



Newsletter #2

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Research and Society

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According to Wikipedia, science outreach encompasses activities that interpret scientific knowledge and make it accessible to society; i.e. all actions that bring science to people interested in understanding or learning about it. Thus, it is not about generating scientific knowledge, which is what researchers usually do. Rather, scientific knowledge is the basis for subsequently interpreting it and making it accessible to society through specific activities.

Current sources of science dissemination include practically all media formats: television documentaries, popular science magazines, articles in generalist newspapers, informal talks, interviews, etc.

At the beginning of their tenure, the current management team of the CIB Margarita Salas, well aware of the importance of science communication, oversaw the creation of the Research and Society Commission, which coordinates all activities aimed at disseminating the scientific knowledge generated by the Center's researchers to society at large. The Commission consists of two large interconnected areas: i) The Web, Social Networks and Events; and ii) Seminars and Training. In addition, it has promoted and coordinated numerous activities, including Open House Days, Science Week Workshops, informative talks in bars, and writing of these periodic newsletters, which publicize the most notable events occurring at the CIB Margarita Salas.

The Commission is made up of CIB researchers with a high level of involvement in science outreach, most of whom altruistically dedicate their time and effort to this work on a voluntary basis. Moreover, some of the more active members have complementary training in science journalism and communication. In recent months, the Commission has grown further with the

hiring, through the CSIC's Youth Guarantee program, of an enthusiastic young woman with a double degree in Journalism and Audiovisual Communication. Few researchers can singlehandedly manage the entire process of publishing research and subsequently adapting and publicly disseminating this knowledge to broader society. Here, the support of "specialists in popular science" plays a key role.

Throughout these months of the COVID-19 pandemic, it has become clear that the current situation of social distancing has not been an obstacle, but rather an incentive, for the development of science dissemination activities, promoted by researchers from the CIB Margarita Salas with the support of the Research and Society Commission, which has shown a remarkable capacity to adapt to the current reality through the use of available information and communication technologies.

Social pressure has reinforced the importance of popular science, the basis of which is access to scientific knowledge. Here, the concept of "open access" publication, which has been around for several years, plays a crucial role. A recent international study led by the Complutense University of Madrid¹ found that due to social pressure and the commitment of commercial publishers to the COVID-19 crisis, the percentage of research articles on coronavirus that were open access in 2020 reaches 91.4%, with the authors from the United States and China leading the way.

Here, it is worth highlighting one of the conclusions of the Coronavirus Scientific Analysis Group, created by the ISCIII, which emphasized the importance of citizen science. This refers to the generation and development of a greater culture of science among society in order to directly involve people in the scientific process.

According to Pere Estupinyà and coworkers², the pandemic has radically changed the reality of scientific journalism and the dissemination of science in general. In recent months, scientific communicators have beco-

me figures of public importance, gaining unprecedented attention in the media and social networks. However, with this elevated public profile come many new challenges. One such challenge is how to narrate the science in detail as it occurs, not after it is published. Currently, citizens are awaiting news on the experimental phases of different vaccine development programmes, and are drip-fed news on discoveries relating to the pathophysiology of the disease, whether those infected have more or less immunity, or whether children are highly contagious or not, etc. There is also the issue of "fake news", which rapidly goes viral on social networks. Here, the

scientific communicators must act by carefully checking and filtering science-related news.

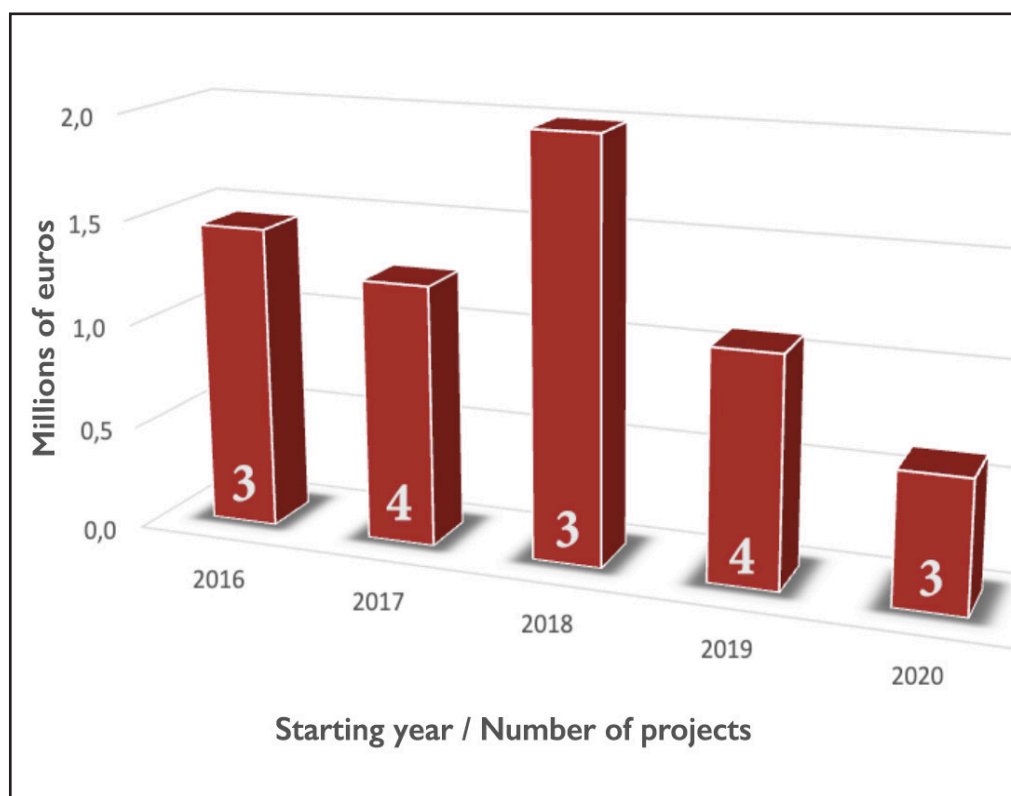
We should emerge from this pandemic with a strong conviction of the need for a much better organized and specialized scientific culture, where researchers receive the support of communication experts and the tools necessary to ensure agile transformation of the results of their research into news that is understandable to the general public and promotes popular science. This is the objective of the current Research and Society Commission of the CIB Margarita Salas, and one we hope to achieve with the support and participation of all.

1. Belli, S., Mugnaini, R., Baltà, J. et al. "Coronavirus mapping in scientific publications: When science advances rapidly and collectively, is access to this knowledge open to society?" *Scientometrics* (2020). DOI: 10.1007/s11192-020-03590-7

2. Reunión virtual organizado conjuntamente por las Consejerías culturales y científicas y Centros Culturales de España en Argentina, Chile, México y Perú, el 6 de agosto de 2020

A few numbers

We are starting a new section in our Newsletter, in which we will present the center scientific activity with numerical data. We have first selected European Union projects, given the high level of competition for these projects, and because the purpose of the majority of EU projects currently funded in the CIB Margarita Salas is to provide benefits to society in general. Since 2016 we have been awarded 17 projects, representing an endowment of almost €6.5 million. Among these are several biotechnology projects for sustainable development, focusing on topics such as the recovery of waste and recycling of pollutants: production of biofuel and bioplastics through waste fermentation; biodegradation of plastics; use of agricultural residues to manufacture construction materials; and, taking a broader perspective, the improvement and design of biotechnological processes based on the circular economy principle. The biomedical projects seek to develop solutions for pressing health problems such as decreasing the toxicity of some anticancer agents; studying how aging



European projects granted to the CIB Margarita Salas since 2016

affects blood cell renewal; improving processes for the development of new drugs; and, more generally, characterizing the basic cellular processes involved in the development of the disease.

The participation of CIB Margarita Salas researchers in European calls is proof of our commitment to society and our determination to direct our research efforts towards the **Biology for Global Well-being**.

A model library

Begoña García Sastre

Journalist (supported by a contract from the *Fondo de Garantía Juvenil*)

The [Library of the Margarita Salas Center for Biological Research](#) is considered the reference library in Biology and Biomedicine in Spain. Today, located in the same center at Ramiro de Maeztu, is a collection that stands out above all due to the diversity of subjects and the amount of resources it offers: 1,367 printed journals and series and 11,900 books, in addition to the multitude of electronic tools and resources available on different CSIC digital platforms.

Moreover, the CIB library also houses a particularly valuable treasure: the "Marañón Legacy", made up of the documents of one of the center's founders that were donated by his family after his death.



