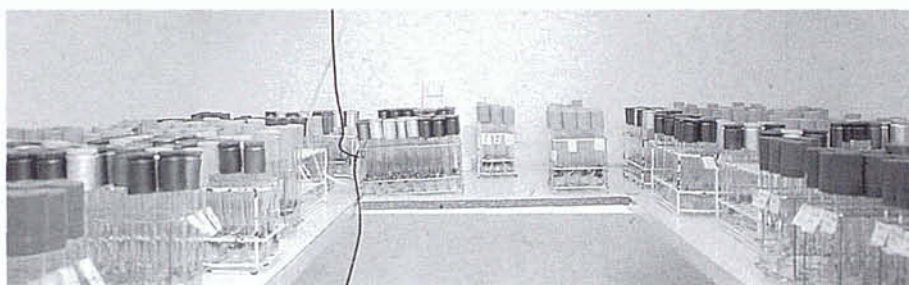


SCIENCE

SCIENTIFIC RESEARCH IN CATALONIA



CATALONIA HAS ALWAYS KEPT ABREAST OF CONTEMPORARY TRENDS IN SOCIETY, CULTURE AND TECHNOLOGY. A COUNTRY WITHOUT RAW MATERIALS OR HEAVY INDUSTRY, IT HAS BASED ITS PROGRESS ON ITS CAPACITY FOR INITIATIVE AND ITS ABILITY TO ADAPT TO NEW SITUATIONS, ON ITS COMPETITIVENESS AND ITS OPENNESS TOWARDS INNOVATION.

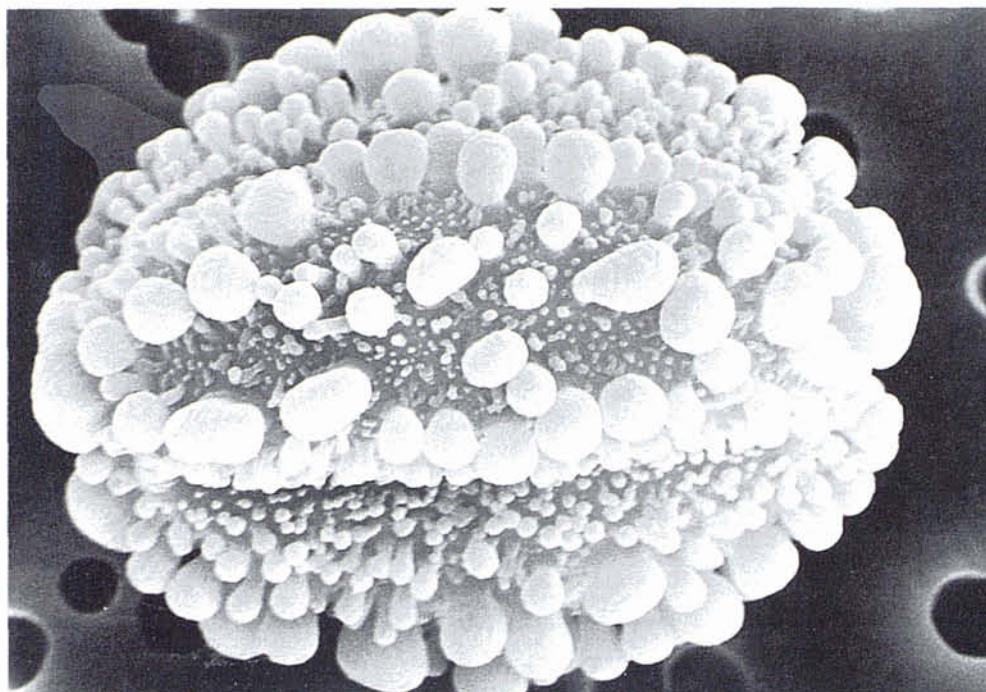
JOAN ALBAIGÉS DIRECTOR OF THE CENTRE INVESTIGACIÓ I DESENVOLUPAMENT

No-one today would deny the importance of scientific activity in shaping our western society. Science, through the new insights it creates and the applications that can be derived from them, has influenced our recent history in two ways: firstly, in the changes it imposes on the production of consumer goods and on the production systems themselves, and secondly, through the impact of new discoveries on the society's intellectual or cultural orientation. It seems quite clear that, for the whole of this

century, social progress, both in terms of technology and in the quality of life, has gone hand in hand with our capacity for creating and assimilating new understandings. I say create and assimilate, so as to reflect the extent to which all countries are involved in these questions, regardless of size. While not all countries can occupy a leading position in the world of science and technology, scientific activity is necessary, if nothing more, in the selection, adaptation and reparation of the results of technological progress abroad.

