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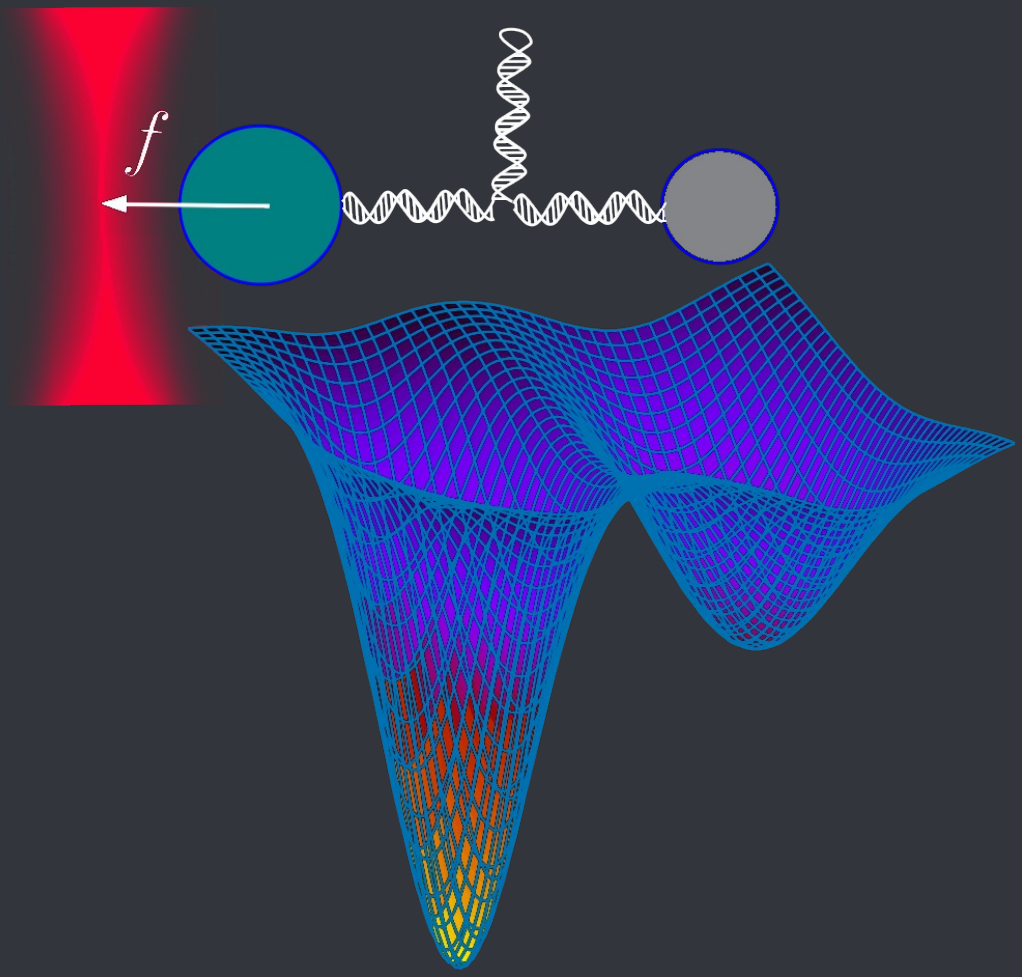

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In this issue

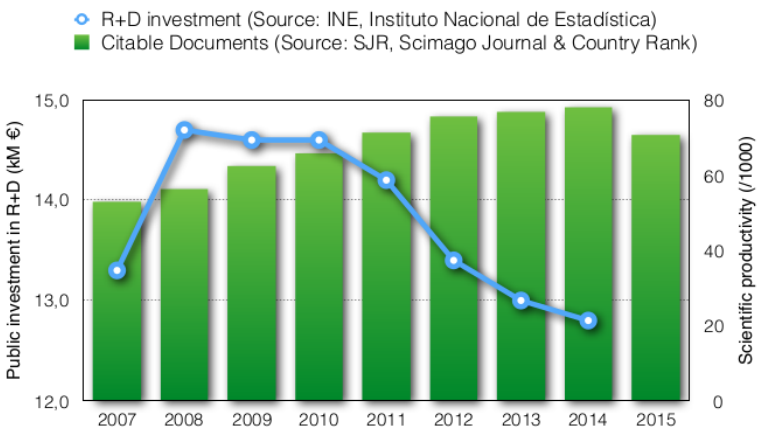
Biofísica Magazine

EDITORIAL / ANALYSIS

Spanish science funding: Low and inefficient

The team of Editors

In 2010, the *Science magazine* published an article stating, "Times are changing in *España*", announcing that "there is a feeling of excitement that Spain is on its way to take a place on the world stage of science" [Levine 2010]. This optimistic prediction was based on solid ground: The investment of the Spanish Government in science had grown to reach a historical maximum in 2008, which in 2010 was still maintained, with only a slight decay. Novel, regionally driven and funded initiatives had led to the creation of new research institutes; more Spanish scientists were returning and foreign scientists were recruited. However, since then the national funds dedicated to R+D have been systematically and dramatically decreased year after year, reaching a 12.8% descent in 2014 as compared to 2008 (see accompanying Graph, [Mingarro 2016]). Sadly, the positive progression predicted by *Science* was stopped in its tracks.



R+D investment in Spain against scientific productivity. Graph kindly provided by I. Mingarro [Mingarro 2016].

The *golden years* of funding (2008-2011) had really worked: a tendency towards increased scientific production had been created. However, this powerful scientific truck, the one foreseen by *Science* in 2010 [Levine 2010], could not go very far with flat tires. Ironically, it may even have contributed to worsen the present scenario, as the favorable situation during that golden period fostered an increase in the number of researchers in the country, who must now ferociously compete for steeply decreasing funds. Naturally, this grown and well-prepared scientific work force managed to keep a high level of production for some time (Graph, [Mingarro 2016]). But, as we are already seeing, poorly loaded batteries cannot last for long.

Spain's scientific production has shown a decrease in 2015 for the first time in the last ten years (Graph, [Mingarro 2016]). We are fooling ourselves if we think that this fact is accidental. This is a real and dangerous trend, which will move Spanish science away from where it could and should be.

But, is it all about the amount of funding? The decrease in national investment is a major factor that is threatening the future of Spanish science, but unfortunately it is not the only one. There are other important aspects that need to be taken into account to evaluate the quality of our funding system. For a competitive funding process to be efficient, three main pillars need to be cared for:

1. The amount of public funding dedicated to R+D.
2. The quality of the evaluation system.
3. The efficiency of grant management by the recipient research groups and institutions.

Ideally, grants should be well funded monetarily, fairly evaluated to international standards, and excellently managed by the institutions. This would warrant that the time invested in the specific research is used optimally to achieve the most important goal: to advance scientific knowledge.

The organization of the funding system: help or hindrance? In Spain, there are two major agencies that provide public funding destined to R+D: the *Instituto de Salud Carlos III – ISCIII* and the *Subdirección General de Proyectos de Investigación – SGPI*, both ultimately managed by the *Ministerio de Economía y Competitividad – MINECO*. These two agencies *provide mutually exclusive funding*. In other words, once a research group is bound to a funding agency, it cannot apply to the other one. In recent years, the ISCIII has been more focused towards clinically-oriented research, performed in Hospitals and Research Institutes from the National Health System, whereas the SGPI has remained more prone to fund basic research in Research Institutes, CSIC and Universities. Following the EU model, there are two programs from the SGPI, which are again mutually exclusive: *Retos* and *Excelencia*. In theory, the first one funds research with clear translational goals, whereas the second is meant to fund excellent groups, doing research directed to the advance of knowledge in their research fields. However, this distinction is in practice blurry and confusing to some extent. Most Spanish scientists seem to apply quite arbitrarily to one or the other, yet the evaluation criteria appear to be equal for both.

Scientists in Spain have a single bullet for funding, but they never know which of the few options is the best target

When to apply? It depends. The call for proposals is annual (most of the times), but the dates are variable. Thus, scientists in Spain have a single bullet for funding, all available programs being mutually exclusive, but they never know when that bullet will be fired or which one of the few options is the best target. All these facts affect negatively the efficiency of the funding system. In other countries highly active in research, like the United States (US) or France, the calls for proposals are published at the exact same dates every year. In the US, funding agencies often issue more than one call for proposals per year. In Germany, one of the countries leading scientific research in Europe, the call for proposals of the German Research Foundation (DFG) is open all year long. Moreover, in Germany, Denmark and the US, scientists can apply to multiple research funding programs, public and private, which are a priori not mutually exclusive. Thus, fixed dates for application (or open calls) and the

possibility to apply to multiple funding entities point us to a possible and, actually, efficient model to imitate.

Scientists: a critical factor. Another important aspect affecting the efficiency of the Spanish funding system relates to the status and duties of the Spanish research personnel. In the *Science* article (2010) mentioned above [Levine 2010], Miguel Beato stated: "the civil servant mentality was -and still is- the main obstacle to Spanish Science". The same article points out that, "In public Universities, the institutional focus is on teaching as opposed to original research".

The research career path in Spain is, to say the least, fuzzy

The teaching load of active researchers is very high when compared to other countries, like the US, where there is a clear research career path. This path in Spain is, to say the least, fuzzy. We do have competitive programs to incorporate excellent research scientists, such as the "*Ramón y Cajal*", but these programs yield a very low number of positions. Success rates are below 10%, leading to saturation and frustration. In most cases, young (and not so young) scientists struggle for a long while until they get a proper place to perform research. Public Universities interpret these positions as the future teaching force, so researchers must soon accept large teaching loads in order to ensure their continuity in the system. This fact affects significantly not only the growth of emergent research, but also the efficacy of the funding in principle directed to facilitate the creation and consolidation of independent groups.

In addition, there is another load that Spanish scientists inevitably face: project management. The proportion of time that researchers need to invest in all kinds of paperwork, to justify expenses, financial project reports, internal reports... is a real menace. Specially when combined with a high teaching load, it diminishes to a dangerous level the time and effort actually dedicated to what researchers are trained for and to the goals of their funded projects, i.e., to produce high quality science. Countries like Switzerland, for example, have learned that it is actually more efficient to combine control with trust, reducing paperwork to bearable amounts both at the application and reporting stages. Other countries have successfully implemented increased grant indirect costs to fund teaching positions that can free the PI from heavy teaching loads.

With the caveats mentioned, it is obvious that Spanish researchers are under strong time constraints in order to fulfill their grant goals. Until very recently, however, the duration of grants was usually of 3 years (but see below), which in many cases is much too short, especially if the project has translational perspectives. The short duration of grants is aggravated by the fact that all funding programs potentiate reorientation of the project for each new application. In other words, continuation of a previous project is judged as negative and scientists are pushed to propose new lines of research if they want to be funded again. This important aspect, which influences the efficacy of the science funding system, is again handled differently in other countries like the US, where the grants are effectively *renewed*. Successful research lines should be periodically evaluated, but their progress should not suddenly cease due to mere bureaucratic reasons.

Success rate: Does it reflect reality? Currently, around 30-40% of projects are funded in national project calls, which some may argue is not a despicable number when compared to other countries.

However, these figures may give a deceitful view of reality since retry after failure in one application (one year later) is highly discouraged and the population of researchers without access to funding, who effectively become disconnected from the system, is large. On the other hand, low success rates are not necessarily associated to higher scientific production, as proven by many studies in the US [Wahls 2016]. Moreover, the amounts granted in Spain to individual projects are small, and in most cases do not include salaries for students or post-doctoral researchers, who need to find their own funding from other (almost inexistent) programs.

A right balance between the amount of grants and the quantity granted to individual projects is crucial

There is no obvious solution to this, especially with low funding budgets. Grants must be higher to warrant that the researchers get the equipment and personnel needed to achieve the project goals. However, with the actual investment in public funding, this measure would inevitably result in a lower success rate, which in turn would lead to a decrease in the quality and quantity of the total scientific production. Furthermore, it is common practice in the national funding system to significantly cut the budget requested by those projects that are finally granted owing simply to budgetary reasons (in order to fund as many projects as possible), and still require that the objectives of the original proposal are achieved. A right balance between the amount of grants and the quantity granted to individual projects is crucial and may be among the reasons behind the decrease in scientific production observed for Spain in 2015 (Graph, [Mingarro 2016]).

A robust reviewing system to build on. A clear strength of the Spanish funding system is its fairly robust grant reviewing process, which is supported by a well-established, wide network of experts and dedicated panels. Good reviews are essential, *not only* as a mechanism of selection. They can help the applicant scientists to improve and better orient their projects, identifying weak points and consolidating strong ones. However, in Spanish calls the extensive reviews provided by experts are not forwarded to the applicants, which is difficult to understand, contributing to discouragement and distrust in the system. Access to reviewing reports by the applicants is very useful for both, successful and unsuccessful projects. For the latter, it can help to limit frustration and find and appropriate tune for the project in the next call, thus increasing the retry rate. Moreover, reviewing feedback from national grant applications will increase the chances of success in the extremely competitive -but much better funded- international calls, which is highly desirable.

In summary, the current Spanish funding system for scientific research presents serious problems that need to be solved. Some aspects should be relatively easy to correct, and therefore should be rapidly addressed, such as establishing fixed dates for the national grant calls, facilitating renewal for well justified cases, providing extensive reviewing reports to grant applicants, or increasing the duration of projects to 4-5 years. Proving that such implementations can be fast, the last national call of *Retos* and *Excelencia* (2016) allows for the first time 4-year duration grant applications. Additionally, some of the goals of the recently established *Agencia Estatal de Investigación* are pointing in the right direction, for instance enabling carry over budget. Other measures, although difficult to implement, must at least be debated to find an acceptable solution. Some involve the establishment of a true scientific career, which in Universities may be associated to teaching, but not the other way around.

Others involve the generation of structures that help researchers to face the huge administrative load or, even better, reducing such load by modernizing many existing procedures and introducing a certain level of trust in them. Finally, and overall, the national investment in science must be substantially increased. Only six years ago we were on the path towards being an international scientific leader. Today, we struggle to make ends meet. We must use our potential to retake a position from which we can plan, innovate and progress.

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Biofísica Magazine

BEYOND BIOPHYSICS

Immunology and Biophysics

A conversation with Francisco Sanchez-Madrid

Jorge Bernardino de la Serna
STFC – Harwell-Oxford (UK)

Although Karl Popper in his *Philosophy of Science* already questioned whether one scientific discipline can be reduced to the terms of another, sometimes, defining and naming cross-disciplinary fields set our minds in common grounds and helps stablishing a fluent communication to eventually produce ground-breaking beautiful pieces of science.