The library facilities not only house this large bibliographic collection, which is distributed between the main room and a 3,200 m warehouse, but also offer other services such as 20 reading stations, Wi-Fi, and reprography service.

However, until reaching its current state, the library has gone through some very different and complicated stages.

First steps

Today's CIB Margarita Salas, which was officially opened in 1958, was created to house the Santiago Ramón y Cajal Institute of Histology, the Jaime Ferrán Institute of Microbiology, and the Gregorio Marañón Institute, which combined the Departments of Metabolism and Enzymology.

The building on Velázquez Street, built by Miguel Fisac, became a meeting point for Spanish researchers working in experimental biology. One of the researchers' main objectives was to publish in foreign journals, as they were convinced that international magazines would

lend greater prestige to their work and provide greater dissemination. For this reason, subscriptions to publications grew at a rate that the libraries of these institutes were unable to support. The space issue was not solved until many years later.

In 1960, the library was named after Gregorio Marañón, in honor of the center's first and only President.

Space issues

In 1968 the institutes of Cell Biology, Genetics, and Enzymology joined the CIB, increasing the number of incorporated institutes from 3 to 6. This led to a greater demand for publications that fed the collections of its libraries and placed additional demands in terms of storage space.

A year later, the Gregorio Marañón library was joined with that of the Institute of Cell Biology and space was expanded thanks to financial support from the Juan March Foundation. This still proved insufficient, however, and journals flooded the shelves in the hallways and stairs.

In 1973 the library of the Institute of Genetics was incorporated into the Gregorio Marañón library and in 1976 it was renamed the Library of the Center for Biological Research, the name which bore until November 2019, when it became the Library of the Margarita Salas Center for Biological Research, due to the change of name of the center.

In 1984, work was finally carried out to solve the space problems. The building's basements were refurbished and the library was relocated. The reading room and the staff were located on the ground floor, while 5000 m of shelving in the basement finally housed the entire collection guarded up to that point.

Two years later, the service was modernized following the guidelines of the CSIC's Libraries Coordination Unit. With the help of the Ramón Areces Foundation, information access was improved thanks to the acquisition of the necessary equipment and software.

Moving and relocation

In 2002, when the new building on the CSIC campus at the Complutense University was completed, the library was partially transferred. Due to some problems delaying the definitive move, a librarian was assigned to the new building so as not to interrupt the service. When the definitive move finally occurred, the library

team managed to do so in just 1 week. “The move was a challenge for everyone: it required moving almost 3,000 m of shelving. The movers did the hardest work, but we had to physically help and relocate the material. We gained a lot in space and comfort, and we only closed the interlibrary loan system for 1 week”, recalls Olvido Parterroyo, who was head of the library at that time and retired in 2019.

The new library, designed by the architect Fernández Alba, has modern and functional facilities. The reading room is spacious and bright, offering 20 individual seats and 2 work areas. Some pieces of furniture in the library date back to the building on Calle Velázquez, highlighting the history of the library and the publications it houses.



Exhibition cases display open journals, monographs, and series from 1995 onwards. The pre-1995 collection is stored in a warehouse with more than 3,000 m of shelving that is permanently open to staff.

With the drastic changes in the manner in which scientific information is disseminated, the number of paper journals has decreased considerably: “In 2020, we had subscriptions to only 5 paper journals,” says Olvido. However, this has not prevented the CIB library from maintaining a significant number of titles, and it continues to receive donations: “Despite everything, this particular CSIC library has best resisted the loss of paper collections; a Numantian resistance that arose out of the peculiarities of the library’s history, since it wanted to maintain the prestige of having the oldest Biology and Biomedicine CSIC collections, which originated from the libraries of the institutes that initially formed the center”, Olvido adds.

This history has given us the library of the Margarita Salas Center for Biological Research, an indisputable reference in Biology and Biomedicine. It should be remembered that none of this would have been possible without the work of the custodians who have cared for this collection down through the years. Despite coming from disparate areas, they have been able to participate

and adapt to offer a service of excellence that gives the CIB library the prestige it enjoys today.

THE MARAÑÓN LEGACY

The most valued jewel of the CIB Margarita Salas library is the “Legado Marañón”, which has been part of the collection since it was donated by the family of Dr. Gregorio Marañón after his death in 1960, although the exact date of the donation is unknown as there is no accompanying documentation.

Marañón was not only a doctor, he was also a passionate historian, essayist, and bibliophile. His prolific activity explains the size of his collection, which consists of 125 books, 1,800 articles, and 250 forewords. He had several libraries, consisting not only of his work but also the works of other authors covering a wide range of subjects and multiple languages.

The donation received by the center included his personal works (a large portion of his scientific and humanistic writings dating from 1910 to 1959 and bound in 34 red leather volumes), as well as his medical, scientific and professional library, consisting of more than 1,400 volumes.

His personal writings stand out in terms of their diversity and how they were ordered and classified. When he had enough, he sent them to be bound by previously making a list that he included in the binding.

In 1994, the Department of Health of the Community of Madrid financed the edition of the “Catalogue of Publications of Professor Gregorio Marañón”, a bibliographic list of 623 documents selected from the bound collection.

The next step was to digitize the legacy, and in 1997 the Ramón Areces Foundation was asked for assistance. However, the project faltered due to a lack of qualified personnel. Consequently, Dr. Marañón’s legacy has been guarded with extreme care over the years, with the most precious works housed in a glass case. In the new building, these works were stored in the Management office, where they remain. The medical collection was stored in the general warehouse under lock and key.

Finally, given the difficulties accessing the stored material, the project to digitize and re-bind the collection began in 2007. This task was outsourced to the company Microdata, which digitized, indexed, recorded, and stored the documents on DVD. This required considerable effort, as a complete review of the collection had to be first performed. An additional 477 documents were added to the Catalogue, bringing the total to 1,100. Furthermore, certain documents had to be unbound and restored to ensure that they survived the process. The project restored the collection to its original status.

The other portion of the legacy, the medical library,

was registered and cataloged in 1993. A striking feature of these works is the number of annotations in the margins and loose handwritten pages, which give the reader a greater sense of closeness to the material. Although a multidisciplinary collection, the topic of endocrinology prevails. There is also a multitude of clinical journals that Dr. Mara^ñon founded and wrote for on numerous occasions.

The Mara^ñon Legacy, preserved all these years by the library staff, is proudly displayed to visitors and its contents are also available for loan.

To complement this report, the following is an interview with past and present members of our Library personnel: the aforementioned Olvido Partearroyo (O), and Elena Tom^é (E), who took over from Olvido as the current head of the service.

Why is the library important for scientific work?

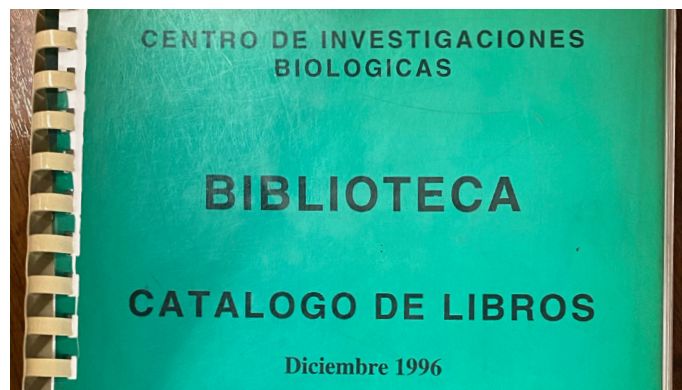
O: Since ancient times, going back as far as Alexandria, and even earlier, libraries have been there to help scholars in all fields of learning. But in the era of modern Science, in the 20th century, the library became indispensable to support scientific work given the exponential growth of sources of information. The librarian is the one who acquires, orders, and ultimately locates and supplies the final article that the scientist needs, greatly facilitating their work.

Is this role still just as important given the availability of new technologies that facilitate access to information? How has it changed?

E: Yes, it is still just as important. Acquiring and cataloging sources of information, and ultimately making them available continues to be the basis of our work. What has changed is how information is accessed and disseminated: there are more and more digital resources and more channels of communication. New tools appear, and therefore learning is a continuous process.

How is this library (and how it works) different from others?