As someone once pointed out, the roots of poverty and dependence are often to be found in ignorance itself.

Catalonia, a small country in terms of its geography, has always kept abreast of contemporary trends in society, culture and technology. A country without raw materials or heavy industry, it has based its progress on its capacity for initiative and its ability to adapt to new situations, on its competitiveness and its openness towards innovation. As a result, whenever Catalònia has been in a position to make



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its own political decisions, initiatives have arisen which have also acted as a boost to its scientific and technological progress.

At the turn of the century, when Europe was still going through the transformation resulting from the Industrial Revolution, a series of Catalan institutions, such as the Institució Catalana d'Història Natural (1899), the Acadèmia de Ciències Mèdiques (1895) or the Laboratori Microbiològic Municipal (1887), were working to keep up a certain climate of scientific renovation in the country. The Laboratori Microbiològic, directed by J. Ferran and R. Turró, both of whom were acquainted with Pasteur, became a leading centre in microbiological research, with contributions such as cholera, typhus and rabies vaccines, that brought it international recognition. This work, paid for by Catalonia, contrasts with the rhetorical, conservative approach to science in Spain, which was even criticised by Cajal himself.

At the time of the political triumph of Catalanism in 1907 (Solidaritat Catalana), Catalan society was all set to start on a period rich in scientific achievements, which, apart from the break imposed by the Dictatorship (1923-1930), was to last until the end of the Civil War (1939). The

period's maximum exponent was the Institut d'Estudis Catalans (1907), founded at the same time as Madrid's Junta de Ampliación de Estudios, which, while it was to have a decisive influence on Spanish Science, never managed to overcome its heavily centralist character. As the then professor of physiology August Pi i Sunyer said, "Catalonia will never have her own Science until she pays for it".

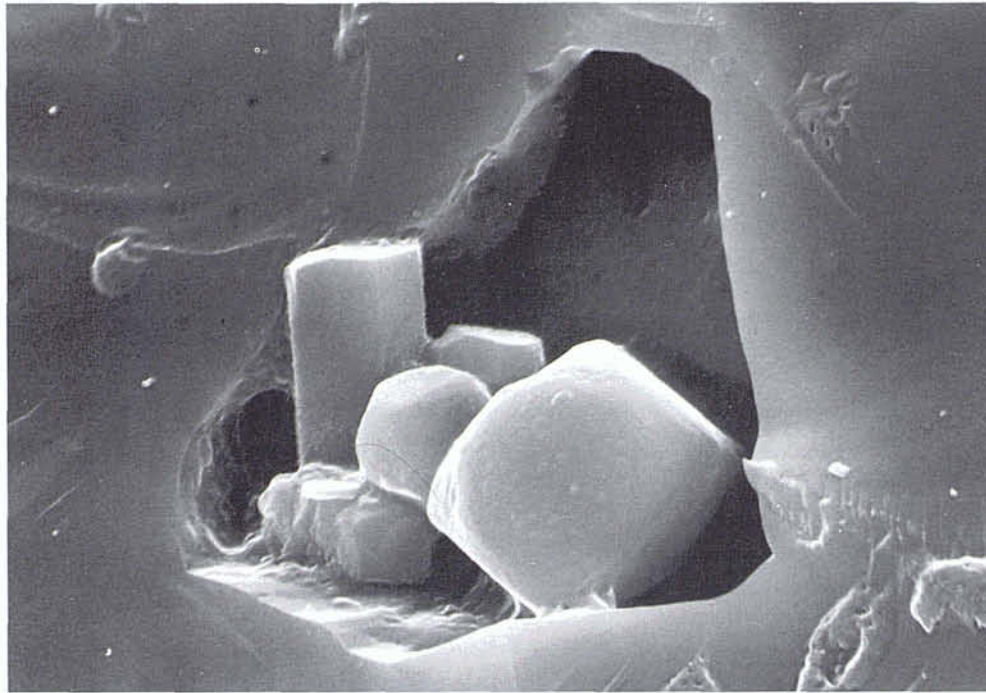
The Institut became a nucleus and a catalyst for Catalan culture and science. It brought together a generation of exceptional scientists, with resources that were scarce but well administered, and with a great team spirit. Examples of their work are the Library of Catalonia, the Meteorological Service, the Geological and Geographic Service, etc., as well as the diffusion of extensive scientific activity through numerous publications.