Immunophysics. According to the English Oxford Dictionary, Immunology is the branch of medicine and biology concerned with immunity -probably, too concise. The Merriam-Webster, instead, defines it as a science that deals with the immune system and the cell-mediated and humoral aspects of immunity and immune responses -definitively, a bit more precise. To me, a common mortal being, Immunology is a very complex, yet fascinating science that captivated my research interest, and where I am trying to apply biophysical approaches to further gain basic molecular mechanistic insights. This cross-disciplinary field -one could be tempted to name it biophysical immunology- was already coined as *immunophysics* nearly 30 years ago by Prof. Dimitrios Morikis. Interestingly, immunophysics, or the study of the physical basis of immune-system function and regulation, is rarely employed in the scientific literature; neither as a research field, nor as an academic discipline. Nevertheless, biological immunologists have been taking advantage of biophysical approaches, especially microscopy, on a regular basis.

With this background, I decided to have a conversation about the interface between immunology and biophysics with Francisco Sanchez-Madrid, Professor at the *Universidad Autonoma de Madrid*, Head of the immunology service at the *Hospital Universitario de la Princesa*, group leader at CNIC, and EMBO elected member. He is an immunologist with world-wide recognition. He has pioneered the application of biophysical tools to unravel the molecular mechanisms involved in the adhesion, polarisation, and migration of lymphocytes at (and through) the endothelium, as well as the chemokine-mediated activation, during the immune and inflammatory response.

Immunophysics at Francisco Sanchez-Madrid's research group. When I asked about the cross-relation between biophysics and immunology in his investigations, he readily acknowledged its pivotal role. Actually, some of his research accomplishments fall within the immunophysics field, he explains. In particular those applying advanced light microscopy, force microscopy, and electron microscopy methods to further understand the molecular mechanisms of immuno-biological processes. For instance, the studies of his group on the dynamic interactions of lymphocytes with endothelial cells during leucocyte extravasation, and the studies on the cognate interaction between antigen presenting cells and naïve T cells. These immune responses, besides the classical signalling and exocytic trafficking pathways, involve a whole plastic change of the cell morphology, spanning from highly dynamic, very sophisticated and complex reorganisation of receptor kinases and phosphatases at the plasma membrane, to full cytoskeletal reassembly, which ultimately orchestrates cell-cell adhesion, activation, interaction, and immune synapse. Such oligomerisation and clustering molecular events are resolved in very short spatio-temporal scales. Therefore, the employment of advanced quantitative microscopy and correlation spectroscopy, as well as the advent of new live-imaging super-resolution microscopy techniques, have generated high *visual expectatives*, which in some cases, unfortunately, exceeded the results obtained, he honestly admits. However, the qualitative and quantitative knowledge advancement resulting from the application of biophysical methods and techniques in immunology is unarguable. Important milestones are, for instance, the recent nanoscopic resolution of the clustering and dynamics of membrane receptors and kinases, or the involvement of actin cortex dynamics in T cell activation and synapse.


Prof. Francisco Sanchez-Madrid.

> **The most difficult part is the fluent communication and *syntony* between a physicist and an immunologist**

Francisco Sanchez-Madrid keeps on doing research at the interface between biophysics and immunology. For example, he has some projects in progress that involve force microscopy, electron microscopy and X-ray diffraction to understand interaction forces and to reveal the complex structures required in lymphocyte adhesion, polarisation and migration. What he likes from biophysics is that it provides a different point of view to scientific questions. He also acknowledges that the most difficult part is probably the fluent communication and *syntony* between a physicist and an immunologist, because far-apart discipline projects usually are long, require hard work and regular meetings. Unfortunately, this situation often leads to the demotivation of researchers.

Challenges of immunophysics. According to Francisco Sanchez-Madrid, a challenge per se is the interpretation of the biophysical data in the context of immunology. Nowadays, in immunological conferences several immunophysics approaches are questioning the dogmatic immunological view of receptor clustering and dynamics during lymphocyte activation

> **Biophysics is shedding light into what shall be considered an artefact or an immunological over-interpretation of the results**

and synapse formation. Biophysics is shedding light into what shall be considered an artefact or an immunological over-interpretation of the results. He acknowledges that biophysicists should have the last word in the analysis and interpretation of the biophysical experiments; hence, collaborating or hiring a good biophysicist would add value to groups or departments of immunology.

From a strictly scientific point of view, I was pleasantly surprised on our mutual agreement on the next challenges in the immunophysics field, which we believe are going to be related to mechanobiology, immuno-oncotherapy, and the engineering of the tumour immunological niche. Correlating the highly coordinated forces exerted by cells with their chemical sensing and activation process is seemingly very challenging, but eventually would be very scientifically rewarding. Furthermore, immunotherapy is widely recognised as one of the most promising recent therapies in cancer treatment, something that few years ago was unimaginable and that has the potential to place ourselves onto the doorsteps of personalised medicine. However, very little is known regarding the molecular mechanisms involved in the process of curing cancer by these means. For this purpose, engineering the tumour immunological microenvironment, and the lymphocyte receptor's recognition patterns might be the way towards the construction of a highly mimetic in vitro model, where advanced microscopy and spectroscopy, force microscopy, and eventually optical and magnetic tweezers would play a critical role... or could this also be a new chapter for the cross disciplinary fields of biophysics and science fiction?

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Biofísica Magazine

COOL BIOPHYSICS

Mechanobiology of collective cell systems

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The concept of *physical force* is deeply integrated in our daily life. We experience it routinely with every heartbeat, walking step, or deep breath. As such, it may seem inconceivable to think that forces are not an integral part of the mechanisms that drive biological function. However, for a long time, modern biology attempted to explain life solely on the basis of the biochemistry of genes and proteins, ignoring any potential role that physical forces could play in biological processes. Yet, it becomes increasingly clear that physical cues are not only as important as biochemical ones, but also that they could help us understand and treat diseases such as atherosclerosis, acute inflammation, fibrosis and cancer.

Mechanobiology is the emergent discipline that explores the role of mechanical forces in cell development, physiology and disease. As a multidisciplinary field, it combines concepts from biology, biochemistry and physics. Challenges in mechanobiology cover from the specific mechanisms by which single cells sense and respond to forces (mechanotransduction) to how a tissue monolayer folds into a 3 dimensional structure during organogenesis. Still being a relatively young field, mechanobiology is starting to provide evidence showing that major biological processes are fundamentally ruled by forces. For example, a class of mesenchymal stem cells tends to differentiate into distinct cell types depending on the stiffness of their surroundings [Engler, et al. 2006]. Other examples include force modulation of apoptosis (programed cell death) and cell division [Slattum & Rosenblatt 2014].

Perhaps the collective migration of epithelial monolayers is one of the areas into which mechanobiology has shed more light in the recent years. Cells often move in groups with coordinated polarity without completely disrupting their cell-cell contacts. This harmonic migration is responsible for closing gaps when a monolayer is wounded or determining organ shape during morphogenesis. To fully understand such processes, it is necessary to have access to one fundamental parameter that has been elusive for decades: the physical force.

Making forces visible at the cellular scale

The notion that physical forces could explain important biological processes has been around for about 100 years [Thompson 1942; the first edition is from 1917]. Nevertheless, until 1980 the direct evidence that forces exist at cellular scale and were measurable was missing. In a seminal work, Harris *et al.* observed that adherent cells generated wrinkles when seeded on soft elastomeric substrates [Harris, Wild, & Stopak 1980] (**Figure 1A**). Two decades later, Dembo and Wang developed an experimental and mathematical framework able to quantify those forces [Dembo & Wang 1999]. Their approach was simple and only applicable to single adherent cells. First, cells were seeded on an elastic substrate with embedded fiducial fluorescent markers. While cells exerted force on the substrate, the fiducial markers were displaced from their relaxed position (**Figure 1B**). Then, the relaxed position was determined after removing the cell by the addition of trypsin (a protein that catalyzes the hydrolysis of peptide bonds) (**Figure 1C**). Finally, by comparing the two images of the fiducial markers –deformed and relaxed– and taking into account the mechanical properties of the substrate, a precise map of the traction forces was computed (**Figure 1D–G**). This technique was named *Traction Force Microscopy* and its appearance was the tipping point that triggered a succession of studies refining [Butler et al. 2002], improving [Sabass et al. 2008] and extending this technique to cell monolayers [Trepat et al. 2009] and three-dimensional environments [Legant et al. 2010].

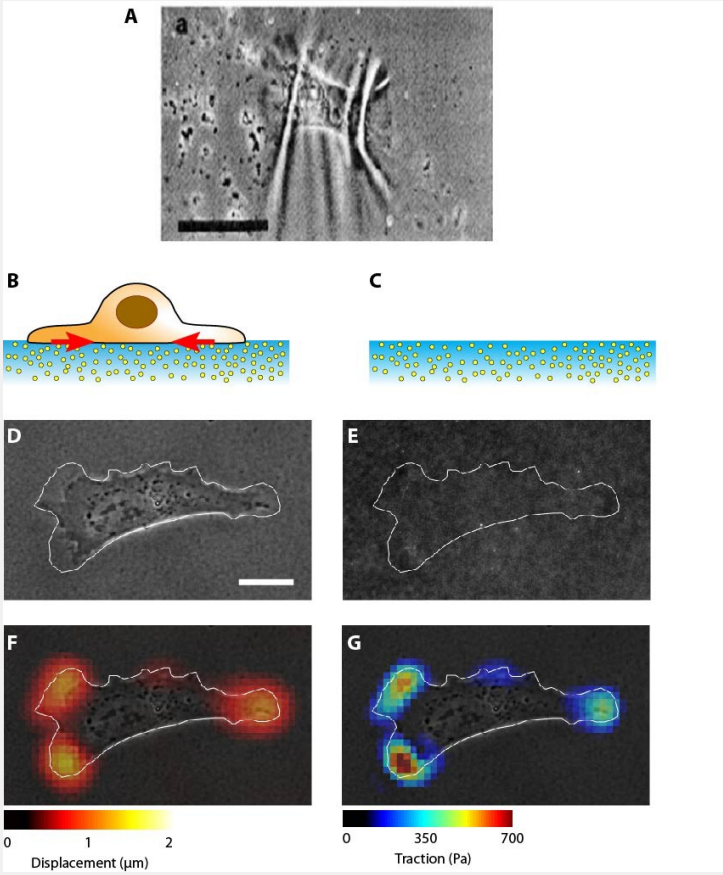

Figure 1. Overview of Traction Force Microscopy. (**A**) First attempts to observe forces at a cellular level showed how adherent cells generated wrinkles when seeded on soft elastomeric substrates, from Harris et al. Science 1980, 208: 177-179. Reprinted with permission from AAAS. (**B-C**) Sketch of Traction Force Microscopy. (**B**) Adherent cells are seeded on an elastic substrate with embedded fiducial fluorescent markers. As cells exert force (red arrows), the substrate and the fiducial markers are displaced from their relaxed position. (**C**) After the addition of trypsin, the cell is detached and the gel returns to its original position. By comparing the two images of the fiducial markers –deformed and relaxed– and taking into account the mechanical properties of the substrate, a precise map of the traction forces is computed. (**D-G**) Example of Traction Force Microscopy. (**D**) Single human bone osteosarcoma epithelial cell cultured on a soft polyacrylamide gel (5 kPa) and imaged with phase contrast microscopy. The line drawn is the contour of the cell. (**E**) Image of the fiducial markers embedded into the gel. (**F**) Displacement map generated by the cell. (**G**) Traction map computed from the displacement map. The scale bar in D corresponds to 20 μm.

How cell crowds play the tug of war

For a long time, it was unknown whether the global motion of cell monolayers was driven by the action of leader cells at the front of the monolayer, pulling the cells behind [Poujade et al. 2007], or by internal pressure, due to cell division that pushed the leading cells forward (**Figure 2A** and **B**, respectively). Recent improvements brought by Traction Force Microscopy have provided some evidence to elucidate which of these mechanisms was more plausible [Trepat et al. 2009]. First, the detailed mapping of traction forces normal and parallel to the cell edge of the monolayer showed that traction forces were exerted many rows behind the leader cells and propagated over long distances (**Figure 2C**–**E**). These data suggested that the idea of leader cells dragging the passive followers could not fully explain the collective migration. Moreover, force propagation over long distances established that collective migration not only involved interactions with the substrate but also interactions with neighboring cells. Consistent with this view, the average traction force in the monolayer was not concentrated at the edges but decayed slowly keeping the values larger than zero (**Figure 2F**).