O: I suppose that, despite operating within the CSIC Library Network, no two libraries are alike. Something unusual then, and that I wanted to do as the head of the library given the availability of sufficient personnel, was to ensure that all of us knew how to perform the basic operating tasks, especially the interlibrary loan, so that the library's work never stopped. This library is one of the few that offers a year-round interlibrary loan service. Another notable difference is the support received by the CIB Management teams down through the years, which have recognized the importance of the Library's work. Besides, the library's work has been constantly monitored by the Commission and especially by the Scientific Officers. Feeling that closeness is always very welcome.



E: Despite having been at the library for only a short time, I can attest to the level of support provided by Management and the scientific director, as well as the high level of professionalism of the library team.

How are the collections of a library like this managed? Are there any peculiarities due to the history of how these collections came about?

O: In the year 2020, the library had subscriptions to only 5 physical journals; all the rest were electronic subscriptions. In 2000, the library subscribed to more than 300 physical titles and maintenance of this collection required very arduous work involving contact with publishers, regular checking of electronic links, and also, exhaustive claims for journal issues, inventory review, etc. Beginning in 2005, the conversion from paper to digital accelerated, and with the 2008 crisis, the shift was drastic.

The Mara^ñon Legacy is the most valued jewel in the library. What are the most valuable and/or curious items in this collection? Do you frequently receive requests to consult these collections?

O: Yes, but in reality, the Mara^ñon Legacy is not that well known, despite the fact we have provided a link to the collection on the library's website for many years now. These documents have been consulted for some doctoral thesis and have been loaned for exhibitions, but it would be nice to give it the broader dissemination it deserves. Last year we resumed contact with the CSIC Library Network to link these documents to the Digital.CSIC repository and the CIRBIC catalog. Of course, there are some very curious documents written by Mara^ñon himself, and countless interesting books in his medical library. The most requested is the Salpetrière collection, which has had an impact on exhibitions and even works of art.

Olvido, how did the library operate when you started? Has it been easy for librarians to adapt to changes in the way libraries operate? How was the transfer to the new CIB building managed, what were the main challenges?

O: When I started working in the library, the digital age was already well underway, beginning in the 80s with databases and then the advent of digital journals in

the 1990s. Although I was still able to experience many advances, it must have been exciting to experience the change from the beginning. I think that all the library staff, each dedicated to their own task, had to adapt to the changes, and we did so with pleasure.

Elena, you just recently joined the library staff, what items would you highlight from the collections? What are your expectations for the future, and what challenges do you anticipate?

E: Yes, I joined just before the lockdown. I would highlight, in addition to the aforementioned Marañón Legacy, a very interesting project that is currently underway to transfer the historical photographic archive of the SEBBM to the library. We are still in the initial phase, but we will make items available as the work progresses. It will be a challenge to publicize these two very special collections. We are also boosting our presence on social media. The future of scientific libraries will continue to be linked to the publication and dissemination of scien-

tific production. Open access is becoming more widespread and the editorial model is changing, which will in turn influence the operation and the role of libraries.

Olvido, now that you have retired, what has stayed with you from your time at the library of the CIB Margarita Salas?

I enjoyed each and every one of the different stages, both my daily work and the interactions with other libraries, the Red-CSIC, and other institutions. Perhaps the first stage was the most exciting. Although I was already working at the CIB, it was a drastic change in my life that I never, never regretted.

** We are grateful to Olvido Partearroyo for providing us with this interview and with information on the library and its history for the preparation of this report, and for the dedication and love she has shown to the library service throughout her time there. We take this opportunity to welcome Elena Tomé and thank her for her availability and participation.*

Teresa Suárez: "Perhaps one day our chips will be able to immediately detect, from inside the cells, whether a given chemotherapy treatment is working"

Carmen Fernández Alonso

PhD in Chemistry at CIB Margarita Salas

Understanding the functioning of cells and tissues is essential when studying the processes of deterioration associated with disease or aging. The techniques and instruments used for this purpose have advanced enormously in recent years, although they have not yet overcome the most significant hurdle: the fact that cells must be ruptured to examine their contents and study their activity. [Dr. Teresa Suárez](#) (León), a member of the Molecular Biomedicine department of the Margarita Salas Center for Biological Research (CIB-CSIC), is seeking to develop non-invasive methods with medical applications that can help overcome this obstacle.

Dr. Suárez holds a degree in biology from the University of León, and is part of the "[3D Lab \(Development, Differentiation, and Degeneration\)](#)", where she heads a line of research focused on the development of miniaturized intracellular silicon chips that can be introduced into cells and interact with them, without causing damage or altering cell function.

Dr. Suárez was part of the Management team of the CIB, serving as Deputy Director between 2014 and 2019.

Committed to increasing visibility around gender issues in science, she is member of the Life Sciences area of the Commission for Women and Science of the Spanish National Research Council (CSIC) since January 2014.

For this issue of CIB's Newsletter, we interviewed Dr. Teresa Suárez about these two features of her professional life: her research work and her awareness about gender stereotypes and biases.

P | How did you make the decision to study biology? Was it vocational?

R | It was not vocational, I had a lot of doubts. I had many interests. Journalism for instance: I was interested in becoming a radio host. Psychology, also. But I also liked biology. I had a wonderful teacher in high school, one of those exceptional people who stimulate curiosity and interest in living things. That was what made me decide to study biology, but it was not a vocation that I had since I was little. I was never the typical girl looking for bugs in the field or that kind of thing.

P | When did you join the CIB Margarita Salas?

R | I joined the CIB in 1994 as a postdoctoral researcher after having spent seven years abroad, at the Microbiology and Genetics Institute (CNRS) attached to the University of Paris XI (Paris-Sud). In 1995, I was

appointed as a tenured scientist

P | In which of the lines of research of your group are you most involved?

R | I am part of a fairly large research group that focuses on the study of degenerative diseases of the retina. We also have another line of research, in which I work more actively, focused on the development of intracellular silicon devices that we introduce into cells to interact with them, by either receiving or sending information. It is a totally new concept, that we develop in collaboration with physicists and chemists. An interdisciplinary project with application in therapies and diagnostics. This is actually my main line of work.

P | This work with silicon microchips is carried out in collaboration with Dr. José A. Plaza, from the National Microelectronics Centre (CNM-CSIC) of Barcelona. How do you start this research?

R | The work began in 2005 when they contacted the researcher Enrique J. de la Rosa, from our group; they had these silicon devices that they had managed to miniaturize, and they wanted to put them inside cells to explore their utility. To me it seemed an interesting and novel project, combining chemical, physical, and biological concepts to generate a very enriching interaction. In the beginning, the work was very sporadic, we were, both groups, working on other projects and doing small collaborations. However, it gradually gained momentum as we published high impact articles and began to get more funding for this research, which has become the central research project of the two laboratories.

P | The very small size of these silicon chips allows their introduction into living cells. What is the advantage of using these chips over existing instruments?

R | The main advantage of our microchips is their size. There is much research into nanotechnological applications in the field of medicine, and into nanodevices of all kinds that are made of different materials (metallic, magnetic, etc.) and are functionalized to carry drugs. However, few of these systems have reached clinical practice because they have a fairly high level of toxicity associated with their size -10-100 nanometres(10⁻⁹ m)-, which can cause them to interfere with the cellular machinery. Our microdevices are in the micron range (10⁻⁶ m) - between 3 and 22 microns - and we have shown that they are not toxic to cells. Furthermore, we have a large surface area that allows us to add new mechanical functions, or to introduce material into the cell, which can be released in a controlled way or response to different stimuli. This is a new type of device and we cannot say yet whether it will be effective. However, for diagnoses or treatments that involve tampering with cells outside the organism and reintroducing them, it can offer a level of versatility not found in other methodologies.

P | What type of processes have you been able to me-



asure within cells so far and what information has this yielded?

R | We have measured chemical processes that had been previously measured in other ways, such as pH. The great advantage of this approach is that it allows real-time measurement and monitoring changes over time in living cells. Moreover, we have been the first group in the world capable of detecting pressure within a completely intact cell. A cell that has not been pierced with a needle, as occurs in other measurement techniques, but remains in a perfectly normal state.

P | So far your experiments have been performed only in the laboratory, but what promising applications could these nanochips have in the field of medicine?

R | Possible applications at the moment are, to be completely honest, pure science fiction. One potential application is to inject these devices, or insert them after removal of a tumor, and use them to carry specific markers. Chemotherapy works for some types of cancer but not for others, and this is usually only evident after the patient has undergone several cycles of chemotherapy. Hypothetically, once perfected, our systems would allow us to determine, almost immediately, whether a patient adequately responds to the form of chemotherapy selected, or whether a modification is required.

