VNIVERSITAT DE VALÈNCIA

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Research Development Innovation Aplication Issue n.6

SCIENCE PARK, *WORK IN PROGRESS*

Next to the Research Institutes of the Burjassot-Paterna campus, the Science Park of Valencia University (PCUV - Parque Científico de la Universitat de València) started operating a year ago with the arrival of new companies and spin-offs, making up the first university company nursery of Valencia. At present, the Park caters for 23 companies working in a setting of academic research. In fact, some of them are the result of research. They are forged with the help of the institution that saw their creation, namely the University of Valencia. Others came to the PCUV to either share common scientific interests or to start operating with the support and guarantees offered by this great centre of innovation. At present, the Science Park covers a 45,000 m2 area in a 200,000 m2 plot of land and is open to further growth and to the future in an academic-entrepreneurial organisation which employs more than 1,000 people and where the transfer of knowledge enables the development and market launch of very different technology and science-based products. The establishment in the Park of Biopolis a few months ago –the first consolidated biotechnology company with a head office at PCUV- meant a step ahead for the University in their progress towards the fulfilment of the goal of becoming an engine of socioeconomic growth. Several strong corporations have already settled down at the Park and the application forms submitted by others to be able to move to the Park's premises are abundant. Some of them have already placed their logos in the rooms of the largest business block, one of the pillars of the Science Park of Universitat de València.

The photograph features the spectacular papier-mâché dolphin exhibited at the entrance hall. It was taken on the 2009 Expociencia Open Day, held in May. More than 2,000 people from the university community attended.

IFIC BRINGS TOGETHER INTERNATIONAL EXPERTS ON MEDICAL PHYSICS

Jointly run by the Higher Council of Scientific Research (CSIC, Consejo Superior de Investigaciones Científicas) and Valencia University, the Institute of Corpuscular Physics (IFIC, Instituto de Física Corpuscular) organised the Symposium IFIMED'09, a conference in which the latest developments in imaging and accelerators with medical applications were presented to the industry and the health care system. These areas are crucial to the commissioning of the Institute of Medical Physics (IFIMED, Instituto de Física Médica) –the first proton therapy centre- to be opened in short by Universitat de València and CSIC.

The conference's main goal was to bring together existing research groups working on imaging and accelerators for medicine, the industry and the health care system.

Supported by IFIC, the future Institute of Medical Physics will become a national reference in this area and will develop new techniques and technologies for future accelerators transferrable to the medical and industrial sectors, as well as research on imaging for diagnostic purposes through the development of radiation detection systems. Additionally, IFIMED shall offer a pioneering proton-therapy service in Spain for the treatment of cancer, with a cyclotron-type accelerator with 200 million electron volts.

Parallel to the conference, the European PARTNER-IFIC training course was delivered to medical physics students, and the first ENLIGHT-PARTNER meeting of the European Network of Medical Physics Centres was held. These events took place at the conference hall of the Science Park of Valencia University.

NASA LAUNCHES A EUROPEAN SOLAR OBSERVATORY PARTLY BUILT BY UNIVERSITAT DE VALÈNCIA

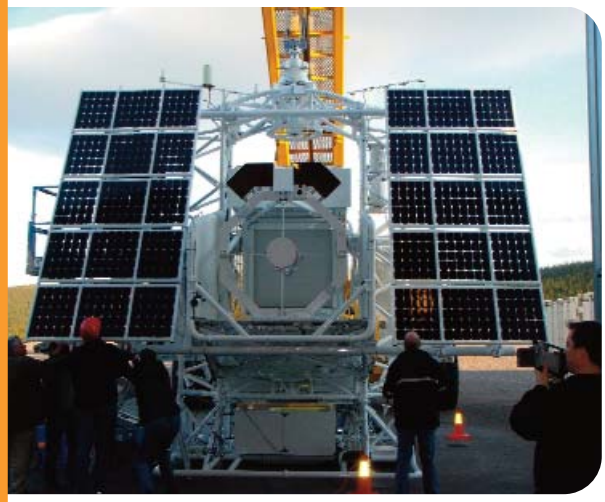
NASA has just sent into space a solar observatory intended to study the sun's magnetic field. The observatory –named SUNRISE- is basically a telescope with a spectrometer/magnetograph. It travelled attached to a NASA balloon in a mission of the programme Long Duration Balloon (LDB) launched from Kiruna, in the north of Sweden, where the sun does not set in summer. The telescope has a 1m opening and includes instruments to take pictures in different wave lengths that will allow scientists to study the properties of the sun's surface where solar phenomena affecting our planet take place.