The job of creating the scientific and technological infrastructure was continued by the Laboratori General d'Assaigs (1922), for industrial products, and the Institut de Fisiologia (1920), amongst others, and culminated in the constitution of the Autonomous University of Barcelona (1933), a clear indication of the scientific impetus of the time. Many young researchers were sent abroad to perfect

their training, some of whom, like Duran Reynals, were to achieve international prestige.

The cultural ruin which resulted from the disaster of the Civil War and the subsequent political action, which condemned the Catalan Institutions to oblivion when not actually persecuting or destroying them, opened a lengthy parenthesis during which there was little hope for the survival of research. For twenty years, research work practically disappeared from the universities, and was reduced to the activities of the Consejo Superior de Investigaciones Científicas, a state organization which replaced the Junta de Ampliación de Estudios, though with a view of research which was totally centralist, bureaucratic and instrumentalized. State expenditure dropped to 0.2 % of the GNP, when in the rest of Europe it stood between 2 and 3 %.

The Central Government's attempts to form a scientific policy during the years of rapid economic growth (1964-1971) were a resounding failure, starting with the foreseen increase in expenditure, which in 1975 was only 0.3 % of the GNP. State investment in Catalonia during this period never reached 5 % of the total set aside for research, when the



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population represents 16 % of the total population of the country and its contribution to the GNP is more than 20 % of the total.

Meanwhile, scientific activity in the industrial world became very much more complex. The term R + D system began to be used in referring to it. Research plans and the creation of centres, development programmes and programmes to encourage innovation, and, very especially, the strengthening of the links between research, innovation and technological development became priority political objectives. Spain missed the boat of these advances, and while it took 13th/14th place in the industrialized world, it was 28th in scientific production, with a quarter as many researchers per 100,000 inhabitants as the OECD countries.

The restoration of democratic liberties, and in particular of the *Govern de la Generalitat* (1977) and the approval of Catalonia's Statute of Autonomy (1979), led once again to a more normal situation, if not a renaissance in the world of science. However, the Catalan government's lack of resources and of competence in this field, coupled with the increased complexity of the problems involved, have made for a

slower rate of achievements during this period.

Nevertheless, the *Generalitat's* policy is made quite clear by the creation of the *Comissió Interdepartamental de Recerca i Innovació Tecnològica*, the creation of a network of agricultural research institutes (IRTA), to support the different activities in this sector, and the total renovation of the *Laboratori General d'Assaigs i Investigacions*, mainly concerned with the industrial sector. Alongside these measures is the creation of the "Technology Transference Centres" in the three universities, designed to bring basic research more closely in line with the needs of the production sectors. As Engels said, "the existence of a need within society does more for research than ten universities".

At the same time, the Spanish system has become more open and more up to date. In 1986, the Madrid Parliament passed the so-called Science Law, which in spite of having been the subject of an appeal to the Constitutional Tribunal by the Catalan Government, has made many more funds available and has set in motion an administrative system which is in line with those of the industrialized countries, based on scientific rather than political criteria. Expenditure has reached 0.8 %

of the GNP, and we now have half as many investigators per 100,000 inhabitants as the OCDE countries, and have jumped ten places as regards scientific production.

Some indicators show a positive tendency for research in Catalonia. For one, there is the increased competitiveness of our researchers, since while Catalonia has only 15 % of the staff of the whole of Spain, it manages to attract 20 % of investments. Also, the structure of the R + D system in Catalonia comes closer to that of other European countries, where the private sector covers 60-70 % of total expenditure, compared to 43 % in Catalonia and less than 20 % in the rest of Spain. Obviously, this is not enough. Having overcome the economic crisis of recent years, many more resources must be made available. There must be a change in the attitude of management, which is directed too much toward short term profits instead of continued research work.

In spite of everything, there is cause for optimism. What we must do now is to get through to and involve the whole of the social fabric, because, as Bernal said, "Science is far too important to be left solely in the hands of scientists and politicians." ●