These findings implied that cell sheets play a global *tug of war* that requires cell-cell junctions (**Figure 2G**). Interestingly, by applying Newton's 2nd law, the cell stress within the monolayer can be calculated [Tambe 2011]. The stress transmitted through cell-cell junctions increased as a function of the distance to the monolayer edge. Such a tensile stress ruled out the idea that cell division and proliferation

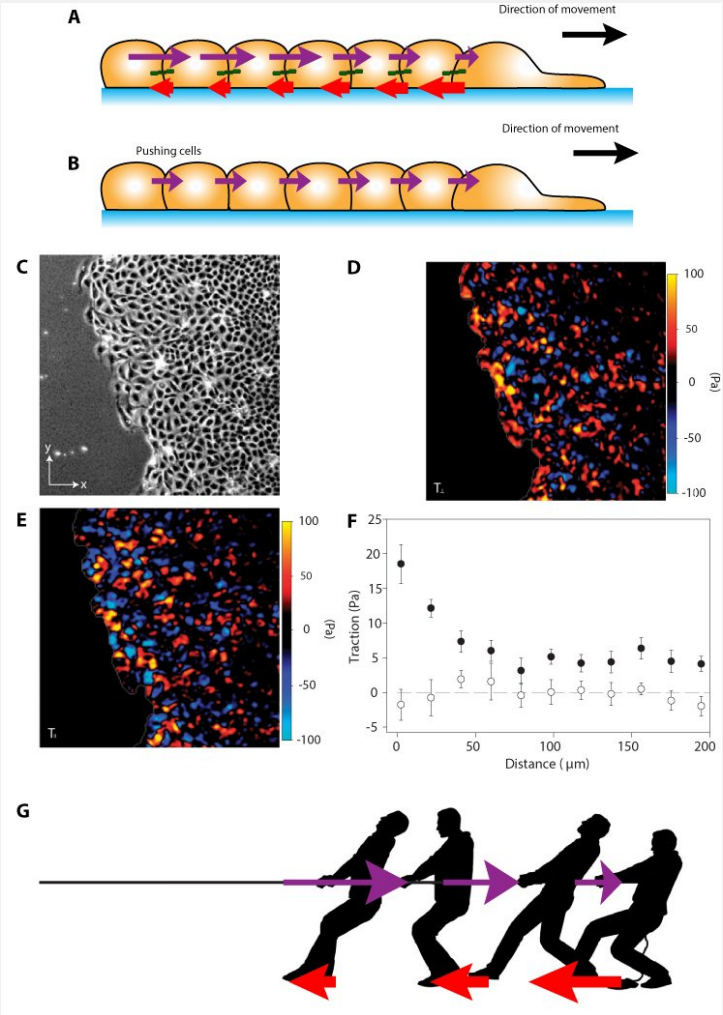

Figure 2. Physical forces during collective cell migration. (**A-B**) Migration of cell monolayers can be governed by different mechanisms. (**A**) Leader cells at the edge pull forward the cells inside the monolayer. Forces that cells exert on the substrate are depicted in red whereas forces acting on cells are purple. (**B**) Alternatively, cell division in the interior of the monolayer push neighboring cells forward. (**C-E**) Traction forces during collective cell migration. (**C**) Phase contrast image of a MDCK monolayer cultured in a soft polyacrylamide gel. Tractions normal (**D**) and parallel (**E**) to the edge of the monolayer. (**F**) The average normal traction decays slowly with distance from the edge (filled symbols), whereas the average parallel traction was negligible and independent of the distance from the edge (open symbols). Error bars indicate standard errors. **C-F** are reprinted by permission from Macmillan Publishers Ltd: Nature Physics (Trepat et al. Nat Phys 5: 426 – 430), copyright 2009. (**G**) The *tug of war* illustrates the mechanisms by which a migrating cell monolayer integrates local tractions (red) into long-ranged gradients of intra- and inter-cellular tension (purple).

pushed the monolayer forward. This kind of *tug of war* motion has been observed in other contexts, such as wound healing [Brugués et al. 2014, Vedula et al. 2014] and cancer progression [Wagstaff, Kolahgar & Piddini 2013].

Moving together towards stiff: how the "tug of war" guides cell groups

A remaining question in epithelial monolayer migration is how the *tug of war* is modulated by external cues, such as the stiffness of the environment. In single cells, it is well established that cells tend to move from soft to stiff regions when seeded on a rigidity gradient matrix [Lo et al. 2000]. This migration was termed *durotaxis*, after de Latin *durus* (hard) and the Greek *taxis* (regular arrangement). Such a guided motion, however, is very small and only appreciable when averaged over many cells or in the presence of very steep gradients (**Figure 3A** and **B**). Surprisingly, when cell clusters were seeded on matrices with graded stiffness, durotaxis was far more efficient than in single cells (**Figure 3C**–**F**). Again, the measure of traction force turns out to be the key to understand this phenomenon.

Measuring traction forces in matrices of non-uniform stiffness is not straightforward. Conventional Traction Force Microscopy algorithms are designed for uniform stiffness substrates in which the mechanical properties are constant along all coordinates. Conversely, on matrices of graded stiffness the application of a given force will produce different displacements depending on whether this force is applied to a soft or a stiff region. To extend Traction Force Microscopy to arbitrary stiffness profiles, the use of finite element methods (FEM) is

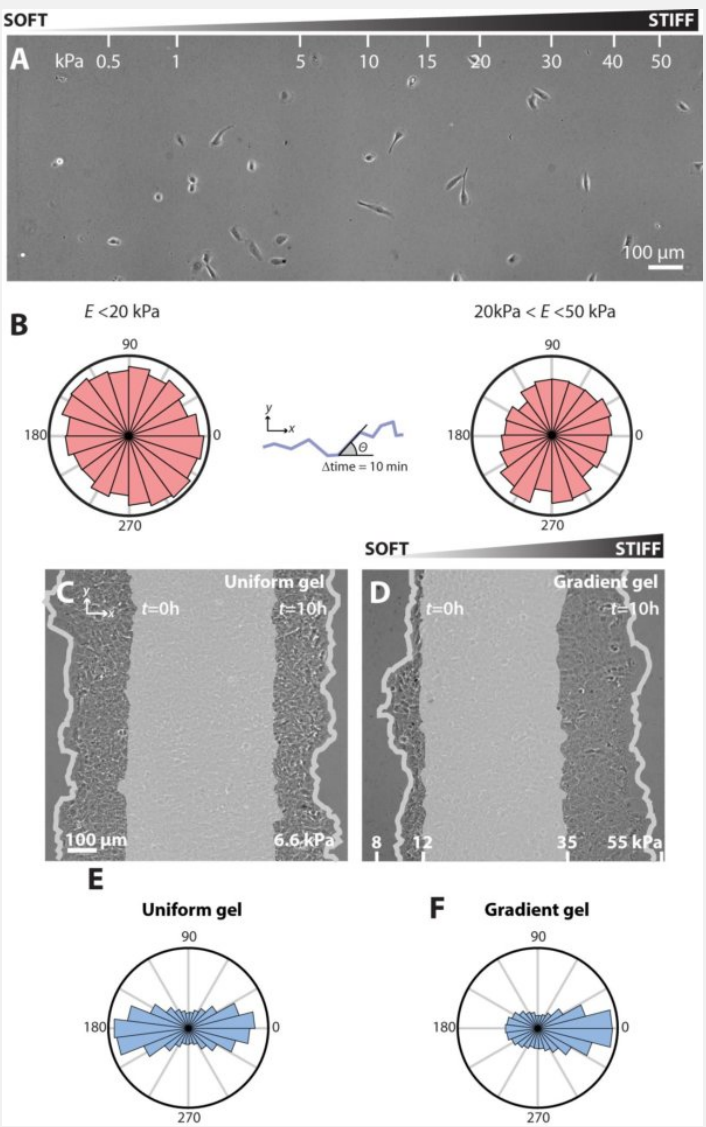

Figure 3. Durotaxis in single cells and multicellular clusters.(**A**) Phase contrast image of human mammary epithelial cells (MCF-10A) cultured in isolation on a gel with graded stiffness. Numbers at the top indicate Young's modulus values measured with AFM. (**B**) Distribution of the angle θ between the instantaneous velocity vector and the x-axis for isolated cells. The inset shows a cell trajectory (blue) and the definition of the angle θ. (**C**) A representative cell cluster expanding on a soft uniform gel of 6.6 kPa. The gray transparent area indicates initial the cluster position (t = 0h) and the phase contrast image shows the cluster after 10 h. Gray lines indicate cluster edges at 10 h. (**D**) Example of a cell cluster expanding on a graded stiffness gel. The gel stiffness increases towards the right of the panel. Numbers at the bottom indicate Young's modulus values measured with AFM. (**E-F**) Distribution of the angle θ between the instantaneous velocity vector and the x-axis (see inset) for the experiments displayed in panels **C** and **D**, respectively. Figure adapted from Sunyer et al. Science 2016, 353: 1157-1161. Reprinted with permission from AAAS.

required [Sunyer et al. 2016]. Using such methods, it was found that multicellular clusters migrating on gels of graded stiffness exhibit traction force maps with highest tractions localized at the edges and pointing towards the midline of the cluster, whereas relatively lower tractions in the bulk showed no particular orientation (**Figure 4A–D**). Unlike traction forces, substrate displacements on gradient gels are larger on the soft edge than on the stiff one (**Figure 4E–F**). These force measurements establish that the monolayer expands by generating contractile traction forces of equal magnitude at both edges, and that these forces are transmitted across the cluster. The net advance of the monolayer is therefore a consequence of the difference between the soft and the stiff deformation.

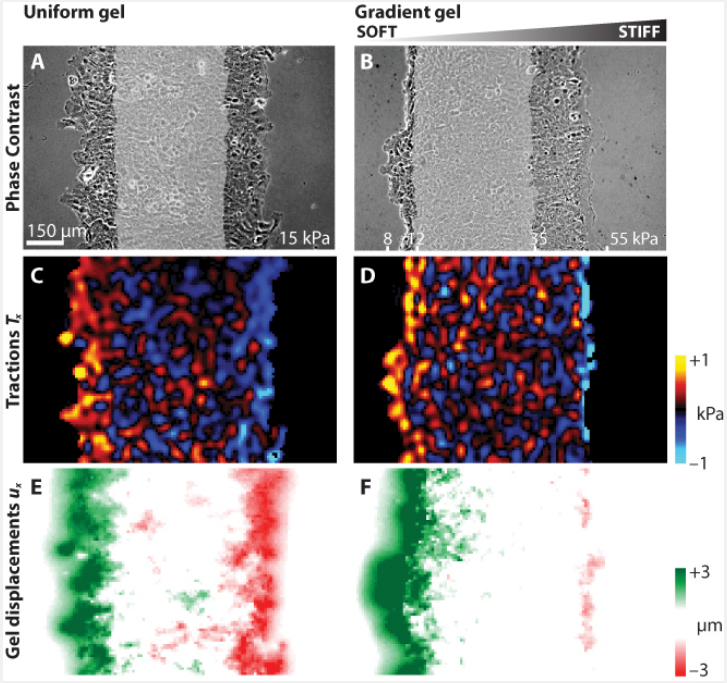

Figure 4. Traction force microscopy on gradient gels shows long range intercellular force transmission within the clusters. (**A-B**) Phase contrast images of clusters migrating on a uniform gel (**A**) and on a gradient gel (**B**). (**C-D**) Maps of the traction component Tx and (**E-F**) maps of the substrate displacement component ux. Adapted from Sunyer et al. Science 2016, 353: 1157-1161. Reprinted with permission from AAAS.

These results can also explain why durotaxis is less efficient in single cells when compared to multicellular clusters. In single cells, the difference in stiffness across a cell length is not large enough to trigger durotaxis. Multicellular clusters, however, act like a *super-cell*: cells within it are connected through cell-cell junctions and capable to transmit forces. Due to the large size of clusters, the variation in stiffness across its length will be much larger than in single cells. Consequently, durotaxis will be stronger. The fact that collectives are more efficient at responding to environmental gradients than their isolated constituents is often referred as *collective intelligence*. This phenomenon has been observed in cell clusters during chemotaxis [Camley et al. 2016, Mayor & Etienne-Manneville 2016], fish schools during phototaxis [Berdahl et al. 2013], and human groups during online gaming [Krafft et al. 2015].

Conclusion: moving forward in cell mechanobiology

The idea that living cells sense and exert physical forces has been around for a long time. However, until the last two decades the measurement of those forces has been elusive. Today it is widely accepted that mechanical cues are fundamental to fully explain biological processes in health and disease. The migration of epithelial monolayers is just an example of how a simple mechanical concept –the *tug of war*– can help us to understand a universal migratory mechanism present in complex biological processes such as morphogenesis or wound healing, as well as in diseases such as fibrosis

and cancer. As the field of mechanobiology continues to grow, it also faces new challenges. One of the most exciting ones is to translate the basic findings of mechanobiology to clinical applications. The first promising attempts to diagnose pathologies, such as malignant transformations with mechanical phenotypes are already on the way [Tse et al. 2013, Otto et al. 2015].

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Biofísica Magazine

CONFERENCE REPORTS / EVENTS / NEWS

REPORT – On the First Biology for Physics Conference (Barcelona 15-18 January 2017)

Felix Ritort, *UB, Barcelona (Spain); DPL and 1st BioforPhys conference chair.*

On the 15-18th of January 2017 took place in Barcelona the 1st Biology for Physics Conference – **BioforPhys17** organized by the Small Biosystems lab from the University of Barcelona under the auspices of the Division of Physics for Life Sciences – DPL from the European Physical Society – EPS.

The main goal of the conference was to debate the question: Is there new physics in living matter?

Since the dawn of modern science, physics has developed the measurement tools for quantitative inquire, and provided mathematical laws to describe and understand the world around us. In turn, physical methods have found applications in biology making it the quantitative science that it is nowadays. However, despite this progress, living matter has astonishing features that, when confronted to those of inanimate matter, make physicists suspect that *they are missing something* in their understanding of the living. The main goal of the conference was to debate the question: Is there new physics in living matter?.

The conference gathered about 170 participants and took place in the auditorium of the Barcelona Biomedical Research Park – PRBB. Talks were presented by about 30 internationally leading experts who have made outstanding contributions in their respective fields, and for whom physics is a source of inspiration for better understand biology. In addition to talks we had ample time (4 hours in total) for poster sessions with 120 posters, mostly presented by young scientists, the core of the participants in the event.

Attendees to the 1st BioforPhys conference, chatting at an outdoor coffee-break.

The conference opened on Sunday 15th evening with a reception followed by a keynote talk by Uri Alon from Weizmann Institute who talked about general laws governing genetic circuits and biological traits of organisms. Dr. Alon ended his talk with a nice and inspiring classic guitar show about science and emotions. The monday 16th morning session started with the talk by Carlos Bustamante from the University of Berkeley who started quoting Jacques Monod and emphasized the feedback between chance and necessity to make complex biological structures. Other talks in that session ranged from neuroscience to collective biological motion and self-organisation of cell structures. The afternoon session started with Cees Dekker from TU Delft and Antoine Triller from the ENS in Paris, who talked about designing synthetic cell structures and the mystery behind the stability of long-term memory, respectively. Finally, I. Junier (Grenoble) and O. Rivoire (College de France) discussed the physics of several regulatory processes (protein folding, DNA replication and transcription) from an evolutionary perspective.

Tuesday morning session was around nonequilibrium aspects of living matter and started with beautiful talks by Fred Mackintosh (Rice University, USA) and Joshua Shaevitz (Princeton University, USA) who discussed nonequilibrium phase transitions in living matter. Paolo de los Rios from the EPFL (Lausanne) and Udo Seifert from the University of Stuttgart closed the morning session discussing fundamental aspects of the nonequilibrium physics of energy powered molecular machines. Tuesday afternoon session included talks on quantum effects in biological matter by Niek Van Hulst (ICFO, Barcelona) and protein folding. Erwin Peterman from Vrije Universiteit (Amsterdam) discussed fluorescence techniques for intracellular transport and Carlo Manzo from the Universitat de Vic (Barcelona) closed the session discussing intriguing aspects related to ergodicity breaking of protein diffusion in cell membranes.