But we are still a long way from achieving clinical application. In fact, I like to compare it to positron tomography. Surely, the physicists who worked on particle emission never thought that a day would come when they would be used to detect cancer through the activation of glucose in a cell. Because at that time, the machine that now detects the signal, didn't even exist. So, I like

to think that right now, the machines that will detect the signals emitted by our chips inside the body do not yet exist. But who knows, maybe at some point a cell in my liver containing one of these devices will light up red, and will then be detected from outside, indicating that I am beginning to develop diabetes. Our devices do not appear to be toxic, and I believe that this is a new field of development with a great future.

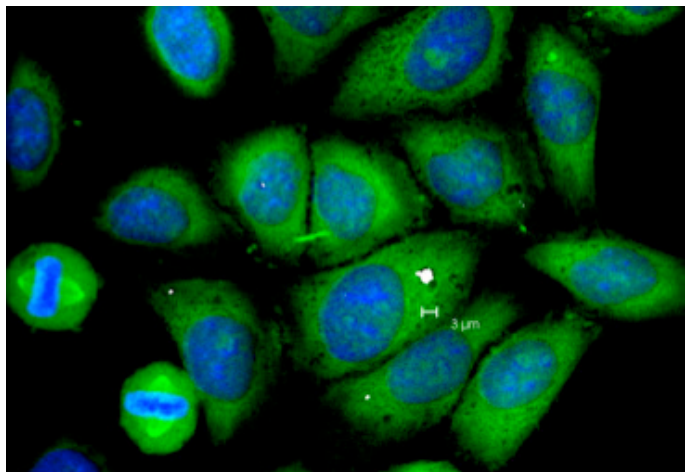
P | Moving to your role as a member of the Commission for Women and Science: when did you begin to become aware of gender issues in science?

R | There is a part of gender awareness which is very personal. I am the only girl in a family of seven, I have six brothers. And I learned from a very young age, thanks to the wonderful education my parents gave me, that we were all the same and that I was equal to or better than them. I think that this gave me a self-confidence that prevented me from clearly identifying macho attitudes because I just didn't see them. And I did not detect discrimination against women in the scientific field until quite late. It's not something that I realized during my degree or my thesis. I don't even think I noticed it clearly during my postdoc. What I noticed was that there were gentlemen, especially at conferences, who explained to me my own work with great emphasis, as if I did not understand it well. I think that was the only thing I noticed. I was aware of the discrimination in our society, but in science, I only noticed it when I started looking at the number of female researchers in the various institutions and, above all, when I arrived at the CIB, where there were very few female group leaders. There are more women, at least in biomedicine, in the earlier pre- and post-doctoral stages, but very few group leaders, and I began to become aware of this, although sadly, not until quite late.

P | You are part of the CSIC Commission for Women and Science. When did you join the Commission?

R | I joined in 2014 as a member representing the biology and biomedicine area. Currently, since the scientific/technical areas of the CSIC have been redefined, I am one of the four members of the Life Sciences area. The terms of the commission are four years, and I am in my second term.

P | The CIB researchers Matilde Sánchez-Ayuso and Flora de Pablo participated in the creation of the



Chip (3 μm) inside a cell

Commission for Women and Science. Can you summarize for us how this commission was created and the role these researchers played?

R | The [CSIC Commission for Women and Science](#) is a pioneering project in Spain. It is an advisory body to the Presidency and was established in 2002. In 2001 several researchers, among them Flora de Pa-

blo, approached the CSIC president at that time, Rolf Tarrach, and presented him with data from the US and Europe demonstrating clear discrimination towards women researchers, and the enormous difficulties they face, especially when it comes to scientific promotion. Rolf Tarrach asked them for the CSIC data. This first study that was carried out, with the participation of both Flora and Matilde along with 9 or 10 other researchers, showed that 31% of the research staff were women and only 13% of the research professors were women. The Presidency of the CSIC then created the Commission for Women and Science, with the mission of promoting and increasing the visibility of female researchers. The Commission is an advisory committee to the presidency, without executive power or funding. But at least it has started pioneering work raising awareness about this issue in Spain..

P | Prof. Flora de Pablo has been a key figure in increasing the visibility of women in science and an exceptional researcher in the field of molecular biology of nervous system development and pathophysiology. Until April 2020, together with Dr. Enrique J. de la



Prof. Flora de Pablo at the Tribute to Pioneering Women Scientists of the CSIC (October 2019, Madrid)

Rosa, she led the research group that you are part of. Has she influenced your career, not just scientifically, but also in terms of your approach to tackling gender issues?

R | In life, if you are lucky, you have several role models. Flora de Pablo has been one of my great role models. She has influenced me scientifically, and has also helped me to understand how to function in this world. There are few role models of effective female team leaders and scientists who bring an important social component to their work and whose mission extends beyond purely scientific work. But Flora is one such exception. Above all, Flora was the person who opened my eyes to gender issues in science, who put the numbers in front of me and, in particular, showed me how there were things that could be improved within our field. It is possible to be aware of the injustice of a situation, but unable to clearly see how things can be actually changed. Thanks to her, I saw that there were tools that could help us to increase gender awareness around us and act at other levels to achieve legislative changes.

P | **How do you see today the situation of women in science, in general, and in the CSIC in particular? Has it improved at all from previous decades?**

R | I think the current situation of female researchers within the CSIC is still quite poor. Time goes by and although there is greater awareness this has not translated into tangible changes in terms of numbers. There is clear stagnation in promotion within the career path of female researchers.

P | **What in your opinion are the main reasons for this problem?**

R | I don't think there are specific problems within science: it is simply a reflection of unconscious gender biases within society at large. Just as there are few women in management positions, few female company directors, few women on executive committees, and few high-level female politicians, the same pattern is seen in science.

Moreover, when you look at the glass ceiling index, which measures the number of women in higher positions compared with the total number of women in a profession, the numbers for the CSIC are not particularly bad, certainly not worse than in other areas.

P | **How is the gender perspective considered within the Strategic Plans for Science, Technology and Innovation (I+D+i)? How is this addressed within the CSIC?**

R | I believe that the CSIC is fully aware of gender issues in science, and does everything possible to address

these issues within the limits of current legislation. Calls have been modified so that motherhood does not affect, or minimally affects, opportunities for promotion and career advancements, offering extensions to deadlines for mothers, so that this pause in their personal life does not translate into a hindrance in the women's scientific career.

In my view, the Commission on Women and Science plays a fundamental role in promoting awareness among personnel and maintaining the visibility of the specific situation faced by women scientists within the CSIC. Our objective is to draw attention to this issue and ensure that it remains front and centre, as well as monitoring compliance with equality legislation, ensuring that information is always available on possible ways of discrimination and how to combat it.

Gender mainstream is considered in the institution's strategic plans, in which gender percentages are monitored, but nonetheless, more aggressive policies, such as specific contracts or promotions exclusively for women in areas in which they are under-represented, cannot be implemented under current public administration legislation.

P | **What are the Commission's proposals to promote the entry and promotion of women within this organization?**

R | One of the most important tasks of the CSIC Commission on Women and Science is the production of rigorous disaggregated statistics. I believe that the collection and analysis of these data over time is our greatest contribution to the CSIC.

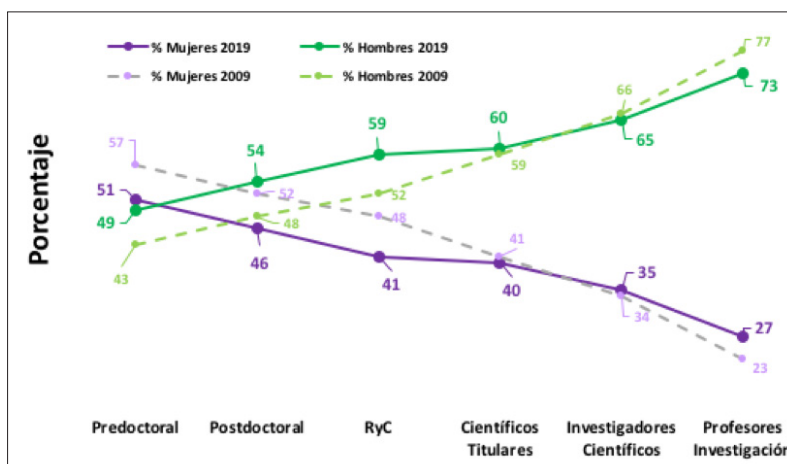
A fundamental role of the Commission is to try to encourage women to put themselves forward for all available opportunities, because in my own experience, our first response is often no. When a woman is offered an opportunity to present on a certain topic or apply for a promotion, but doesn't feel ready, the first instinct is often to refuse. From the Commission, we strongly encourage women to apply for opportunities, or we nominate them for awards, seek out female researchers with appropriate resumé's, etc.