One of those instruments, the IMaX (Imaging Magnetographic Imager) was built by a Spanish institute partnership consisting of the Astronomy and Space Science Group of the University of Valencia, represented by Vicente Domingo Codoñer (IP) and José L. Gasent, the Astrophysics Institute of the Canary Islands –the project leader-, the Astrophysics Institute of Andalusia and the National Institute of Aerospace Technology. IMaX takes spectroscopy and polarimetry measurements, producing the best magnetograms to date with an unprecedented resolution.

Getting to know the structures of the Sun's magnetic field is fundamental to interpreting and even predicting its behaviour. The balloon flew during five days at 40,000 feet with almost no atmospheric pressure, travelling from Kiruna (Sweden) to Victoria Island (Canada), where it landed. It took images of the sun that have now been made available to the project's researchers.

The main telescope and the programme are run by the Max-Planck Institut für Sonnensystemforschung (MPS) of Lundau (Germany). They developed one of the instruments, SUFI. The third one -CWS- was developed by the Kiepenheuer-Institut für Sonnenphysik (KIS) of Fribourg (Germany).

The other institutes that take part in the project are HAO/NCAR from Boulder (Colorado, US), the Polytechnic University of Madrid (IDR/UM), the LMSAL of Palo Alto (US) and scientists from other international centres.



The SUNRISE being installed on the NASA balloon

THE ASTRONOMY AND SPACE CCIENCE GROUP OF VALENCIA UNIVERSITY HAS PARTICIPATED IN THE CONSTRUCTIONS OF IMAX, THE MOST COMPLEX INSTRUMENT OF THE SUNRISE MISSION

THE SPANISH TYPE CULTURE COLLECTION (CECT) TO BECOME A CENTRE OF MICROBIAL BIOLOGICAL RESOURCES

The Spanish Type Culture Collection (CECT, Colección Española de Cultivos Tipo) of Universitat de València will be accredited as a Centre of Microbial Biological Resources at the service of industrial microbiology and microbial biotechnology, following the implementation of specific quality standards

for Biological Resource Centres. The CECT is a collection set up in 1960. It maintains and supplies the research community, companies and different types of public laboratories with bacteria, filamentous fungi and yeasts. Biological Resource Centres (BRCs) preserve and make the most of microbial biodiversity. They are key elements in the system underpinning current research in each field, microbiology in this case. These specialised centres accept, validate, study and distribute living organisms and organism structures that can be replicated, conforming to strict quality standards and traceability rules, and they also maintain the databases of the collections. Reaching MBRC status involves fulfilling a number of duties specified by the OECD for Biological Resource Centres: to preserve biodiversity; to carry out R&D activities on the biological resources maintained; to act as repositories of biological resources in order to protect intellectual property; to preserve and supply biological resources for R&D activities of a scientific, industrial, agricultural, environmental and medical nature, and their applications; to store data and resources for public purposes and for the development of new research lines; and to operate on the basis of international quality criteria. Operating since 1992 as an International Microorganism Depositary Authority for patent purposes as per the Budapest Treaty, CECT conforms to international quality standards (ISO, 9000 series). In 2004 the Collection

CECT has been an International Depositary Authority (IDA) under the Budapest Treaty for patent purposes since 1992

was certified for ISO 9001:2000 for the preparation, sale and distribution of microbial cultures, subsequently renewed. In December 2008 it passed an audit for ISO 9001:2008. CECT currently participates in the development of specific international quality standards to be applied to collections/BRCs within the framework of two European and international initiatives. Fostered by the German government, the first one –Demonstration Project on a Global Biological Resource Centres Network (GRBCN)- lays down regulations on a worldwide basis. The second one is the European Consortium for Microbial Resource Centres (EMbaRC) under FP7 of the EU Capacities Specific Programme-Research Infrastructures. Participating in the initiatives will enable CECT to reach MBRC status in short, based on compliance with quality guidelines published in 2007 by the OECD to be developed by the cited projects.