Wednesday session started with talks by Jacques Prost from Institut Curie (Paris), who showed examples of biologically inspired problems leading to new physical concepts. This was followed by talks on the physics of morphogenesis (S. W. Grill from TU Dresden and C. P. Heisenberg from IST Austria), cell migration and biological self-organization. The conference was ended by a beautiful,

inspiring and provocative talk by Erik Van Nimwegen on the physics of evolution and the physical meaning of concepts, such as fitness landscapes.

The conference had five nice moments I would like to underline. One was the evening poster exhibitions in the outside on Monday and Tuesday (17h-19h) that, despite of the exceptional strong cold we had those days in Barcelona, was softened by mushroom heaters and hot chocolate served for the youngsters and the not so ones. Second, the relaxing piano recital on Monday at 19h in the auditorium offered by the talented Italian pianist Patrizia Marcatello who played 5 pieces: Ludwig van Beethoven (first piano sonata), Frederic Mompou (first Catalan dance and song, and a variation of one of Chopin's *preludes*), Ennio Morricone (*Playing Love* from the movie *Legend of 1900* directed by Giuseppe Tornatore) and *Claire de Lune* from Claude Debussy. Third, the excellent conference dinner event at Hotel W in the Barcelona seashore that was followed by drinks and dance at the 26th floor of the Hotel W. Fourth, the poster prizes given to the best six posters of the conference selected from a committee chaired by Udo Seifert. Fifth, the round table scientific discussion that followed after the morning session of Tuesday. It was moderated by the conference chair and led by five among the invited speakers (Mackintosh, Prost, Bustamante, Grill and Shaevitz). The debate spontaneously organized and gently evolved (as biological matter does!) into a fruitful discussion were participants asked many interesting questions about the main theme of the conference: *Is there new physics in living matter?*

Two were the main conclusions of the conference in regards to the main question. First, it was acknowledged that *biology truly provides new problems and questions* that require novel theoretical and experimental approaches that contribute to fast expanding the domain of physical sciences. Second, biology is still waiting for an answer to the most intriguing question, i.e. *where does all this marvellous complexity come from?* Throughout the conference we heard appeals to Schroedinger (*What is life?*), Jacques Monod (*Chance and Necessity*) and R. P. Feynman (*What I cannot create I do not understand*). However it is clear that we are missing something in our understanding. What makes living matter emerge against irreversibility and the fate of the Second Law? *Evolution hides the mistery!* it was often heard in the conference. Biology has no meaning outside the evolutionary context. Are there new physical laws hiding inside evolutionary forces? Surely, this and other will be questions to address in a future second **BioforPhys** conference.

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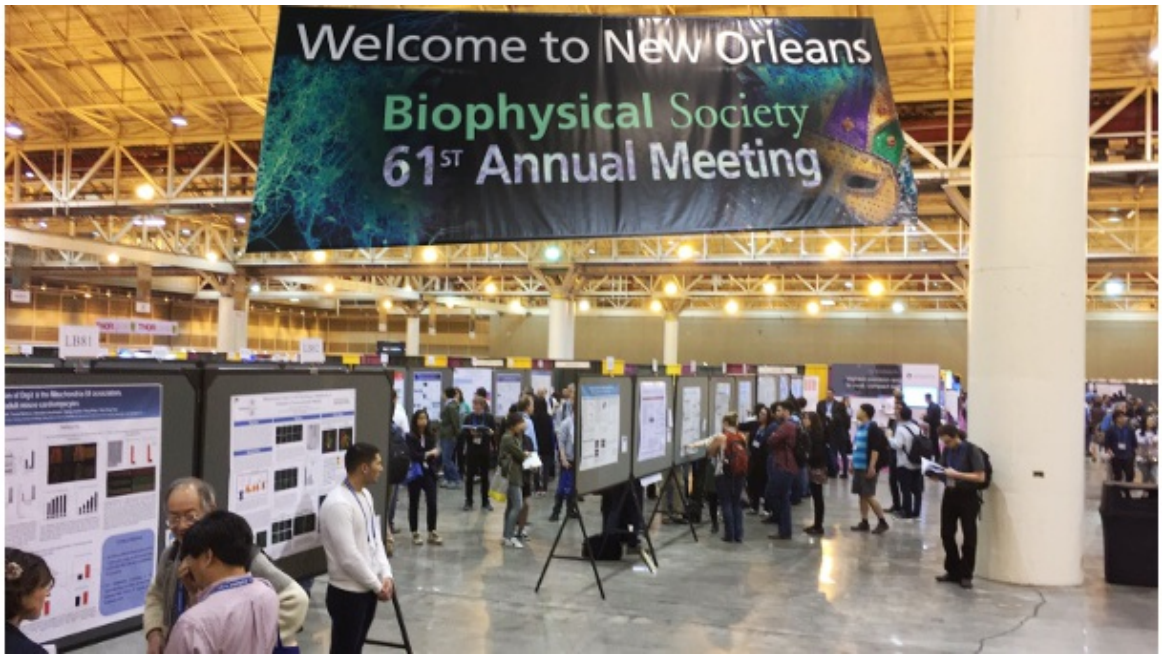
Biofísica Magazine

CONFERENCE REPORTS / EVENTS / MEETINGS / NEWS

REPORT – Biophysical Society Meeting 2017: Eric Betzig "super resolves" the way to ground-breaking science



Jorge Alegre-Cebollada, *CNIC, Madrid (Spain)*.

The 61st Biophysical Society Annual Meeting took place in New Orleans, Louisiana, USA on February 11-15 2017, organized by the Biophysical Society.

The Biophysical Society – BPS annual meeting is a fantastic event. Scientists interested in Biophysics should attend this meeting at least once in their life time. This is especially true for students. Students may be already used to national or to some small-size international conferences in Biophysics. At the BPS meeting, first-time attendants may feel overwhelmed by the amount and quality of the science presented. Thousands of posters, dozens of commercial exhibitors, hundreds of oral presentations. It is quite commmon that your preferred sessions overlap in time, so be prepared for it!

The 61st Biophysical Society Annual Meeting took place in New Orleans, Louisiana last February. It covered many different topics, reflecting the multidisciplinary approach to science shared by biophysicists: protein structure and function, electrophysiology, muscle physiology, single-molecule

methods, nanotechnology, membranes... It is impossible for a single person to select the highlights for even half of those topics. I would like to mention a few, although, of course, these are biased by my own personal interests.

I was impressed by the advances in the manipulation of single proteins using magnetic and optical tweezers techniques. For instance, the laboratory of Julio Fernández at Columbia presented results showing that single unfolded proteins slowly lose their ability to refold just by keeping them unfolded. The mechanisms behind this surprising behavior are currently under investigation, although it seems to involve oxidation of side chains in the protein. I also had the opportunity to attend a very interesting thematic session about Piezo channels. These enticing molecules support mechanosensation by detecting variations in membrane pressure, which lead to changes in the conductance of the Piezo pore. Results were presented that link mutations in Piezo channels with loss of proprioception, our ability to know where we are in relation to our environment. Proprioception is something that we take for granted, but it isn't obvious at all. Ardem Patapoutian from Scripps showed a shocking video of a patient who lacks proprioception and, as a result, is not able to stand. These new findings put us in the way to be able to treat these patients by targeting Piezo channels.

But the absolute highlight of the conference was the National Lecture, delivered by Eric Betzig. National Lectures at the BPS meeting are impressive events on their own. The National Lecture is given by a top scientist, in many instances a Nobel Prize awardee. The room is huge, probably hosting over 2,000 delegates. I appreciate that giving such a lecture brings in many challenges. It has to be general, while showing top-notch science. And yet, it is an evening session, where the speaker must engage an exhausted audience that has been discussing science since 8:30 am... Not easy!

Cells in their native environment can be visualized in real time at resolutions below Abbe's diffraction limit in 4D. I had the impression that these developments would be enough to award Betzig a second Nobel Prize.

I cannot stress enough how amazing and motivating Betzig's lecture was. He presented his milestone contributions to the field of super resolution microscopy. He was awarded the 2014 Nobel Prize in Chemistry for developing PALM microscopy. One may understand from Betzig's talk that this award was too preliminary because this technology is not well-suited for live-cell imaging in 3D. Indeed, he stressed that wide field and confocal microscopy techniques are limited because: i) they expose cells to a lot of photons (although most of them are not used to build the image) leading to photodamage of the cells, ii) they require transfection and labelling in non physiological conditions to introduce bright fluorophores in the cell, and iii) they require working with isolated or even fixed cells that have lost their homeostatic environment. Betzig described how he has been addressing all those limitations by developing different forms of structured illumination microscopy and light sheet microscopy. The movies shown by Betzig ware captivating. Cells in their native environment can be visualized in real time at resolutions below Abbe's diffraction limit in 4D. I had the impression that these developments would be enough to award Betzig a second Nobel Prize.

But on top of Betzig's contribution to light microscopy, his unconventional career is also exemplary.

Betzig would love to see academic life drifting away from bureaucracy and heavy teaching loads, to bring professors back to the lab. Indeed, he was never attracted by the traditional academic career. After getting his PhD in Physics from Cornell University, he joined AT&T Bell labs. It was during his time at Bell labs that he started thinking about ways of breaking Abbe's diffraction limit when imaging biological samples at room temperature. When Bell labs closed, he was first unemployed and spent some time as a house husband. Later, he worked for his father's company developing novel industry instrumentation with little commercial success. He quit and moved back to unconventional science. Using equipment discarded by Bell labs, installed in the living room of his friend and colleague Harald Hess, they both provided the first experimental evidence that PALM could be used to break the diffraction limit in light microscopy. They used their own savings to fund the project.

Soon afterwards, opportunity kicked in. The Howard Hughes Medical Institute (HHMI) launched his own research campus, Janelia Farms (nowadays Janelia Research Campus), in Virginia, US. The HHMI was interested in supporting unconventional scientists and providing them with funds to run a small research group, fully devoted to explore ground-breaking ideas -no grant writing, no teaching duties, no administrative service. Ten years later, Betzig's story of success shows that the HHMI's recipe works. During his lecture, Betzig was very thankful to the HHMI and very lively encouraged people like him to apply to Janelia… and proposed that the whole system should learn from this experience.

> *…the whole academic model of taking somebody from their postdoc, who finally is a really great researcher, and rip them out of the lab and make them basically the CEO of a small non-profit as an Assistant Professor… that seems f… stupid to me, I'm sorry!*

Betzig said at the very end of his talk. It was late in the evening, but people cheered and applauded for a long time! I think we all wanted to be Betzig at that time. I for sure did.

Any student should watch Betzig's National Lecture, available *online*. Do not miss either Betzig's biographical note on the Nobel Prize website.

Hopefully I've provided enough reasons for you to attend the 62nd BPS meeting which will be held in San Francisco in February 2018. And maybe also to follow in on Betzig's footsteps!

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Biofísica Magazine

NEWS

Between atom and cell: Integrating Molecular Biophysics Approaches in Europe with the ARBRE/MOBIEU Network

The ARBRE/MOBIEU network

The **ARBRE initiative** (Association of Resources for Biophysical Research in Europe) was launched in 2014 by Patrick England (Paris) and Thomas Jowitt (Manchester) to ally the forces in molecular-scale biophysics and to provide it with a clearer identity. Together with its associated COST action MOBIEU (MOlecular BIophysics in EUrope), started in April 2016, has become the ARBRE/MOBIEU network. It aims to seed a large-scale pan-European interdisciplinary synergistic clustering, allowing to ally and synergize the power of spectroscopic, hydrodynamic, real-time microfluidic, thermodynamic and single-molecule approaches.

> *Molecular-scale biophysics is a dynamic interdisciplinary field that aims to study biological macromolecules and assemblies as a whole, bridging the gap between atomic-resolution structural descriptions and cellular-level observations ("Between Atom and Cell"), with significant applications in biomedicine and drug discovery. However, before 2014, the core facilities, infrastructures and resource labs in this field were either isolated or scattered within different structural biology or protein production organizations, with little opportunity to synergize efficiently.*

This novel open network will create an optimal environment for the development of innovative

integrative biophysical approaches, at the level of data acquisition, analysis and modeling, as well as for the design of unprecedented and ambitious combinations of methodologies, to decipher more efficiently crucial biological phenomena and to overcome significant biomedical challenges.

ARBRE-MOBIEU will also broadly disseminate knowledge, notably through the organization of a strong programme of Workshops, Training Schools and Short Term Scientific Missions aimed in priority to Early Career Investigators and technical scientists.
In parallel, it will place a special emphasis on the construction of a new distributed molecular-scale biophysics European infrastructure, aiming to facilitate the transnational access to instrumentation and expertise for a wide user community, in particular from Inclusiveness Target Countries.

Finally, ARBRE-MOBIEU will provide a platform for scientists to establish early contacts with instrument developers (at the level of concept or prototype), allowing to set-up win-win partnerships that will allow to define and develop together future instrumentation that genuinely meets the needs of the broad biomedical and life sciences communities.

Additional information

For more information and registration within the ARBRE/MOBIEU Network, please visit the website http://arbre-mobieu.eu/

Biofísica Magazine

NEWS

A manifesto for reproducible science

Munafò MR, Nosek BA, Bishop DVM, Button KS, Chambers CD, Percie du Sert N, Simonsohn U, Wagenmakers EJ, Ware JJ, Ioannidis JPA

Nature Human Behaviour 1, #0021 (2017)

OPEN access

> *The field of metascience — the scientific study of science itself — is flourishing and has generated substantial empirical evidence for the existence and prevalence of threats to efficiency in knowledge accumulation.*

Improving the reliability and efficiency of scientific research will increase the credibility of the published scientific literature and accelerate discovery. Here we argue for the adoption of measures to optimize key elements of the scientific process: methods, reporting and dissemination, reproducibility, evaluation and incentives. There is some evidence from both simulations and empirical studies supporting the likely effectiveness of these measures, but their broad adoption by researchers, institutions, funders and journals will require iterative evaluation and improvement. We discuss the goals of these measures, and how they can be implemented, in the hope that this will facilitate action toward improving the transparency, reproducibility and efficiency of scientific research.