Another of our fundamental task is to ensure that the work of women in science receives maximum visibility. We watch that women account for 40% of the panels in thesis committees, meetings and institutional events, and we carry out various visibility activities, such as our activities on International Day of the Working Woman and International Day of Women and Girls in Science (February 11), when we launched a series of initiatives that have been supported by all CSIC centers.

"There is clear stagnation in promotion within the career path of female researchers"

Current situation for women scientists in the CSIC

The CSIC Commission for Women and Science was created in 2002 to identify possible causes that hinder women's entry into science and their career progression, and to propose actions aimed at eliminating the barriers. One of the Commission's main tasks is to produce disaggregated data for the institution, which show little improvement in the situation of women scientists (Figure 1). In 2009, after the years of economic boom, approximately 50% of postdoctoral researchers and Ramon y Cajal grant recipients in the CSIC were women. For many women, this is the point at which career stabilization can coincide with motherhood, and well-prepared female researchers fall through the gaps in the



Progression of the career of female researchers at the CSIC between 2009 and 2019 (CMYC, CSIC 2020)

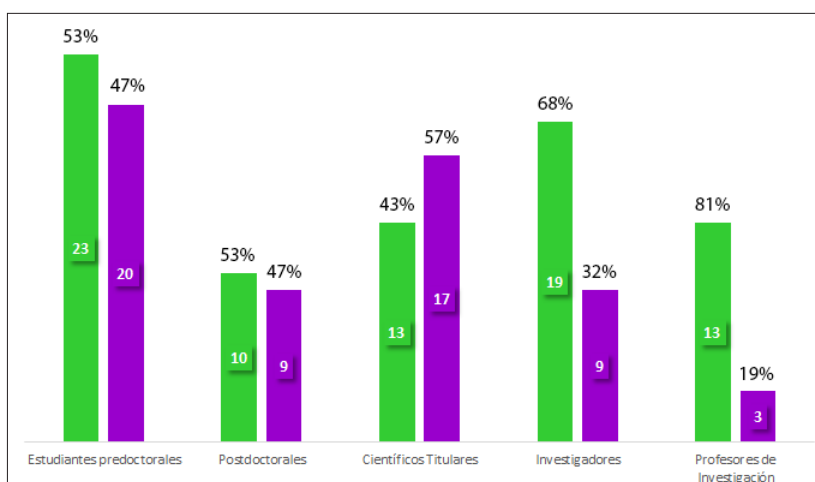


Figure 2: Distribution of staff at the CIB Margarita Salas, January 2020 (green, men; purple, women)

research system. These values fell from around 50% in 2009 to 41% in 2019, demonstrating that the passage of time alone is insufficient and active policies are required to achieve one of the key goals of the millennium for scientific research: to promote gender equality and empower women.

At the CIB Margarita Salas (Figure 2), we still have relatively high numbers of female postdocs, but the low numbers of female senior researchers and research professors clearly show the difficulties faced by women in the advancement of their scientific careers.



Prof. Flora de Pablo at the Tribute to Pioneering Women Scientists of the CSIC (October 2019, Madrid)

With science, there is a future

Ernesto Arias Palomo

Senior Research Scientist at the CIB Margarita Salas



The crisis caused by COVID-19 has brought science into the limelight. Terms such as PCR and hydroxychloroquine are widely used by politicians and in the media and they are commonly heard on the streets. We all wonder when the long-awaited vaccine will arrive, or at least a treatment that can alleviate

the symptoms of the disease.

According to surveys, Spaniards place more trust in scientists, doctors, and engineers than other European countries. This observation, however, contrasts with the difficult situation currently faced by the scientific and technological research in Spain. Science and healthcare not only depend on positive public opinion, but also on the hiring of highly qualified personnel and the availability of competitive infrastructure and facilities. This summer, a movement supported by thousands of people emerged on social networks, using the slogan #SinCienciaNoHayFuturo (without science there is no future), to denounce the repeated cuts to science funding over the years that have seen R+D+i investment decrease to the levels of over a decade ago.

While investment in public research in the United Kingdom and Germany increased by 30% and 35% during the period 2009–2016, in Spain this budget decreased by more than 12%. This leaves our country's investment in R+D at around 1.2% of GDP, which is far below the European and German average (2% and 3%, respectively), and closer to that of countries such as Poland and Turkey. This year, for example, €362M (a figure equivalent to the cost of construction of 14 km of high-speed railway) has been allocated to the Plan Nacional, the competitive program that finances the majority of Spanish laboratories. This insufficient funding has left many positively evaluated projects without funds, and is complicating the work of many research groups while making it difficult to attract talent from abroad.

The movement also highlighted the instability and fragile working conditions in the sector, which pose ad-

ded challenges to female scientists, as detailed in another article in this newsletter. While embarking on a research career is no easy task (the average grade required to obtain a FPU grant to fund a PhD thesis is 8.4/10), the greatest bottleneck occurs at more advanced stages of the research career. While 10,000 to 15,000 people are awarded their PhD in Spain every year, only about 200 Ramón y Cajal postdoctoral contracts are offered. This generates great pressure, sometimes leading to preposterous situations; for example, requiring candidates seeking these contracts, which are specifically aimed at researchers who wish to establish their own research group, to have prior experience as group leaders. The striking reality is that sometimes it is easier to find work in prestigious international institutions in the US or other European countries than in Spain.

Consequently, we are seeing a marked aging of personnel in research institutes: in 2018 the average age of CSIC staff researchers was 54 years¹. The brain drain from southern to northern Europe is reflected in the nationality of the candidates and the countries of destination on this year's list of recipients of prestigious European Research Council (ERC) Starting Grants. Although no country has a perfect scientific research system, the reality is that money brings money and talent attracts more talent. Science is a particularly global endeavour, and if we wish to be competitive we must undertake profound structural reforms that provide decent working conditions in the fields of science and technology, as well as competitive resources to attract and retain foreign talent.

It should be noted that after the online demonstrations of June², the government announced an action plan for science and innovation. Although the proposals were initially well received, one of the biggest criticisms was that the solution cannot simply consist of occasional injections of money, but requires a long-term plan sustained over time. Furthermore, the proposed measures only take us back to the investment levels of 2010, and the amounts invested pale in comparison to those granted to other sectors such as tourism and the automotive industry. While it is important to maintain these traditional economic driving-forces, it should be noted that countries do not conduct research because they are wealthy; they are prosperous specifically because they promote research.

Perhaps seeking to move in that direction, the Government recently announced the Spanish Strategy for Science, Technology and Innovation. The objectives of the plan for 2021–2027 include to better define the career

of researchers, promoting reforms that alleviate some of the bureaucracy that burdens the research system, and to increase investment in R&D to 2.21% of GDP during this period. However, as on previous occasions, the specific proposals are still poorly defined and much of the increase in investment seems to be destined to the private sector. The next few years will reveal whether this plan has a real impact and effect on the scientific system.

Unfortunately, the emergence of the coronavirus has laid bare the weakness of the infrastructure underlying industry and innovation in Spain. We have come to rea-

lize that we do not even produce products as basic as paracetamol, and we wondered why it was so difficult to develop diagnostic assays or even manufacture surgical masks sufficiently fast. This crisis offers us the opportunity to rethink the kind of society we want to have and how we intend to address the challenges that undoubtedly lie ahead. It is our collective responsibility to ensure that this opportunity is not missed.

**Las opiniones expresadas en este texto reflejan el punto de vista de su autor y no necesariamente el institucional.*

1. http://www.imse-cnm.csic.es/docs/inicio/mujeres_investigadoras_2018.pdf
2. (a) https://cadenaser.com/emisora/2020/06/25/ser_malaga/1593081638_234403.html, (b) https://www.lasexta.com/noticias/sociedad/sin-cien-cia-no-hay-futuro-la-manifestacion-virtual-que-reivindica-mas-financiacion-y-apoyo-a-los-proyectos-cientificos_202006175eea2ce8b27bce00019ec3cb.html

A meaningful logo: the Fountain of life

Carmen Fernández Alonso

PhD in Chemistry at CIB Margarita Salas

A kneeling man who appears to be supporting the wall of a building with his hand. Anyone who has passed the corner of Calle Velázquez and Calle Joaquín Costa, in Madrid, will have seen this original sculpture. What they may not know is that it is actually a fountain: between the fingers of that hand water trickles down into an oval basin on which the man's knee rests.