A few days ago, the students of the optional course Observing planets from the threshing machine observed the Moon, Venus and Saturn, live and via the Internet, from the robotic telescope of Valencia University, Trobar, in Aras de los Olmos. This is the most spectacular picture taken in the first part of the observation session. The intense light of the radiating moon prevented the participants from watching Uranus but Venus could already be seen in the west. Later on, the sky cleared up, making possible the sighting of enigmatic Saturn, with its rings facing the Earth this time of the year.

Isabel Fariñas, PhD in Molecular Biology at the University of Valencia, received the Alberto Sols Award to the Best Scientific Project in the Health area from the Council of Sax, Alicante. The prize was shared with the biologist Óscar Marín.

Pedro Andrés Bou, PhD in Optics at the University of Valencia, has been appointed member of the Managing Board of the European Optical Society. He is the only Spanish representative in a team of 18 specialists responsible for implementing a common European platform for optical development.

PROGRESS MADE IN THE STUDY OF HUMAN GENETIC DISEASES

Geneticists from Universitat de València have taken part in a research project intended to explore human genetic diseases in general and the physiopathological mechanism of complex kidney disorders in particular. The participating professors are Rubén Artero and Amparo García, from the Department of Genetics.

According to their work, published in Nature, a cell type from the excreting system of the fly Drosophila melanogaster –the nephrocyte- is very similar, from an anatomical, molecular and functional viewpoint, to a cell type of the human kidney, the podocyte. The authors also argue that mutations in homologous genes in Drosophila result in problems equivalent to those of humans. This is the first time that evidences are found of a common evolutionary origin for both cell types.

Podocytes and nephrocytes have structures specialised in blood filtration or in the haemolympha, respectively, consisting of homologous proteins in vertebrates and the vinegar fly. The importance of these proteins lies in the effects of the mutations in the genes that code them. For instance, mutations in the human gene responsible for coding in the Nephrin protein cause the congenital nephrotic syndrome of the Finnish-type, a disease requiring a kidney transplant due to a massive loss of proteins from blood into urine leading to the death of the baby in the first year of life. The findings of this investigation will allow scientists to study this disease and other genetic conditions with a simple system from an experimental perspective.

The project is headed by the University of Cambridge in cooperation with CSIC, Heinrich-Heine-Universität, Max Planck Institute, and Valencia University, which provided different transgenic fly lines to express a human gene in Drosophila. This task was done by Arteo and García. This work line has resulted in a spin-off -Valentia Biopharma- focused on genomic research in rare diseases such as myotonic dystrophy, a hereditary muscular disease still incurable. Based in the Science Park, the company seeks a treatment to halt its degenerative process.

VALENCIA UNIVERSITY RESEARCHERS FIND A NEW CONTROL FACTOR FOR NEUROGENESIS

José Manuel García Verdugo, joint project manager

A team of researchers from Valencia and the United States have proved that the lack of one of the genes involved in neural regulation -Mixed Lineage Leukemia (MLL)- does not interfere in the differentiation towards the phenotype of the glial cell, but it does interfere in that of neural cells, seriously altering neurogenesis, that is, the production of cells in the nervous system. The study provides new data for the understanding of the biology of stem cells and their orientation towards the desired target, i.e. for a possible use in regenerative therapies.

NSCs are able to generate neurons and glial cells. "The brain needs a balance between both cell lineages" says José Manuel García Verdugo, a Valencian researcher in the project. "The presence of MML is very important when pathology exists with a shortage of neurons because, if it is not expressed, differentiation only occurs towards the phenotype of glial cells and neural proliferation disappears".

Neurogenesis is regulated by different factors and mechanisms, most of which remain unknown. Among the factors regulating neurogenesis are epigenetic mechanisms directly related to the structure of chromatin -a DNA and protein complex formed by chromosomes- which enable the expression or silencing of certain genes.