What proportion of published research is likely to be false? Low sample size, small effect sizes, data dredging (also known as P-hacking), conflicts of interest, large numbers of scientists working competitively in silos without combining their efforts, and so on, may conspire to dramatically increase the probability that a published finding is incorrect. The field of metascience — the scientific study of science itself — is flourishing and has generated substantial empirical evidence for the existence and prevalence of threats to efficiency in knowledge accumulation

URL: Nature Human Behaviour 1, Article number: 0021 (2017). Doi: 10.1038/s41562-016-0021.

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NEWS

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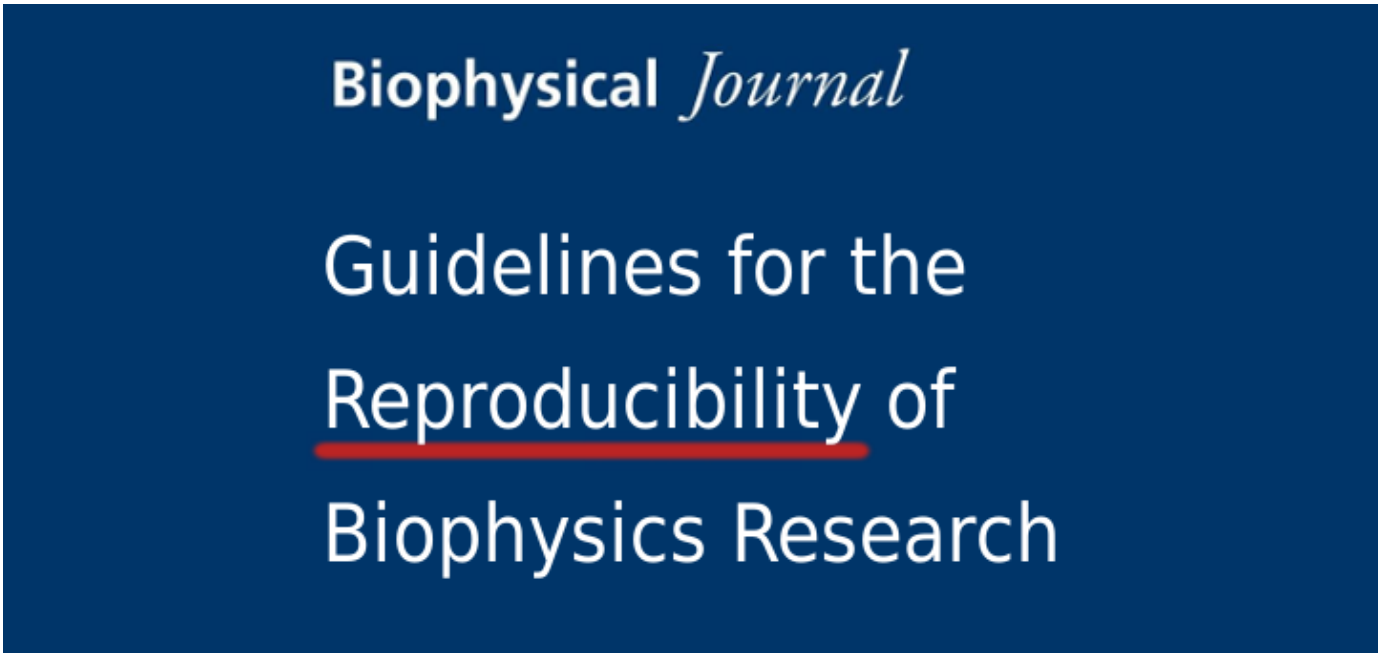

Updated July 2015

The Biophysical Society, publisher of Biophysical *Journal* (*BJ*), agrees fully with the intent of the National Institutes of Health's *Principles and Guidelines for Reporting Preclinical Research* to encourage reproducible, robust, and transparent research. The two *basic principles* underlying these Guidelines are the following:

First, research results should be reported with sufficient clarity and detail to ensure that the study can be replicated in any laboratory.

Second, data and material produced during the research leading to a published study should be readily disseminated and openly accessible, whenever feasible (e.g., by depositing the information in a public, community-endorsed database [see below], by including it in the online Supporting Material accompanying the article, or by posting it on the author[s]' website).

By submitting a manuscript to *BJ*, the authors agree to adhere to these fundamental principles.

Adherence to these principles requires attention to the points listed below, where the specific guidelines will continue to evolve as new community standards emerge.

1. RIGOROUS STATISTICAL ANALYSIS

Any *statistical analysis* must be checked for accuracy by the authors; if statistical software is used, the

source (including version number) of the tools must be listed in Materials and Methods. Authors are strongly encouraged to seek the assistance of a statistician at their institution or elsewhere; if they seek such advice, the resource should be identified in the letter of submission.

Statistics should be fully reported in the manuscript/article, including the statistical test used, exact value of *N* and the definitions of center and dispersion and the precision measures (e.g., mean, median, SD, SEM, confidence intervals). Manuscripts that report results based on the analysis of large data sets, such as Genomic, GWAS and NextGen Sequencing-based studies are required to specify in detail how the statistical analyses were done.

2. TRANSPARENCY AND REPRODUCIBILITY

BJ has no page limitations for research articles and allows for the submission of online Supporting Material. To ensure that published studies can be *replicated*, authors should adhere to the following standards:

- Describe Materials and Methods in sufficient detail to enable researchers in other laboratories to reproduce the experiments described in the manuscript.
- Use the generally accepted nomenclature in their field; define all non-standard terms.
- Report how often each experiment was replicated and, where applicable, whether the results were substantiated by replication over a range of conditions. Provide sufficient information to allow readers to distinguish between independent data points and technical replicates.
- Where applicable, state whether the samples were randomized and, if so, the method of randomization.
- Where applicable, state whether the experiments were blinded and, if so, how.
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In manuscripts that report the development of novel chemical tools, or the use of known compounds, the authors should use systemic nomenclature to refer to the compounds, based on the guidelines developed by the International Union of Pure and Applied Chemistry (IUPAC); informal common names, such as dioleoylphosphatidylcholine, cholesterol or sucrose, are also acceptable. In the case of novel chemical tools, the authors are required to provide the exact structures of the compounds (prepared according to the IUPAC recommendations) and are encouraged to explain how each reported chemical structure was identified according to established standards in the field.

3. DATA AND IMAGE PROCESSING

Authors should make every attempt to minimize the post-acquisition processing of data. Some degree of processing may be unavoidable and is permitted provided that the processing procedure is described and the final data accurately reflect the original. In the case of image processing, alterations must be applied to the entire image (e.g., brightness, contrast, color balance). In case this is not possible (e.g., alterations to a single color channel on a microscopy image), any alterations must be clearly stated in the figure legend and in the Materials and Methods section. Groupings and consolidation of data (e.g., cropping of images or removal of lanes from gels and blots) must be

explicitly indicated in the appropriate figure and figure legends.

Data comparisons should only be made among comparative experiments, and individual data should not be reused across multiple figures. When data are used multiple times (e.g., multiple experiments were performed simultaneously with a single control experiment), this must be clearly stated in each figure legend.

If it is deemed necessary for proper evaluation of the manuscript, authors will be required to make the original unprocessed data available to the handling editor. The *figures* in all accepted manuscripts will be examined before publication.

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One of the terms and conditions of publishing in *BJ* is that authors agree to distribute materials (cells, DNA, antibodies, reagents, organisms and software) and protocols developed during the course of published studies, as well as the data that were generated, to qualified researchers for their own use.

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Articles in *BJ* are based on many different kinds of data, and community-endorsed data standards and public repositories are not available for all types of data sets. When there are community-endorsed standards and repositories, the full data set must be submitted to an appropriate repository, and accession numbers must be provided in the article.

Examples of data sets and public repositories are listed below (The list of repositories is not intended to be complete and authors may deposit their data in public repositories not listed below, as long they state where the data are deposited).

1. STRUCTURES OF BIOLOGICAL MACROMOLECULES
   The atomic coordinates and related experimental data (structure factor amplitudes/intensities and/or NMR restraints) must be deposited at a member site of the Worldwide Protein Data Bank (wwPDB). Authors must agree to release the atomic coordinates and experimental data when the associated article is published.

   For manuscripts reporting *electron cryomicroscopy* (cryo-EM) density maps and fitted coordinates, authors are encouraged to include with their submission either maps and coordinates, or a movie that shows an interactive session describing the map and the fit of the model in sufficient detail. Authors must agree to make the images and relevant metadata needed to reproduce a published EM reconstruction available when the article is published, preferably by depositing in the Electron

Microscopy Pilot Image Archive (EMPIAR) or upon reasonable request. Cryo-EM-derived density maps must be deposited into the EMDataBank (EMDB), through one of the partner sites (EM Data Bank in Europe or EMDataBank). Atomic coordinates fitted to EM maps must also be deposited to a wwPDB member site. If an article discusses a protein structure only at the level of the main chain alpha carbon atoms, only alpha carbon coordinates need be deposited. If the discussion involves higher-resolution data, a full coordinate list must be deposited.

BJ encourages authors to deposit the information before the manuscript is submitted because the corresponding database IDs must be included in the manuscript, and the handling editor should be informed no later than the completion of the editorial process that the necessary information has been sent to the appropriate data bank. *BJ* recommends that authors include the PDB validation report as part of the online Supporting Material for all new submissions describing results of *X-ray* and *NMR* structure determination.

For articles that include NMR spectra, authors must deposit the chemical shifts, coupling constants, relaxation data and other relevant data in the Biological Magnetic Resonance Data Bank (BMRDB) prior to submission of the manuscript and include the BMRDB-ID in the manuscript.

For articles that include *circular dichroism* spectra of proteins, authors must deposit the raw, processed, and metadata in the Protein Circular Dichroism Data Bank (PCDDB) prior to submission of the manuscript and to include the PCDDB-ID in the manuscript.

2. SMALL MOLECULE STRUCTURES
   The atomic coordinates and related experimental data (structure factor amplitudes/intensities and/or NMR restraints) of small molecules (lipids, amino acids, and other biologically active small molecules including drugs) must be deposited in the database maintained by the Cambridge Crystallographic Data Centre (CCDC). Authors must agree to release the atomic coordinates and experimental data when the associated article is published.

3. DNA AND PROTEIN SEQUENCES
   Authors must deposit their sequence data in the appropriate database among the following:

   - Protein sequences: UniProt
   - DNA and RNA sequences: GenBank, European Nucleotide Archive (ENA), DDBJ, Protein Data Bank, UniProt.
   - DNA sequencing data (traces and short reads): NCBI Trace and Short-Read Archive, ENA's Sequence Read Archive.
   - Deep sequencing data: deposit in GEO or ArrayExpress upon submission to the journal.
   - The sequences of all RNAi, antisense, and morpholino probes must be included in the article or deposited in a public database with the accession number provided in the article.
   - Human genomic data containing newly described SNPs and CNVs identified in control samples must be deposited in an appropriate repository such as dbSNP, the Database of Genomic Variants Archive (DGVa) or the Database of Genomic Structural Variation (dbVAR).

Articles based on genomic data generated from HeLa cells must comply with the *NIH HeLa Genome Data Use Agreement*, by affirming that the NIH has approved use of the data and acknowledging the contributions of Henrietta Lacks and her family to the research.

4. PROTEOMICS AND PROTEIN INTERACTIONS DATA
   Authors must deposit their data in the appropriate database among the following:
   - PRIDE, PeptideAtlas.
   - The IMEx consortium of databases.
5. CHEMICAL COMPOUND SCREENING
   The PubChem databse should be used.
6. COMPUTATIONAL SYSTEMS AND PHYSIOLOGICAL MODELS
   SBML and CELLML are two emerging standards for encoding computational models related to *systems biology* and *physiology*. To assure public access to such computational models, authors should, where applicable, deposit their models in the CellML Model Repository or the Biomodels Database. Other public databases for models developed in NEURON or VCell should also be utilized where applicable. When this is not possible (e.g., in the case of *MatLab* or other code), authors should include their model code as a file in the online Supporting Material.
7. CELL IMAGING DATA
   Currently, there is no community-endorsed repository of cell imaging data. If practical, raw image data should be made available as supporting material. Also, authors should, where applicable, make the image processing code available, preferably as a plug-in to open source software such as ImageJ or Python.
8. SOFTWARE
   Authors must declare the location and accessibility of any custom code and software central to the main claims of their paper. We recommend deposition of source code GitHub together with a listing on Zenodo, which will assign a Digital Object Identifier (DOI) to make the upload uniquely citeable; this DOI should be reported in the manuscript.

The standards for the public deposition of data continue to evolve, and the above list will be revised at regular intervals. If there is no community-agreed-upon format (such as for imaging, molecular dynamics, electrophysiology, and single-molecule studies), if there is no public repository, or if the data sets are too large to submit to the journal online, authors are encouraged to make the data available on request.

5. CONSIDERATION OF REFUTATIONS

It is the policy of *BJ* that, once it has published an article, it accepts responsibility to consider for publication manuscripts that refute the interpretations of the results in the original article according to the Journal's established standards for evaluating the suitability.

Updated July 2015

Biofísica Magazine

NEWS

Maintain transparency, open communication and mobility of scholars and scientists

FEBRUARY 10, 2017

We, as European organisations involved in science (which for us includes the social sciences and humanities), research, education and innovation, benefit from and wish to defend the open exchange of ideas and people, which constitutes the foundation of scientific endeavour.

From our multiple contacts with scientists, researchers and organisations in the USA and around the world we are aware of the anxiety among our colleagues concerning the impact of the ongoing policy reorientation under President Donald Trump and his administration. We are particularly concerned about the following developments:
The Executive Order discriminating against persons because of their nationality ;
Indications that government scientists might be affected by new administration policies limiting their communication with the press, policymakers or society at large, and that government scientists would require permission from superiors to publish;
The unwarranted credibility to views not based on facts and sound scientific processes and evidence in areas such as climate science or the safety of vaccines.

All of these are at odds with the principles of transparency, open communication, mobility of scholars

and scientists, which are vital to scientific progress and to the benefit our societies, economies and cultures derive from it. Restrictions on research, scientists and research centres in inconvenient areas have no place in science.

Our colleagues working in the US will suffer, the United States and US citizens will pay a price, as will Europe and Europeans, and countries and people all across the globe. Facing unprecedented challenges the world needs solid science and research resulting from an open scientific process in which scientists, researchers, students and innovators can freely exchange approaches and results, and can move from country to country to study and work where their contributions are most valuable.