This sculpture is part of the building, belonging to the Spanish National Research Council (CSIC), that housed the Center for Biological Research for 45 years¹. As one of its most representative features, the man's silhouette became the center's logo in 2007. And appropriately so, as the meaning of the sculpture perfectly complements the mission of the institution, as will become clear in this historical tour of the construction of this emblematic building.

Let's provide some con-

text. The CSIC was created in 1939 from what was left of the JAE (Board for the Expansion of Studies), which was dissolved after the Spanish civil war. The organization inherited its buildings and research institutes (including the Cajal Institute) from the JAE, and focused on research management, without conducting any real planning of Spanish scientific policy during the Franco regime². José M^a Albareda, together with the then Minister of National Education José Ibáñez-Martín, designed the structure of the institution, of which he was Secretary-General until he died in 1966.

In 1953 the Board of Institutes of the Center for Biological Research was created, promoted by Albareda and Gregorio Marañón (who would be its first President), with Julián Sanz (Instituto Cajal), Arnaldo So-cías (Ferrán Institute of Microbiology) and José Luis Rodríguez Candela (Institute of Metabolism and Nutrition) as heads of each of the institutes that would become part of it³. On February 8, 1958, the CIB facilities at Calle Velázquez 144 were officially inaugurated.



Image taken from "Miguel Fisac. Arquitecturas para la investigación y la industria", by Diego Peris.

The building was considered one of the masterpieces of 20th-century Spanish architecture and had been commissioned in 1949 and designed by Miguel Fisac to house the Cajal and Ferrán institutes.

Miguel Fisac was born in 1913 in Daimiel (Ciudad Real). He began his architecture career in 1933, but the Civil War interrupted his studies and forced him to go into hiding with his family to escape persecution. He completed his studies in 1942. His first commission was the construction of the Iglesia del Espíritu Santo (Madrid). This first work was followed by the CSIC headquarters (1943), the Institutes of Geology and Geography (1943), the Institute of Edaphology (1944), and the Daza de Valdés National Institute of Optics (1948).

This professional relationship between Fisac and the CSIC was no accident. The architect had met José M^a Albareda in October 1937 and they frequently met during the war, consolidating their friendship⁴.

In this context, Fisac was commissioned in 1949 to design the building that would house the Cajal Institute and the Microbiology Institute, in addition to an adjacent animal facility to house the mice, rats, and guinea pigs used in the research work; a clean, isolated area free from contagion, that fulfilled all the safety/hygiene requirements of an animal facility.

To study the experimental animal facilities of different European research centers, he was funded to the tune of 8,000 pesetas to travel and examine the works of the main modern architects. Between October and November 1949, he toured France, Switzerland, Germany, Holland, Denmark, and Sweden, a trip that had important consequences for the architect, who admired and sought to replicate the Nordic style of architecture⁵.

Fisac designed a V-shaped building, with the animal facility located at the vertex, in a block with a concave

curvature facing the outside, and two adjacent blocks: the Cajal Institute, oriented towards Calle Velázquez; and the Microbiology Institute, facing Calle Joaquín Costa. An interior garden was located between the two arms of the V. He introduced a novel element into the design: a type of hollow brick designed and patented by himself and used in all facades, which featured Nordic-inspired tilting windows.

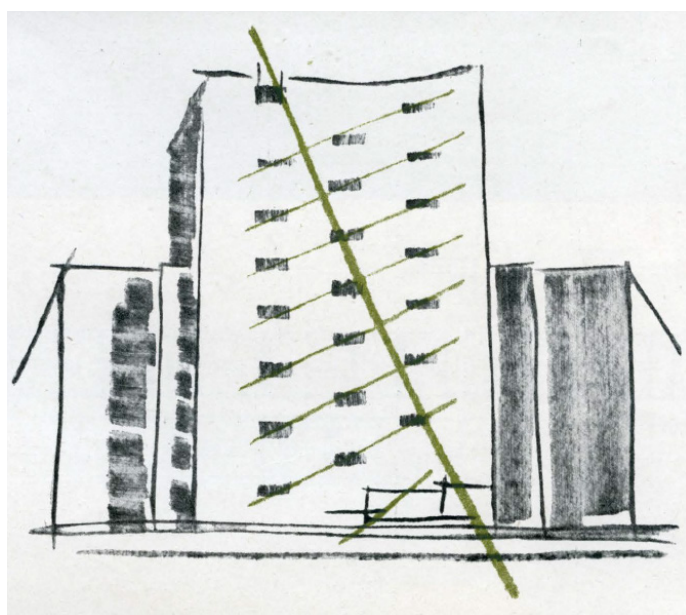


Tilting window. [Reference 7]

The enormous symmetry of this construction is ingeniously broken by the concave facade of the vertex, using two discordant elements placed diagonally: a cantilevered pulpit that breaks the cornice line on the left side, and the aforementioned bronze and white stone fountain, which is attached to the right side. The balcony seems to throw itself forward while the figure in the sculpture pushes the base of the building inwards. Fisac also created spaces in the facade in a checkerboard pattern⁶.

Of this balcony, known to the researchers who worked in the building as “the fellow’s balcony”, Fisac said the following: “In addition to its role in stabilizing the overall eurythmy of the building, the balcony has another function: it is the only point on the roof of the tower from which you can contemplate the wonderful landscape of the Guadarrama [...]”⁷.

To create the sculpture opposite the balcony, Fisac commissioned Carlos Ferreira. This sculptor created an ornamental fountain that was referred to as the “Fountain of Life”, in which the water that emerged from the wall symbolized the passage of human life. The figure, a scientist, attempts to stem the flow, although his attempts are unsuccessful since the water ends up flowing through his fingers. This allegory symbolizes man’s fight against disease and embodies perfectly the scientific ob-



Fisac's sketch of the corner of Calle Velázquez and Calle Joaquín Costa highlighting the break in symmetry. [Reference 7]

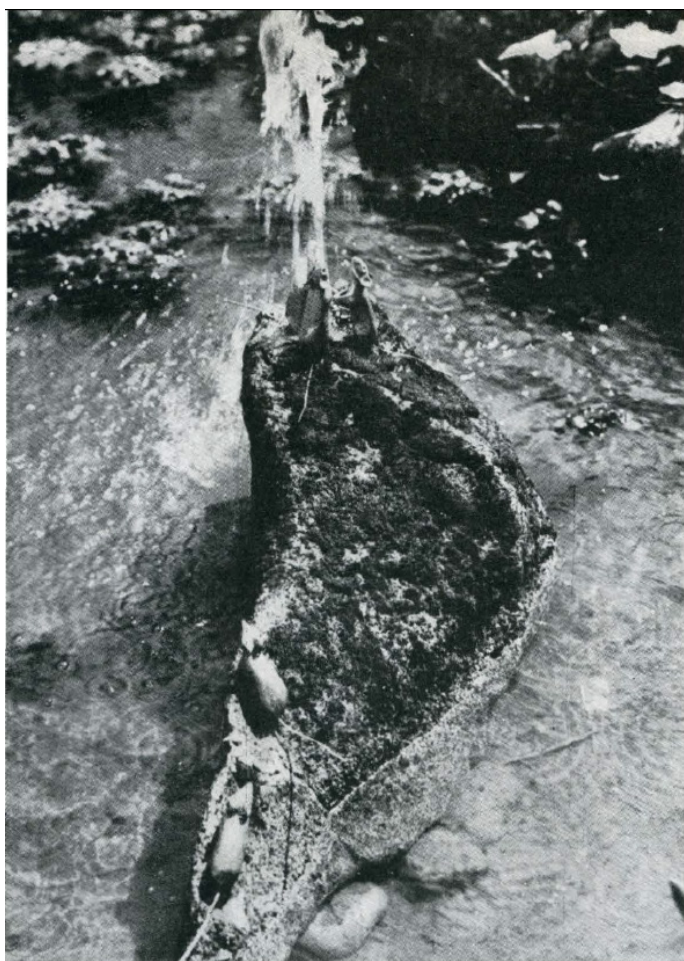
jectives of the center for which it was chosen as a logo.

