' from the very beginning by graduates from Granada.

4). Reguant, who had studied at the Seminary in Vic, was one of the first students in the newly created Geology Faculty while he was still teaching sciences at the Seminary and various other schools in Vic. He continued to

teach in this city until 1969. He, and the others who graduated with him, were veritable pioneers.

On the other hand, the object of our tribute also had a real vocation for palaeontology. It is undoubtedly true that living in Vic, the surrounding land offered him a first class range of fossils to study. It was Father Lluís Via that introduced the young Reguant to the paleontology of the Vic Eocene, and particularly to an aspect that had hardly been worked on at that time. Very soon, Reguant was captivated by the bryozoa of the Gurb Formation. It should be pointed out that the special interest he had in this fossil group has never waned. Even today, it is one of the areas of research he continues to work on, and he is an acknowledged international authority on bryozoa.

However, his decision to begin the scientific study of this group was not a particularly fortunate choice – it was far from clear if working in this area would enable him to produce a doctoral thesis. His visit to Paris, to the *Muséum National d'Histoire Naturelle*, did not produce very gratifying results for various reasons. The teacher under whose wing he was supposed to work was not there. Moreover, the fossil group of bryozoa had not been the object of much study. In the end, he decided to change the subject of the thesis.

5). In Dr. Solé's laboratory, after the departure of Fontboté to Granada, our friend Carmina Virgili – who received her Doctorate in December 1954, the first woman to do so in Barcelona! – had been appointed laboratory assistant. She held this position for ten years until, in 1963, she won the Chair of Stratigraphy in the Oviedo Faculty (Asturias region, NW Spain). It must be recorded that for Dr. Solé, Virgili's prolonged stay in the Barcelona laboratory produced excellent results – Carmina was his trusted right hand.

Dr. Solé had long nurtured a desire to cover the whole of the territory of Catalonia with modern research projects and thesis. To some extent the '*Catalanids*' had already been covered by Llopis' thesis. However, this thesis had not stood well the test of time – there were some deficiencies in the work, and it reflected certain German-inspired viewpoints that had become obsolete. We need only to remember the stratigraphic and structural changes introduced by Virgili.

Dr. Solé, together with the newly graduated Catalan geologists, began to draw up a research plan that would cover the whole of the Pre-Pyrenees and the inland margins of the Coastal Ranges. In other words, he located a string of doctoral theses in such a way as to cover the whole of the Tertiary of the Central Catalan Depression. Joan Rosell, Miquel Gich, Pere Mascarenyes, Raimon Obiols, the younger Lluís Solé and Lluís Pallí covered an

enormous and little known area of the Pre-Pyrenees. On the southern boundary of this area, there were geologists working with the oil companies such as Jordi Ferrer, Joan Rosell, Valentí Masachs and Lluís Via. Meanwhile, Eduard Clavell, Josep Fontboté and Oriol Riba were working in other areas (the latter being responsible for the whole of the Tertiary basin). All were actively collaborating with foreign geologists such as Defalque (from Petrofina) and Hentschel and R. Brinkmann (from Ciepsa-Carl Deilmann Bergbau).

6). Salvador Reguant, with the support of Dr. Carmina Virgili, began working on his thesis. His task was to link the Pre-Pyrenees' studies with those of the Coastal Ranges. He launched himself into the work in 1962. Shortly afterwards, Dr. Virgili entered the process of competitive exams on which the Chair of Stratigraphy at Oviedo University would depend. Her selection marked the beginning of a period in which she took a special interest in the work of Reguant, and he lost no time in applying for his doctorate to be transferred to the Asturian capital.

For Reguant, the decision to study the Vic Plain, and the neighbouring hills of Lluçanès and Bages, suited him perfectly - it was after all his own back yard. His study area extended from Roda de Ter to Sant Feliu de Codines.

He fitted his fieldwork in around his teaching obligations in Vic. As Pere Busquets has reminded me, they went out into the field three times a week, with the other days being dedicated to laboratory work. Pere Busquets acted as Reguant's assistant, and incidentally received an education in geology, similar in many ways to my own trips into the Pyrenees, around the headwaters of the Ter, with Fontboté (1946-47).

The subject of the thesis chosen by Reguant was the marine Eocene that lies between the Pre-Pyrenees and the Coastal Ranges. It covered that area misnamed by the Germans in the 30s as the *threshold of Empordà*. This monocline, only slightly deformed, formed an excellent subject for a detailed stratigraphic study. The conventional cross-sections of the strata, from the Palaeozoic of the Guillerries to the Upper Red Sandstone of the Artés Formation (Collsuspina), provided him with very reliable samples and data to undertake a comparative stratigraphic study.

He already had aerial photographs at his disposal, which enabled him to produce not only a good geological map, but also allowed him to establish the correlations between the cross-sections he was producing and the position of the isochrones.

Reguant's research, to our way of thinking, is perfectly balanced. The lithostratigraphy, that is the study of the units of rocks that make up the substrata, precedes the

biostratigraphy. This, the study of the fossil content, then paves the way for the chronostratigraphic synthesis, in which the various units identified are dated in line with the ages and subdivisions established in the international geological time scale. The classical model is rigorously followed.

The fundamental correlations are backed up not only by the fossil content, but also by data on the mineral and petrographic content based on detailed samples taken at very close intervals. It is easy to understand the quantity of work that the analysis of heavy and light minerals, of indicators such as the presence of representative minerals like glauconite, the morphoscopic analysis of the lithic and bioclastic components, and the analysis of grain size, represented for the aspiring doctorate student. These are techniques that to a certain extent are now ignored by more modern authors, and have been superseded by the analysis of sedimentary structures and depositional sequences. However, it should be remembered that these techniques of structural and sequential analysis had not yet been developed. I also recall that Dr. Reguant had no financial support to undertake the enormous task he had set himself. He was faced with the necessity of using analytical laboratory techniques that were very laborious.

The lithostratigraphic structure described in Reguant's thesis follows the traditional norms of binomial nomenclature – *the Vic Marls, the Centelles Clays, the Sant Martí Xic Limestones*. They are clearly explained and defined units that meet the norms of the American Stratigraphic

Code, and also with the later International Code. These rules which were subsequently used in the publications of Joan Rosell, Jordi Ferrer and Reguant himself, were commonly used in the stratigraphy of the American school of oil company geologists.

Reguant's work also dealt with the fossil content. Paleogene biostratigraphy was in the process of being thoroughly overhauled at that time, with new stages such as the *Biarritzian* and *Ilerdian* being established and defined. Reguant turned for help to specialists in microfacies like Dr. Linares of Granada University, L. Hottinger of Basel, a specialist on macroforaminifera, Dr. Chevalier of Paris for help with corals... the list of specialists is endless.

The overall synthesis of his work was exemplary, and remains perfectly valid today. The paleogeographic maps demonstrate the main north to south marine transgression, while the existence of the Guillerics'– Montseny Rise and the questions of the sedimentary environments and the paleoclimate were all adequately considered.

7). I would not like to finish without recalling that far off day – 35 years have already passed! - when the thesis was presented at the Science Faculty of Oviedo University. For the director of the thesis, and host to the jury, Dr. Carmina Virgili, that 10th of October 1966 was a memorable day, a day to hang out the flags! Can you imagine in a university so far from Catalonia, all the deliberations of the jury were carried out in Catalan? It was unforgettable – we felt as if we were at home!.