We call upon European governments and the European Commission to uphold the principles and values that underpin scientific progress, to work with their counterparts in the US administration to maintain a global science system based on these principles and to take any measure at the national and European levels to preserve and increase the world's scientific and research capacity. These principles and values have been and will remain vital for our societies, economies and cultures to flourish.

List of signatories

- Academia Europaea
- ALLEA (ALL European Academies)
- British Biophysical Society
- Citizens of Academia, Poland
- Danish National Committee for Biophysics
- De Jonge Academie Vlaanderen
- EPSO, European Plant Science Organisation
- Eurodoc
- European Association of Social Anthropologists
- European Association of Social Psychology
- European Biophysical Societies' Association
- European Crystallograpic Assocation
- European Educational Research Association
- European Mathematical Society
- European Physical Society
- President and Executive European Science Foundation
- European Society for Gene and Cell Therapy
- European University Association
- EuroScience
- Federation of European Neuroscience Societies
- French Biophysical Society
- German Biophysical Society (Deutsche Gesellschaft für Biophysik)
- Informatics Europe

- Italian Society of Pure and Applied Biophysics
- LERU, League of European Research Universities
- Marie Curie Alumni Association
- Portuguese Biophysical Society
- Pan European Region of the International Association for Dental Research
- Real Sociedad MatemÃ¡tica EspaÃ±ola
- ROARS (Return On Academic ReSearch, Italy
- Royal Netherlands Academy of Sciences and Arts KNAW
- Royal Swedish Academy of Sciences
- Science Europe (Association of European Research Funding Agencies and Research Performing Organisations)
- Scientists for EU
- Sense about Science EU
- Societas biochemica, biophysica et microbiologica Fenniae
- Spanish Biophysical Society
- Swiss Academies of Arts and Sciences
- Executive Committee of Turkish Biophysical Society

Biofísica Magazine

NEWS

Spanish Scientific Societies promote a declaration in defence of Science

The Spanish Confederation of Scientific Societies – COSCE has written a Manifesto in support of Science. The declaration is framed in the context of actions programmed for the 22nd of April 2017 in different cities around the world, with the aim to call attention to Society about the importance of Science as well as to denounce recent political directions which erode the prestige of Science. The COSCE manifesto affirms:

> *A global political trend is emerging in the developed countries, which ignores the role of science in our lives, with the result of an inexorable deterioration in health and the environment and a growing disregard for knowledge, that is seen replaced by interpretations of reality, alternative to those provided by Science.*

The document refers also to the particular context of Spanish Science and demands a "coherent and lasting scientific policy and the recognition of the value that science has to achieve the objectives of social, political and economic progress that our society deserves."

Together with COSCE, the Manifesto is promoted and signed by the Conference of Rectors of Spanish Universities – CRUE and most important scientific societies in Spain.

You can read and sign the manifesto (in Spanish) by following *this* link

Biofísica Magazine

AWARDS / NEWS / SBE PRIZES

Alicia Alonso and María García-Parajo, winners of the Bruker prize 2017

The Executive Council of SBE has awarded the 2017 *"Manuel Rico" – Bruker* prize to:

Alicia Alonso, *UPV/EHU, CSIC (Bizkaia, Spain)*,

> *For her excellent scientific trajectory and notable contributions in Membrane Biophysics.*

and to:

María García-Parajo, *ICREA, ICFO (Barcelona, Spain)*,

> *For her outstanding scientific work on the development of advanced optical techniques to the study of biological, dynamic processes at the single molecular level on living cells.*

About the 2017 Awardees

Dra. Alicia Alonso

Professor of Biochemistry at the Biofisika Institute, University of the Basque Country – UPV/EHU and CSIC (Bizkaia, Spain).

Scientific Trajectory

Dr. Alicia Alonso received her M.Sc. in Biology at the University of Bilbao, where she also got her PhD in Biochemistry (1980; that year the university was officially designated to be the University of the Basque Country) working on the analysis of the interactions of detergents with cell and model membranes and also deciphering the roles of lipids in membrane fusion events. She then moved to the Royal Free Hospital (London, UK), where she worked as post-doctoral under the supervision of Dennis Chapman. Since 1992 she is Professor of Biochemistry at the University of the Basque Country and in 1998 became the first Head of the newly created *Unidad de Biofísica*, a joint centre of the Spanish National Research Centre – CSIC and the University of the Basque Country. During 1999-2000 she was visiting Professor at the University of Victoria (British Columbia, Canada).

Her scientific trajectory reveal notable contributions in different but related topics, such as the biological activities of ceramids and sphingolipids, the effects of catalytic activity of phospholipases and sphingomyelinases on model and cell membranes, mechanism of membrane fusion and more recently the role of lipids in autophagy. She has published more than 160 articles, which have been cited more than 5400 times (h-index: 43).

Dra. Alicia Alonso has been President of the Spanish Biophysical Society (2006-2010), Vice-President of the Spanish Society for Biochemistry and Molecular Biology (2010-2014) and a Member of the Council of the International Union for Pure and Applied Biophysics – IUPAB (2008-2014).

More information

Please visit Dra. Alicia Alonso webpage at Biofisika Institute (UPV/EHU, CSIC).

Dra. María García-Parajo

ICREA Research Professor at the Institute of Photonic Sciences – ICFO (Barcelona, Spain).

Scientific Trajectory

Dra. María García Parajo got her M.Sc. in 1989 in Physics (Semiconductor Science and Technology) at the Imperial College (University of London, UK) and her PhD in Physical Electronics in 1993 by her studies on "Natural lithography and photoluminescence of GaAs/AlGaAs quantum pillars", under the supervision of Prof. Mino Green. In 1996 she moved as post-doctoral to the Applied Optics Group at the MESA+ Institute for Nanotechnology (University of Twente, The Netherlands). In 1999 she became Research Fellow of the Royal Netherlands Academy of Sciences – KNAW, Assistant Professor of the MESA+ Institute for Nanotechnology (2002) and finally Associate Professor in that same institute (2004). In 2005 she came to Spain as Group Leader of the BioNanophotonics Group at the Institut de Bioenginyeria de Catalunya – IBEC, Barcelona (Spain) until 2011, when she became Group Leader of the Single Molecule Biophotonics Group at the Institute of Photonic Sciences – ICFO, Barcelona (Spain).

Her research focuses on the development of advanced optical techniques to the study of biological processes at the single molecular level on living cells, bringing biophysical insights into fundamental biological questions with important implications for health and disease, including cell biology and immunology. She has published more than 110 articles (34 since 2012), which have been cited more than 4500 times (h-index: 43).

Dra. María García Parajo has been Member of the Advisory Board of the European Federation in Biotechnology (section on Nanotechnology; 2007-2009), and of the Advisory Board for the BioNanoScience Program at University of Delft (The Netherlands; 2011). From 2009 to 2016 she was Member of the International Committee of the Society of Fluorescence and also of the Executive Board of the Spanish Biophysical Society (2011-2015). She has participated in the Evaluation Panel for Group Leader positions at ICFO and currently is member of the STFC Panel (Rutherford Appleton Lab.; Oxford, UK) and WISE Review Panel.

More information

Please visit the website ofSingle Molecule Biophotonics Group at ICFO.

About the *"Manuel Rico" – Bruker* Prize

> *Awarded in memory of Professor Manuel Rico, who was a leading biophysicist, member of the SBE, and a Research Professor at the Institute of Chemical Physics "Rocasolano", CSIC (Madrid). He was a pioneer using NMR technologies to study protein structure, stability, dynamics and interactions.*

Sponsored by

Bruker Española S.A.

Addressed to

Biophysicist who develope their main activity in Spain. **Preference** is given to members of the SBE working on Structure/Function problems from a Biophisics perspective.

Award

3000 € and a talk delivered by the awardee during a special session of the 16th SBE Congress (Sevilla June 6 – 8, 2017).

Past winners of this prize

2016: Xavier Gomis-Rüth (Barcelona)
2015: Juan A. Hermoso (Madrid)
2014: Óscar Llorca (Madrid)
2013: José Manuel Sánchez Ruiz (Granada) and Félix Ritort (Barcelona)
2012: Antonio V. Ferrer Montiel (Elche-Alicante) and Marta Bruix (Madrid)
2011: Ignacio Fita (Barcelona)
2010: Modesto Orozco (Barcelona) and José Luis Rodríguez Arrondo (Bilbao)
2008: José García de la Torre (Murcia)
2006: Jesús Pérez Gil (Madrid)
2004: Javier Sancho (Zaragoza)
2002: José María Valpuesta (Madrid)
2000: Miquel Pons (Barcelona)
1998: Rafael Picorel (Zaragoza)

More information

Please, visit the SBE website.

Biofísica Magazine

AWARDS / NEWS / SBE PRIZES

Emilio J. Cocinero and Carlo Manzo, winners of the SBE-40 prize 2017

The Executive Council of SBE has awarded the 2017 *"Enrique Pérez-Payá" – SBE-40* prize to:

Dr. Emilio J. Cocinero, *UPV/EHU (Bizkaia, Spain)*,

> *For his remarkable contributions in molecular spectroscopy.*

and to:

Dr. Carlo Manzo, *Universitat de Vic – Universitat Central de Cataluya, (Vic, Spain)*,

> *For his notable research in the visualization of dynamic processes occurring in living cells.*

About the 2017 Awardees

Dr. Emilio J. Cocinero

Research Associate at the University of the Basque Country – UPV/EHU (Bizkaia, Spain).

Scientific Trajectory

Dr. Emilio J. Cocinero got his B.Sc. in 2001 in Chemistry at the University of Valladolid (Spain) and his Ph.D. in Physical Chemistry in 2005 from the same University for his studies on the structure of amino acids by microwave spectroscopy, under the supervision of Professors Alberto Lesarri and José L. Alonso. In 2008 this thesis work was recognized with an *special award* by the University of Valladolid. In 2006 he moved to the Physical and Theoretical Chemistry Laboratories from Oxford University to join Professor John P. Simons' research group for the study of carbohydrates in the gas phase. In 2009 he obtained a Juan de la Cierva fellowship in the Science and Technology Faculty of the University of the Basque Country and in 2011 he became a Ramón y Cajal scientist. Currently, he leads research focused on solving structural problems of chemistry at the molecular level; in particular, the study of biomolecules, including sugars, peptides and drugs, generated and stabilized in the gas phase.

Dr. Emilio J. Cocinero has been winner of the Flygare Award for outstanding contributions in molecular spectroscopy by an early career independent scientist (2015), the Sigma-Aldrich prize for the best scientific career of a Spanish young researcher (Spanish Royal Society of Chemistry – RSEQ, 2012) and Postdoc-SusChem prize for the best scientific publication in 2011 conducted by a Spanish young researcher in any area of Chemistry. In 2014 Dr. Emilio J. Cocinero was elected President of young chemists researchers – JIQ of the RSEQ.

He has published more than 90 articles, which have been cited more than 1300 times (h-index: 22).

More information

Please visit the website of the Spectroscopy Group at the Department of Physical Chemistry of UPV/EHU.

Dr. Carlo Manzo

Associate Professor at the *Universitat de Vic – Universitat Central de Catalunya* (Vic, Spain).

Scientific Trajectory

Dr. Carlo Manzo got his M.Sc. in Physics in 2001 in the University of Naples (Italy) and his Ph.D. in Fundamental and Applied Physics four years later in the same University. During his thesis, he investigated topics related to the interaction between light and soft-matter under the supervision of Prof. Marrucci, a leading expert in the field of nonlinear optics. In 2006, he joined the research group of Prof. L. Finzi at Emory University (Atlanta, USA) as post-doctoral fellow. His postdoc research focused on the application of single-molecule manipulation methods (magnetic tweezers, tethered-particle microscopy, single-molecule video microscopy) to study the effect of DNA looping on gene transcriptional regulation. In particular, he devised novel approaches for the analysis of noisy time-traces, focusing on the kinetics and the mechanics of DNA looping in the lambda-phage, a paradigmatic genetic switch. In 2008 he joined the group of María García-Parajo at the Institute for Bioengineering of Catalonia – IBEC where he studied the organization and dynamics of constituents of plasma membranes and also developed optical and analytical tools for application in life sciences, such as fluorescence correlation spectroscopy in ultra confined volumes. In 2011 he joined the Institute of Photonic Sciences – ICFO as research fellow where he investigated on visualizing dynamic processes occurring in living cells. In 2016 he obtained a Ramón y Cajal contract and recently bacame Associate Professor at the University of Vic – Central University of Catalonia.

He has published more than 40 articles, which have been cited more than 1100 times (h-index: 18).

More information

Please visit Dr. Carlo Manzo webpage at UVIC.

About the "*Enrique Pérez-Paya*" – SBE-40 Prize

> *Awarded in memory of Dr. Enrique Pérez-Payá, SBE member who contributed to the development, translation and internationalization of Biophysics in Spain. He worked on peptide-membrane interactions and apoptosis and was a pioneer in the use of combinatorial chemistry to expand the chemical space for basic research and to develop peptide-based therapeutics. He was also an entrepreneur and always supportive of young biophysicists.*

Sponsored by

BCN Peptides and Prima – Derm.

Addressed to

Biophysicists under 40 who develope their main activity in Spain. **Preference** is given to members of the SBE and to achievements from the last 10 years.

Award

1500 € and a talk delivered by the awardee during a special session of the 16th SBE Congress (Sevilla June 6 – 8, 2017).

Past winners of this prize

2016: Raúl Pérez-Jiménez (San Sebastián)
2015: Irene Diaz Moreno (Sevilla)
2014: Fernando Moreno (Madrid)

Sponsored by SBE and Werfen-Izasa-Beckman-Coulter:
2013: Xavier Salvatella (Barcelona)
2012: José Manuel Gómez Vilar (Lejona-Vizcaya)
2011: Teresa Giráldez (La Laguna)
2010: Pau Bernardó (Barcelona)

More information

Please, visit the SBE website.