Ferreira's sculpture was not the only fountain in Fisac's complex. He introduced another artistic element, a stone fountain located in the interior patio, in memory of experimental animals⁸. The sculpture, the work of Susana Polac, featured small cast aluminum mice. This fountain and its ornamental mice disappeared when renovations were carried out to transfer the book collection to the basement.

These two fountains convey powerful allegorical messages related to the challenges associated with biomedical research, its noble objectives, and the difficulties in achieving them. And they constitute a powerful exam-

ple of the fusion between architecture and sculpture: it is not easy to dissociate one from the other. Both are integrated within and support each other, and the messages they convey complement one another. Similarly, the image of the CIB will always be associated with the silhouette of that man trying to prevent the advance of diseases.

**I am grateful to Dr. F. Javier Medina for providing information that Miguel Fisac himself shared with him about the meaning of the Carlos Ferreira sculpture. Thanks also to Javier Navarro, secretary of the Fisac Foundation, who provided additional information that helped me locate images of the missing Mice Fountain.*



The Mouse Fountain. Detail of the aluminium mice. Susana Polac. [Reference 7]

1. In 2003, the CIB was moved to its current location on the campus of the Complutense University of Madrid. A reproduction of the ornamental fountain was placed in the gardens of the new building. The General Secretariat of Fisheries is now located at Calle Velázquez 144.

2. Las primeras décadas del Consejo Superior de Investigaciones Científicas: Una introducción a la política científica del régimen franquista. María Jesús Santesmases y Emilio Muñoz. Boletín de la Institución Libre de Enseñanza (1993), 16, 73-94.

3. "El Instituto Cajal en el Centro de Investigaciones Biológicas", José Borrell. Capítulo 8 en "Los cincuenta años del Centro de Investigaciones Biológicas, su impacto en el desarrollo de las Ciencias Biológicas en España". Fundación Ramón Areces, Madrid, 2010.

4. Viejos recuerdos en torno a la construcción del Instituto Cajal de Microbiología en 1950. Miguel Fisac (1998) Arbor 631-632, 333-341.

5. El ladrillo como lenguaje de la modernidad en la obra de Miguel Fisac (2017) Ramón V. Díaz del Campo.

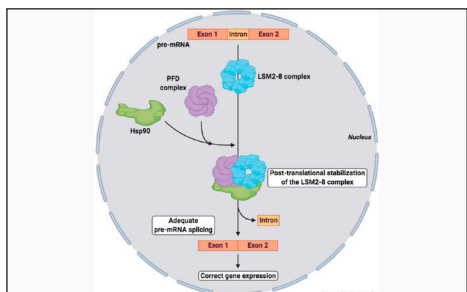
6. Fundación Miguel Fisac.

7. Centro de Investigaciones Biológicas, de los patronatos Cajal y Ferrán del Consejo Superior de Investigaciones Científicas. Miguel Fisac. Revista Nacional de Arquitectura, 1956, 175, 5-12.

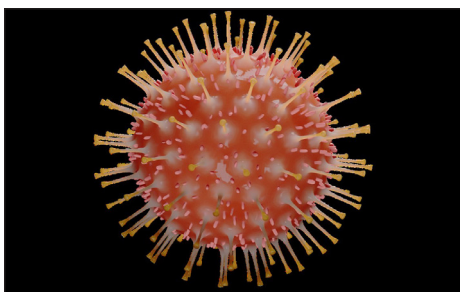
8. More recently, other installations have paid homage to experimental animals. In 2013 a 6-meter tall sculpture of a mouse weaving a DNA helix was erected at the Institute of Cytology and Genetics of the Russian Academy of Sciences in Akademgorodok (Novosibirsk, Russia), the work of Andrew Kharevic.

Recently at the CIB Margarita Salas

NEWS



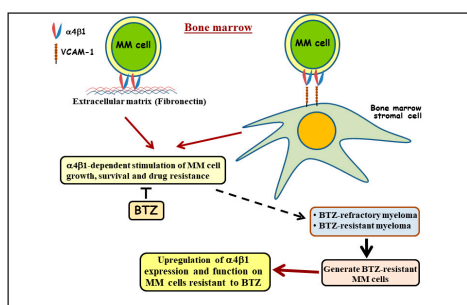
Discovered a molecular mechanism for the regulation of LSM2-8 complex levels by prefoldins



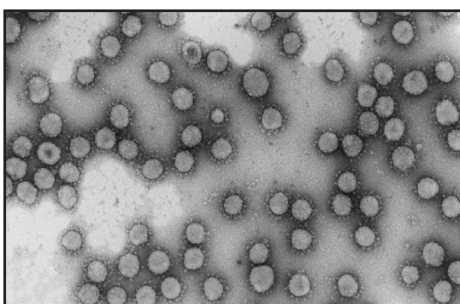
Prof. Vicente Larraga leads a project to develop a vaccine against SARS-CoV-2 based on recombinant DNA



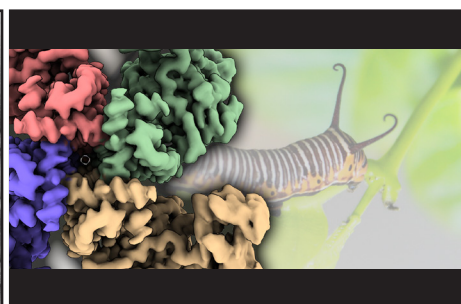
Characterization of the familial risks of developing atypical hemolytic uremic syndrome (aHUS)



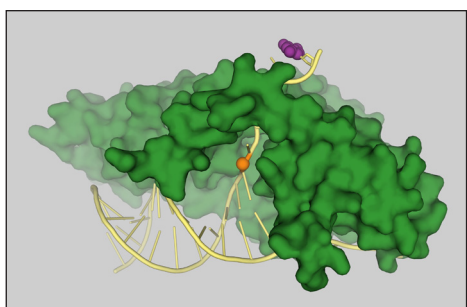
Increased function of a key adhesion receptor in multiple myeloma cells resistant to proteasome inhibitors



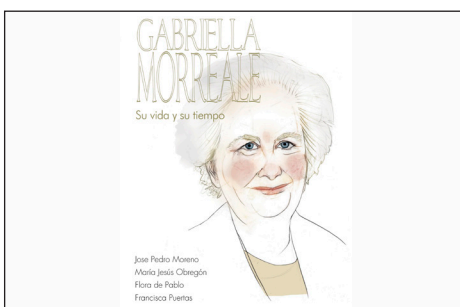
CIB Margarita Salas researchers develop more than fifteen projects related to the COVID-19 pandemic



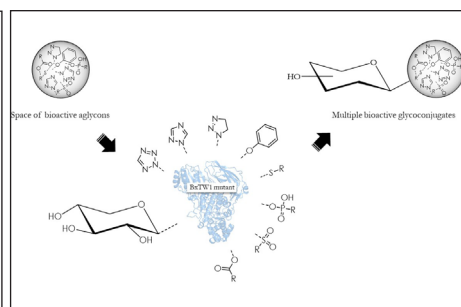
Unraveled the molecular organization and activation mechanism of the insecticidal protein Vip3A



The structure of the protein that eliminates DNA lesions produced by ultraviolet light or chemotherapy revealed



The book "Gabriella Morreale. Su vida y su tiempo" receives the National Prize for Scientific Dissemination of the Union of University Publishers of Spain



Identification of a novel enzyme for sustainable synthesis of high added-value products

EVENTS



CSIC Webinars

The CIB Margarita Salas researchers [Nuria Campillo](#), [María Montoya](#), and [Carmen Fernández](#) have participated in webinars organized by the CSIC as part of the series *El CSIC da Respuestas* (The CSIC Gives Answers).

Researcher [Ana Martínez](#) presented the opening session of the series *¿Qué sabemos de...?* (What do we Know About...?), also organized by the CSIC, with a talk about Parkinson's disease.

[Bruce Alberts](#) inaugurated the fifth edition of the Masters in Molecular and Cellular Integrative Biology organized by the CIB Margarita Salas in conjunction with Menéndez Pelayo International University.

He presented the talk "[The cell as a collection of protein machines. Preparing the next generation of molecular cell Biologists](#)", which was broadcast live via the YouTube channel of the CSIC.

