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EDITORIAL

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Spinning-off and joining ventures in microbiology

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A criticism that has frequently been leveled against the Spanish (and European) science system is the scarcity of entrepreneurial initiatives that have originated in universities and research organizations in the country. Several national and transnational initiatives are currently aimed at solving this deficiency and at bridging the gap that prevents the commercial exploitation of research-derived inventions. The results of these initiatives, however, have been far from satisfactory. Academic scientists trying to set up a new company to market a discovery face a number of hurdles and mermaid songs that usually abort both momentum and initiative.

The costs of establishing a new entrepreneurial society are high. Academic life and affluence are usually strangers to each other. Hence, the participation of extra-academic partners is usually mandatory to establish a production-based initiative. In Spain, national agencies, such as the Center for Technological and Industrial Development (CDTI), and an increasing number of regional public and semi-public organizations aid in establishing new technologically based companies. Participation of these agencies ranges from offering low-interest rate loans to becoming involved as industrial partners in the new companies for definite periods of time. In addition, these agencies provide business advice for academics. This help is offered once the company (or an initial version of it) has been established. The administrative steps necessary to set up a company are cumbersome, as is creating the necessary equilibrium among the different—private and public—partners in the company. All these tasks are far removed from ordinary academic activities, and the success of scientists taking on these responsibilities is usually far from optimal.

The level of involvement of the founder scientist in the new company also poses new problems. For a company aimed at the production of material goods, the investment in equipment and facilities is exceedingly higher than the start-up capital. In accordance with the Spanish Law of Contracts with Public Administrations, if part of the developmental process is to be carried out at public facilities, the participation of tenured academics in the society must be limited to 10%. This limits dramatically the weight of the founder scientists in the company and, consequently, the amount of the economic return to them. Several universities have studied different initiatives to overcome this limitation, which has discouraged the founder momentum, but a definitive, broadly accepted answer has not yet been found.

As an alternative to creating a new company, academic scientists can establish production-oriented research contracts with already established companies. This possibility allows scientists to escape from the labyrinth described above, and increases the economic return to them to the limits established by law. Moreover, because of the limits to the participation of academic scientists in commercial enterprises, the economic return from direct contracts with an already established company is higher than from a new company created under the initiative of the scientist. However, the drawback of such a model based on contracts between scientists and established enterprises is twofold: (1) The academic participates as a mere problem-solver for the industry, not as a generator of new industries. (2) The contracts for non-tenured scientists involved in this scheme are of low quality—being essentially, similar to fellowships.

Considering the three different reasons for funding a technologically based spin off, namely, economic return, application of research results, and bridging the gap between academia and industry, the costs of the first two, in terms of money, time and stamina, exceed the benefits. Therefore, cooperation with already established

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industries is a good alternative. Obviously, the preceding considerations apply to industries aimed at developing an actual product, not to the establishment of companies that act as consultants.

Let us now consider whether the scarcity of good-producing enterprises originating from academia is a true problem or rather a pseudo-problem. Ideally, universities and research councils should produce knowledge that can be commercially applied within a short period of time. This statement is generally placed within the framework of basic versus applied research. However, the framework for this discussion can be a different one. Universities are institutions where undergraduates and Ph.D. candidates are trained for academic or professional careers. Within the Spanish science system, most research carried out at universities and at the Spanish National Research Council (CSIC) relies on students who are expected to develop original research projects. Unfortunately, originality and commercial application are, in many cases, contradictory. For instance, in the field of microbiology, antibiotic screening is basic task for a Research and Development department of a pharmaceutical company. It is, however, time-consuming, has a low level of originality, and is frequently a borderline subject for a Ph.D. or Master's thesis. Furthermore, for the daily operation of a productive industry, professionals with different academic qualifications are needed. An industry whose manpower is exclusively based on Ph.D.s or Ph.D. candidates can produce very exciting academic discussions, but its performance in the production of goods will probably be far from acceptable. If academia concentrates on training scientist and on exploring new problems, it cannot also concentrate on developing and marketing new drugs.

In his classical speech to Dr. Martin Arrowsmith, Prof. Gottlieb argues that the "action man" is a human species completely different from the real scientist. (In his quest for pure science, the main character of the novel *Arrowsmith*, by Sinclair Lewis, encounters meanness, corruption, and misunderstanding.) Prof. Gottlieb was almost a science version of a religious fundamentalist (as his name suggests), but he was quite right in urging Martin Arrowsmith to decide whether he is going to become a scientist or a producer, because the two were hardly compatible. By contrast, Louis Pasteuris hardly considered to have been an applied scientist, although most of his work was aimed at solving applied problems. While Pasteur tackled problems encountered by different industries, he was never an industrial founder. Moreover, in his autobiography Salvador E. Luria wrote that the university is a world of scholarship and trust, where the reward for success is intellectual recognition, whereas industry is a world of contracts and insecurity, where pay is the reward for work, and success can make one expendable.

Perhaps a time is arriving (it is always arriving) in which academia should clarify its objectives with respect to it relationship to business, i.e., the generation and transmission of knowledge, so-called know-how, and abandon its attempts to reach unreachable stars that, in addition, shine in parallel universes.