Biofísica Magazine

AWARDS / NEWS / SBE PRIZES

María Queralt-Martín and Álvaro Inglés, winners of the SBE-33 prize 2017

The Executive Council of SBE has awarded the 2017 *AntalGenics – SBE-33* prize to:

Dra. María Queralt Martín, *NICHD-NIH (Bethesda, USA)*,

> *For her excellent investigations on the mechanisms of ion transport by protein channels in model membranes.*

and to:

Dr. Álvaro Inglés, *IST-Austria (Klosterneuburg, Austria)*,

> *For his excellent work on the application of diverse biophysical methods to investigate the stability, structure and function of ancestral proteins.*

About the 2017 Awardees

Dra. María Queralt-Martín

Postdoctoral fellow at the Eunice Kennedy Shriver National Institute of Child Health and Human Development, NIH (Bethesda, USA)

Scientific Trajectory

Dra. María Queralt-Martín got her B.Sc. in Physics and her M.Sc. degree in Biophysics in 2009 at the University of Barcelona (Spain) and her Ph.D. in Physics at the University Jaume I, Castellón (Spain), under the supervision of Professors Vicente Aguilella and Antonio Alcaraz. Her research focused on the study of ion transport mechanisms of protein channels in model membranes; in particular the OmpF channel from *E. coli*. She has also studied the interactions of the mitochondrial channel VDAC with monomeric tubulin during her stays at the group of Prof. Rostovtseva at the National Institute of Child Health and Human Development – NICHD, National Institutes of Health – NIH, Bethesda (USA). The quality of her predoctoral work has been recognized with a PhD *Special Award* (2015) by the University Jaume I (Castellón, Spain). In 2016 she joined Dr. Berzukov's laboratory at NIH to study the molecular mechanisms of mitochondrial toxicity by alpha-synuclein, a disease-related amyloid protein, and its interaction with the voltage-dependent anion channel.

Dr. Álvaro Inglés

Postdoctoral fellow at the Institute of Science and Technology – IST-Austria (Klosterneuburg, Austria).

Scientific Trajectory

Dr. Álvaro Inglés got his M.Sc. degree in 2009 in Protein Structure and Function at the University of Sevilla (Spain) and in 2012 he obtained his Ph.D. in Chemistry at the University of Granada (Spain), under the supervision of Prof. José M. Sánchez Ruiz. His work focused on understanding how the biophysical properties of proteins change during evolution and use this knowledge to re-engineering proteins. He has characterized ancestral (Precambrian) proteins in terms of stability, structure and function. In 2013 he moved to the laboratory of Prof. H. Janovjak at the Institute of Science and Technology – IST-Austria (Austria) as a postdoctoral fellow, where he is working in the field of synthetic biology. In particular, he has developed a general strategy to control receptor tyrosine kinases with light.

About the *AntalGenics* – SBE-33 Prize

> *Recognizes the work of outstanding young Biophysicists under 33, independently of the country where their work has been done.*

Sponsored by

AntalGenics.

Addressed to

Outstanding young Biophysicists under 33, independently of the country where their work has been done. **Preference** is given to members of the SBE.

Award

1000 € and a talk delivered by the awardee during a special session of the 16th SBE Congress (Sevilla June 6 – 8, 2017).

Past winners of this prize

2016: Lorena Redondo-Morata (Marseille)
2015: Cecilia Artola (Madrid)
2014: Jorge Alegre Cebollada (Madrid)
2013: Anna Shnyrova (Bilbao)
2012: Sergi García Manyes (London)

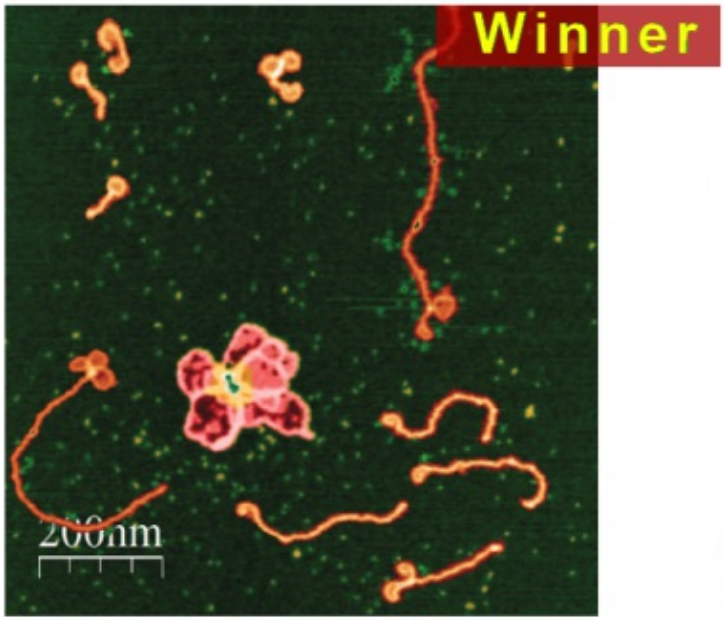
More information

Please, visit the SBE website.

Biofísica Magazine

AWARDS / NEWS / SBE PRIZES

Alejandro Martín-González wins Imagin'Action 2017



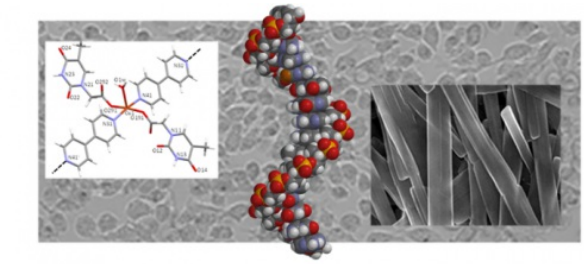
***Alejandro Martín-González*, from the Spanish National Centre for Biotechnology – CNB (CSIC) has won the second "IMAGIN'ACTION" image contest of SBE. Congratulations!**

The winner image, "Mother DNA with babies", is based on an AFM image of operon CRZY condensed by the protein TubR (pink DNA), surrounded by smaller fragments of the same DNA partly condensed by TubR.

The image will be displayed in the main hall at the location of the 16th SBE Congress (Sevilla June 6 – 8, 2017). The prize consist on a free inscription to the meeting, plus a sum of money to cover travel expenses.

Biofísica Magazine

PAPERS OF THE MONTH BY SBE MEMBERS: JANUARY - APRIL 2017



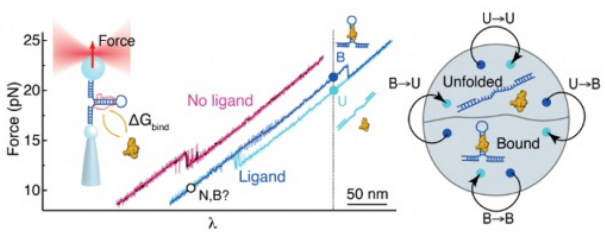
Vegas...,Somoza,...Amo-Ochoa {*Angew Chem Int Ed Engl* 56: 987}

HIGHLIGHTS2017 / JAN. 2017

Copper(II)-Thymine Coordination Polymer Nanoribbons as Potential Oligonucleotide Nanocarriers

Vegas VG, Lorca R, Latorre A, Hassanein K, Gomez-Garcia CJ, Castillo O, Somoza A, Zamora F, Amo-Ochoa P.

Angew Chem Int Ed Engl 2017 Jan.; 56: 987.



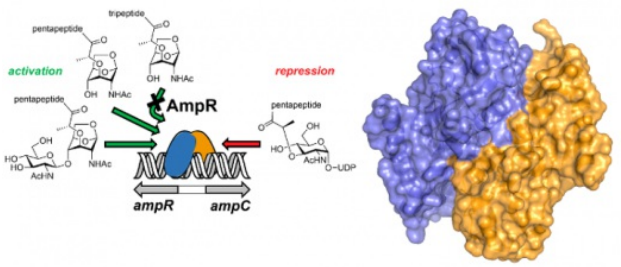
Camunas-Soler, Alemany, Ritort {*Science* 355: 412}

HIGHLIGHTS2017 / JAN. 2017

Experimental measurement of binding energy, selectivity, and allostery using fluctuation theorems

Camunas-Soler J, Alemany A, Ritort F.

Science 2017 Jan.; 355: 412.



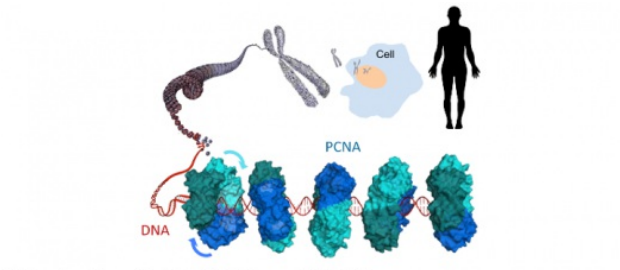
Dik..., Hermoso, Mobashery {*J Am Chem Soc* 139: 1448}

HIGHLIGHTS2017 / JAN. 2017

Muropeptide Binding and the X-ray Structure of the Effector Domain of the Transcriptional Regulator AmpR of Pseudomonas aeruginosa

Dik DA, Dominguez-Gil T, Lee M, Hesek D, Byun B, Fishovitz J, Boggess B, Hellman LM, Fisher JF, Hermoso JA, Mobashery S.

J Am Chem Soc 2017 Feb.; 139: 1448.



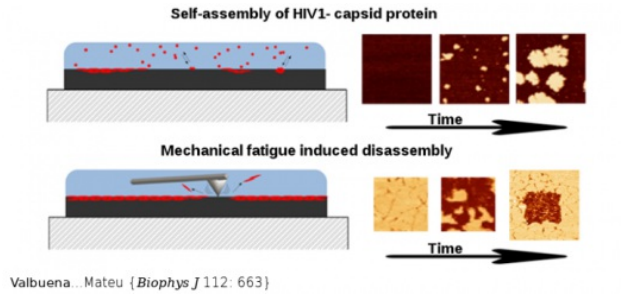
De March..., Blanco, De Biasio {*Nat Commun* 8: 13935}

HIGHLIGHTS2017 / JAN. 2017

Structural basis of human PCNA sliding on DNA

De March M, Merino N, Barrera-Vilarmau S, Crehuet R, Onesti S, Blanco FJ, De Biasio A.

Nat Commun 2017 Jan.; 8: 13935.



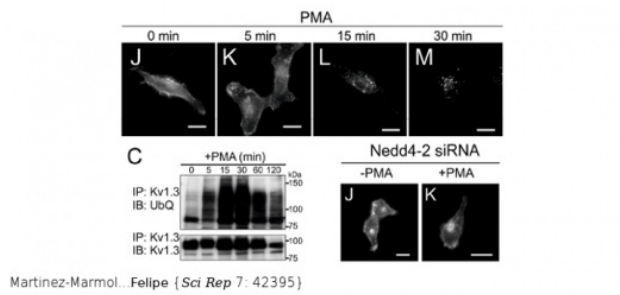
Valbuena...Mateu {*Biophys J* 112: 663}

FEB. 2017 / HIGHLIGHTS2017

Kinetics of Surface-Driven Self-Assembly and Fatigue-Induced Disassembly of a Virus-Based Nanocoating

Valbuena A, Mateu MG.

Biophys J 2017 Feb.; 112: 663.



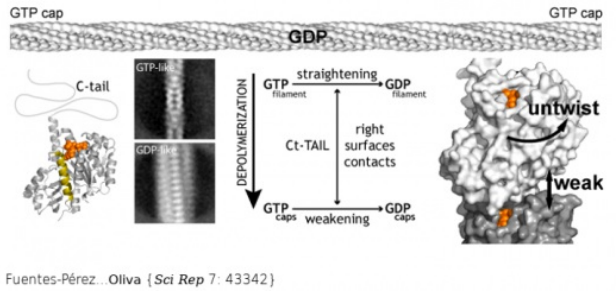
Martinez-Marmol...Felipe {*Sci Rep* 7: 42395}

FEB. 2017 / HIGHLIGHTS2017

Ubiquitination mediates Kv1.3 endocytosis as a mechanism for protein kinase C-dependent modulation

Martinez-Marmol R, Styrczewska K, Perez-Verdaguer M, Vallejo-Gracia A, Comes N, Sorkin A, Felipe A.

Sci Rep 2017 Feb.; 7: 42395.



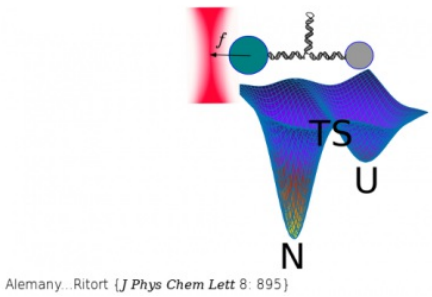
Fuentes-Pérez...Oliva {*Sci Rep* 7: 43342}

FEB. 2017 / HIGHLIGHTS2017

TubZ filament assembly dynamics requires the flexible C-terminal tail

Fuentes-Perez ME, Nunez-Ramirez R, Martin-Gonzalez A, Juan-Rodriguez D, Llorca O, Moreno-Herrero F, Oliva MA.

Sci Rep Feb.; 7: 43342.



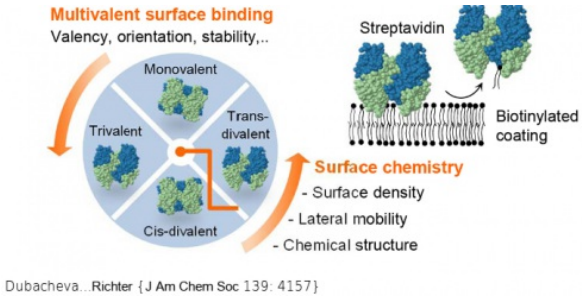
Alemany...Ritort {*J Phys Chem Lett* 8: 895}

HIGHLIGHTS2017 / MAR. 2017

Force-Dependent Folding and Unfolding Kinetics in DNA Hairpins Reveals Transition-State Displacements along a Single Pathway

Alemany A, Ritort F.

J Phys Chem Lett 2017 Mar.; 8: 895.



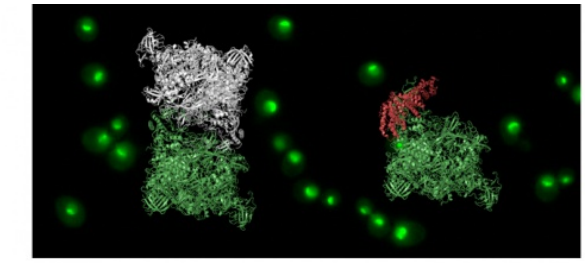
Dubacheva...Richter {J Am Chem Soc 139: 4157}

HIGHLIGHTS2017 / MAR. 2017

Controlling Multivalent Binding through Surface Chemistry: Model Study on Streptavidin

Dubacheva GV, Araya-Callis C, Geert Volbeda A, Fairhead M, Codee J, Howarth M, Richter RP.