The cell as a collection of protein machines.
Preparing the next generation of molecular cell biologists



Bruce Alberts

Chancellor's Leadership Chair in Biochemistry and
Biophysics for Science and Education
University of California, San Francisco

After a 6-month hiatus in events due to the COVID-19 pandemic, in October the CIB Margarita Salas resumed its series of seminars and workshops, switching to an online format that ensures compliance with the contingency plan put in place to address the current health crisis



Science and Technology week

Between November 2nd and 15th, the CSIC has organized numerous activities throughout Spain within the framework of Science Week. Among them, the CIB Margarita Salas has conducted workshops, colloquia, talks... All of them were online.

We have replaced our traditional Open Door Days with videos of researchers and services in order to publicize the scientific activity of the center.

RECENTLY...

Autophagy and autophagy-related pathways in vertebrates. Noboru Mizushima, Faculty of Medicine Experimental Research, The University of Tokyo. Tokyo (Japan). **November 27, 2020.**

First Steps in Entrepreneurship Workshop - 4th Edition. Various speakers (see program). **December 1 and 2, 2020.**

Workshop: Basic Notions in Biostatistics. Dr. Miguel Peláez, Senior AI Specialist at Playground & Executive Director at *Clubes de Ciencia España*. **December 3, 2020.**

Bioethics Workshop. Lluís Montoliu, CNB-CSIC; Teresa Suárez, CIB Margarita Salas; and Elena Campos, CBM-SO-CSIC-UAM. **December 4, 2020.**

CONGRATULATIONS!

Juan Antonio Méndez Liter. Functional study of the beta glucosidases of the fungus *Talaromyces amestolkiae*: biotechnological applications and rational design of catalysts. February 2020.

Cristina Clemente Toribio. Role of MT4-MMP protease as a modulator of patrolling monocytes in the inflammatory context. February 2020.

Felipe de Salas de la Cuadra. Engineering of a fungal laccase as a biocatalyst for organic synthesis. March 2020.

Beatriz Fernández de Toro Ronda. New methodologies for the study of the carbohydrate-protein interaction using nuclear magnetic resonance. April 2020.

María Tsampika Manoli. Optimization of polyhydroxyalkanoate metabolism of *Pseudomonas putida* KT2440 using synthetic and systems biology approaches. May 2020.

Sofía Inés Leal Duarte. Role of the C-terminal domain of vimentin in the reorganization of filaments during cell division. June 2020.

Lucía Benito Jardón. Characterization of molecular mechanisms associated with melanoma cell resistance to inhibitors of the MAP kinase pathway. October 2020.

Alonso Sánchez Cruz. Experimental treatments for retinitis pigmentosa in animal models: targeting insulin receptor, GSK-3 and Toll-like receptors. October 2020.

Ana Moreno Blanco. Characterization of two transcriptional activators: MafR from *Enterococcus faecalis* and MgaP from *Streptococcus pneumoniae*. November 2020.

Elisa Rojas Prats. Inhibitors of cell division cycle kinase 7 (CDC7) for the treatment of amyotrophic lateral sclerosis. November 2020.

María Molina Gutiérrez. Immobilization and applications of the versatile lipase from *Ophiostoma piceae* in the synthesis of nutraceutical flavours and biodiesel. November 2020.

Julia Mayor Pillado. Antitumor action of alkylphospholipid analogs and nanotechnological approaches in gastric cancer. November 2020.

The CIB Margarita Salas wishes to congratulate the new doctors as well as the students who presented their Master's or Degree dissertation at the CIB in 2020, particularly given the circumstances arising from the COVID-19 crisis.

Meet...



Pablo Jalón, Photography Service

Pablo Jalón, an audiovisual technician and photographer, is the head of the Photography Service at the CIB Margarita Salas. After he arrived at the CIB in 2007, he obtained his certificate of Advanced Professional Training (FP Superior) as Laboratory Technician, allowing him to further specialize and dedicate himself to scientific photography in support of the research performed at the CIB.

Pablo captures photos relating to experiments conducted in the CIB, and of the center's infrastructure and scientific and administrative staff. The most important aspect of scientific photography is that it is carried out with the same rigour applied to scientific experiments, i.e. always under the same conditions. Moreover, these conditions should be reproducible if the experiment is to be repeated, and if the images are modified in any way, it must be demonstrated that no manipulation occurred.

Pablo can take photos of objects both large (e.g. equipment, people) and small (the eye of an ant!). He captures images of objects in stasis, such as protein gels, and in motion, such as live insects or the different stages of an ongoing experimental procedure. He is also responsible for the development and adaptation of these images for subsequent publication, and of all audiovisual needs in the CIB: graphic design and photocomposition, poster layout, maintenance of seminar rooms and equipment, installation and assembly of the necessary equipment for events in the auditorium.

For all these reasons, the Photography Service and Pablo provide essential support to the research carried out in the center, and to the image of the center. Thank you Pablo!

**Pablo has been promoted to senior imaging technician and moved to another organization, the Higher Center for National Defence Studies (CESEDEN). We will miss you Pablo!*

Latest on CIB TV



Radio 5 interview Enrique de la Rosa y Ana Martínez. Image: RTVE

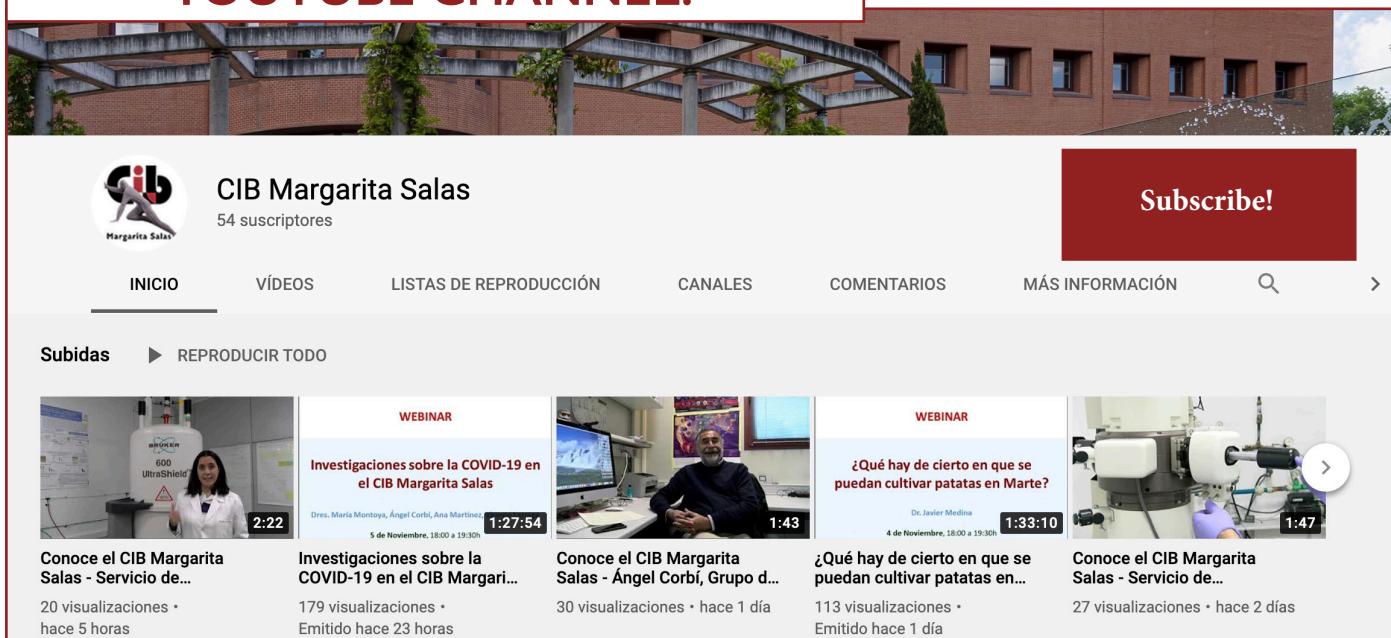
Launch of the "CIB in Media" section

With the emergence of the COVID-19 pandemic, requests for quality scientific information have come from both the media and the public. For this reason, many researchers at the CIB Margarita Salas have made themselves available to the media and have collaborated on numerous occasions.

These appearances in print media and on radio and television are compiled in [this new section](#) so that they can be accessed at any time.

We are also unveiling...

YOUTUBE CHANNEL!



Do you have a question that you want our scientists to answer? Do not hesitate to write to us:
difusion@cib.csic.es



CSIC
CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS



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