J Am Chem Soc 2017 Mar.; 139: 4157.



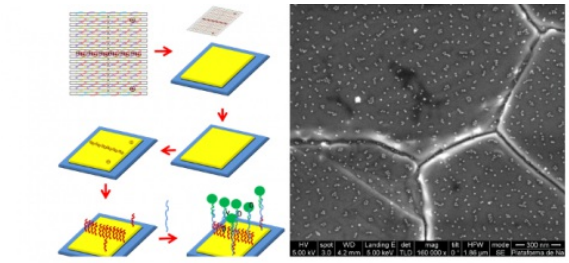
Torreira...Fernandez-Tornero {eLife 6: e20832}

HIGHLIGHTS2017 / MAR. 2017

The dynamic assembly of distinct RNA polymerase I complexes modulates rDNA transcription

Torreira E, Louro JA, Pazos I, Gonzalez-Polo N, Gil-Carton D, Duran AG, Tosi S, Gallego O, Calvo O, Fernandez-Tornero C.

eLife Mar.; 6: e20832.



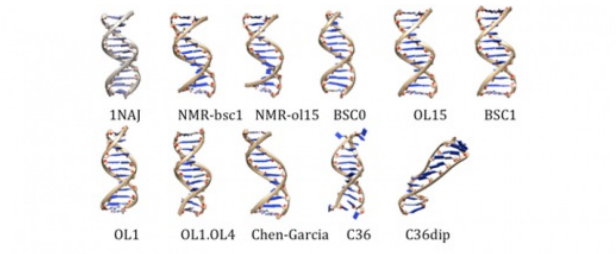
Gallego...Eritja {Adv Mater 29: 1603233}

HIGHLIGHTS2017 / MAR. 2017

DNA-Origami-Driven Lithography for Patterning on Gold Surfaces with Sub-10 nm Resolution

Gallego I, Manning B, Prades JD, Mir M, Samitier J, Eritja R.

Adv Mater 2017 Mar.; 29: 1603233.



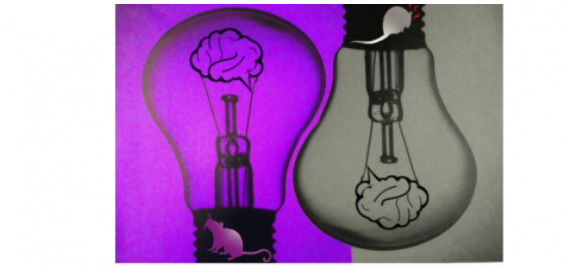
Dans...Orozco {*Nucleic Acids Res* 45: 4217}

APR. 2017 / HIGHLIGHTS2017

How accurate are accurate force-fields for B-DNA

Dans PD, Ivani I, Hospital A, Portella G, Gonzalez C, Orozco M.

Nucleic Acids Res 2017 Apr.; 45: 4217.



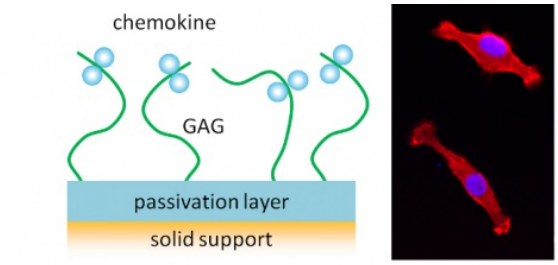
Font...Ciruela {*eLife* 6: e23545}

APR. 2017 / HIGHLIGHTS2017

Optical control of pain in vivo with a photoactive mGlu5 receptor negative allosteric modulator

Font J, Lopez-Cano M, Notartomaso S, Scarselli P, Di Pietro P, Bresoli-Obach R, Battaglia G, Malhaire F, Rovira X, Catena J, Ciruela F.

eLife Apr.; 6: e23545.



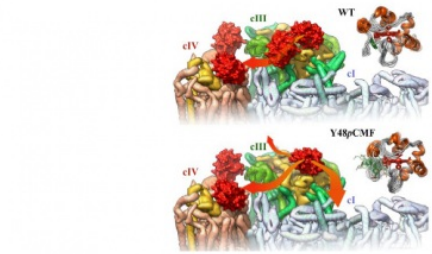
Thakar...Richter {*Biomaterials* 123: 24}

APR. 2017 / HIGHLIGHTS2017

Binding of the chemokine CXCL12alpha to its natural extracellular matrix ligand heparan sulfate enables myoblast adhesion and facilitates cell motility

Thakar D, Dalonneau F, Migliorini E, Lortat-Jacob H, Boturyn D, Albiges-Rizo C, Coche-Guerente L, Picart C, Richter RP.

Biomaterials 2017 Apr.; 123: 24.



Moreno-Beltrán... Diaz-Moreno {*Proc Natl Acad Sci USA* 114: E3041}

APR. 2017 / HIGHLIGHTS2017

Structural basis of mitochondrial dysfunction in response to cytochrome c phosphorylation at tyrosine 48

Moreno-Beltran B, Guerra-Castellano A, Diaz-Quintana A, Del Conte R, Garcia-Maurino SM, Diaz-Moreno S, Gonzalez-Arzola K, Santos-Ocana C, Velazquez-Campoy A, De la Rosa MA, Diaz-Moreno I.

Proc Natl Acad Sci U S A 2017 Apr.; 114: E3041.

Biofísica Magazine

CATEGORY: EVENTS

Upcoming Meetings, Courses and Workshops

COURSES / EVENTS 17/05/2017

XII “Manuel Rico” NMR School

Jaca, Huesca (Spain), Sunday 18 June to Friday 23 June 2017 . Throughout its editions, this wellestablished course organized by the specialized Nuclear Magnetic Resonance...

AWARDS / EVENTS / MEETINGS / NEWS / NOMINATIONS / SBE PRIZES

07/05/2017

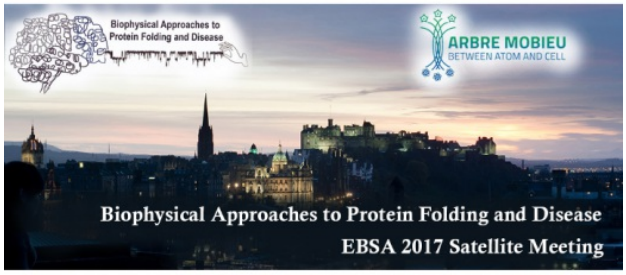
16th SBE Congress

Annual Meeting of the Spanish Biophysical Society. June 6 – 8, 2017, Sevilla (Spain). Presentation On behalf of the Organizing Committee, it is a great...

COURSES / EVENTS 08/04/2017

15th International School of Biological Magnetic Resonance

Ettore Majorana Centre, Erice Sicily (Italy), May 20th – 28th 2017 . This course focuses on recent advances in molecular biophysics and structural biology, as...



EVENTS / MEETINGS 23/03/2017

Biophysical Approaches to Protein Folding and Disease

EBSA 2017 Satellite Meeting Edinburgh International Conference Centre, 20th – 21st July 2017, Edinburgh (UK) Deadline for abstract consideration for a short oral presentation: 20th April 2017....

EVENTS / MEETINGS 19/02/2017

IUBMB Focused Meeting on Molecular Aspects of Aging and Longevity

October 16 – 19, 2017, Athens (Greece). Deadlines May 1st, 2017. Abstract submission May 1st, 2017. Fellowships June 1st, 2017. Early registration Aging is an...

EVENTS / MEETINGS 18/02/2017

Conformational Ensembles from Experimental Data and Computer Simulations

August 25 – 29, 2017, Berlin (Germany). Deadlines May 1st, 2017. Early registration This meeting aims to bring together scientists from across disciplines to advance...

EVENTS / MEETINGS 07/01/2017

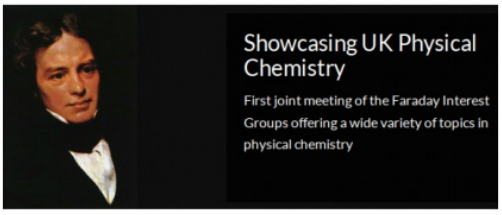
42nd FEBS Congress

September 10 – 14, 2017, Jerusalem (Israel). Deadlines June 1st, 2017. Early registration The FEBS Congress aims to provide an outstanding international forum in the...

COURSES / EVENTS 14/11/2016

Lecture course on “Ion Channels and Transporters”

FEBS/EMBO lecture course May 14 – 20, 2017, Erice (Italy). Deadlines March 15th, 2017. Registration The FEBS/EMBO lecture course on “Ion Channels and Transporters” has...



EVENTS / MEETINGS 26/12/2016

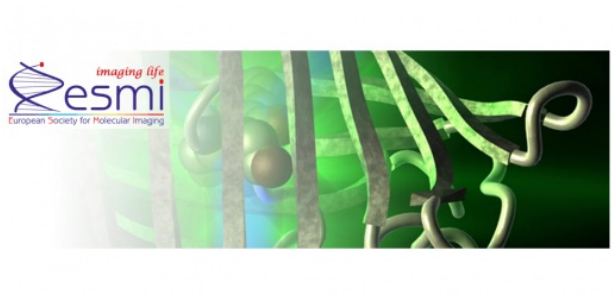
Faraday Joint Interest Group Conference 2017

Joint meeting of RSC Faraday interest groups, including Biophysical Chemistry April 11 – 13, 2017, Warwick (UK). Deadlines March 14th, 2017. Registration for those wishing...

EVENTS / WORKSHOPS 14/11/2016

Advances in Single-Molecule Research for Biology & Nanoscience

XIX. Annual Linz Winter Workshop February 3 – 6, 2017, Linz (Austria). Deadlines October 15th, 2016. Early registration December 1st, 2016. Registration and abstract submission...



EVENTS / MEETINGS 24/10/2016

12th European Molecular Imaging Meeting – EMIM

April 5 – 7, 2017, Cologne (Germany). Deadlines January 11st, 2017. Abstract submission February 14th, 2017. Early registration What you can expect: It's all about...

EVENTS / WORKSHOPS 24/10/2016

1st Biology for Physics Conference: Is there new Physics in Living Matter?

DPL Workshop January 15 – 18, 2017, Barcelona (Spain). Deadlines December 11th, 2016 (extended). Abstract submission January 8th, 2016. Registration The workshop aims to bring...

EVENTS / MEETINGS 14/09/2016

61st BPS Annual Meeting

61st Biophysical Society Annual Meeting. February 11 – 15, 2017, New Orleans, Louisiana (USA). Deadlines January 9, 2017. End of early bird registration October 3,...

COURSES / EVENTS 07/06/2016

Winter School: Biology at different scales

Winter School in Les Houches, France March 13 – 25 2017 The school will focus on the interplay between physics and biology to understand biological...

Biofísica Magazine

CATEGORY: JOBS

Positions in Biophysics

JOBS / POSTDOC 17/05/2017

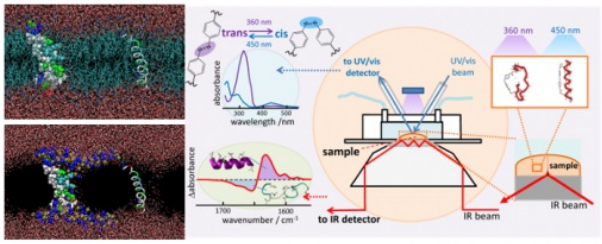
Postdoctoral position in protein design

The hosting place is the Proteolysis Lab of the Structural Biology Unit – SBU from the Spanish Research Council – CSIC in Barcelona (Spain) offers...

CALLS / INTERNSHIP 08/03/2017

Cicerone: Summer Internship Program at CNIC

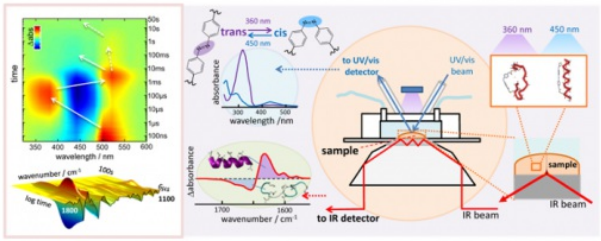
The aim of the program is to give university students first-hand knowledge of biomedical research so that they can make more informed choices about the...



JOBS / POSTDOC 29/01/2017

Postdoc Position: Optical control of photoswitchable membrane peptides

2 years postdoc position The Biomembranes group at the Institute of Molecular Science – ICMol (Universitat de València) offers a 2-years postdoctoral position within the...



FELLOWSHIPS / FPI / JOBS / PREDOC 29/01/2017

Predoc Position: Optical control of photoswitchable membrane peptides

4 years Ph.D. position funded by FPI-MINECO The Biomembranes group at the Institute of Molecular Science – ICMol (Universitat de València) offers a 4-years predoctoral...

JOBS / POSTDOC 18/01/2017

Postdoc position on cellular membrane biology and biotechnology

The Endocytic Trafficking and Intracellular Delivery team in the the Chemical Biology Department of the Institut Curie in Paris (France) is recruiting a post-doctoral researcher...

JOBS / POSTDOC 17/01/2017

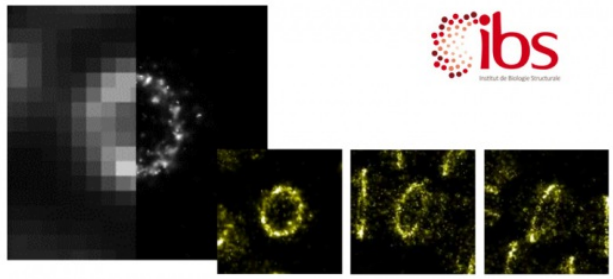
Posdoctoral Position in METABOLOMICS

Funded by MINECO Grant RTC-2016-5239-2 Topic: Metabolomics for the improvement of organoleptic quality in organic agriculture. The work will be performed at the University of...

JOBS / POSTDOC 17/01/2017

Postdoctoral Positions in Biomolecular Simulations

Postdoctoral positions funded by the ANR @RAction program within the project Multiscale Modeling of Biomolecular, to work at the Centre de Biochimie Structurale (IBS) Montpellier...



JOBS / POSTDOC 17/01/2017

3-year post-doctoral position: Super-resolution imaging of bacterial division

Applications are opened for a postdoctoral position at the Pneumococcus group – Institut de Biologie Structurale (IBS) – UMR5075 (CNRS/CEA/UGA), Grenoble (France) Bacterial cell division...