The article published in Nature describes the role of the MLL gene in the trxG family, one of the gene groups involved in chromatin remodelling. The protein that codes this gene is a histone methyltransferase that participates in neural differentiation. Obtained through in vivo transgenic models and in vitro experiments, the results of this research show that the absence of this gene does not interfere with the proliferation rate of glial cells or the differentiation towards this phenotype, whereas differentiation into neurons is severely affected. Specifically, according to the researchers' report, MLL regulates the expression of DIx2, a key regulator in neural differentiation.

> Recently published in Nature, the study provides data for a therapeutic use of neural stem cells

The project is led by Prof. Arturo Álvarez-Buylla, from the University of California, with collaboration from the universities of Stanford, Hannover and Valencia. The participation of University of Valencia, overseen by García Verdugo, is centred on the morphological characterisation of stem cells, chromatin remodelling and all the morphological changes in the neurogenic niche of the transgenic animal.

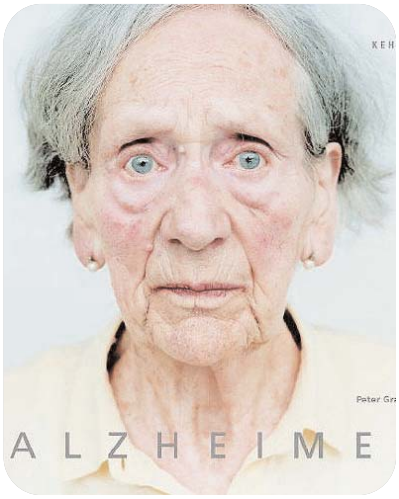
NEW DATA FOR THE STUDY OF ALZHEIMER'S DISEASE OFFERED BY UV RESEARCHERS

The research group run by José Viña, PhD, at the University of Valencia have just published in Journal of Alzheimer's Disease a paper entitled Vitamin E paradox in Alzheimer's disease: it does not prevent loss of cognition and may even be detrimental. The study reveals that, paradoxically, vitamin E –acting either as an antioxidant or not- improves cognitive skills in some patients and worsens them in others. Therefore, according to the study, vitamin E should not be indiscriminately administered to all patients with Alzheimer 's disease.

In recent years, in the Department of Physiology of the University of Valencia, Dr. Lloret, supervised by José Viña, has conducted studies on the existence of oxidative stress in Alzheimer's disease. These studies have been jointly undertaken with the Department of Neurology of Valencia University. The medical part has been carried out by Dr. Dolores Alonso and Dr. María Carmen Badía.

Firstly, studies have shown that there is oxidative stress in patients with Alzheimer's disease. Moreover, the severity of the cognitive loss is associated with the presence of increased oxidative stress that can be determined even in the blood of the patients. The obvious consequence of the presence of this oxidative stress was that the administration of antioxidant vitamins, such as vitamin E, could be useful for the treatment of Alzheimer's disease. Previous studies had shown that, indeed, some signs of the disease (other than those related to cognitive deterioration) improved partially when patients were treated with vitamin E.

The studies undertaken by Viña's group show that the administration of vitamin E cannot be indiscriminate to all patients. There is great variability in their response. Customized studies must be conducted to determine whether vitamin E will improve the patient's antioxidant status or not. Only in those patients in whom vitamin E acts as an antioxidant (it does not behave equally in everybody) improvement or at least the maintenance of cognitive functions is identified.



VITAMIN E IMPROVES COGNITIVE SKILLS IN SOME PATIENS AND WORSENS THEM IN OTHERS

However, in patients in whom this vitamin does not act as an antioxidant, it does not improve their cognitive capacity; in fact it can get worse. Thus, the paradox of vitamin E lies in the fact that in some patients, despite the existence of oxidative stress, their cognitive function may worsen. Therefore, the conclusion can be drawn that the administration of vitamin E, which can be useful in Alzheimer's disease, must not be given indiscriminately to all patients. Rather, a battery of studies on their oxidative status must be implemented to ascertain the cases in which it should be prescribed.

ACCORDING TO AN ECONOMIC STUDY, GLOBALISATION FAVOURS SOCIAL COOPERATION

According to a study published in the scientific journal PNAS (Proceedings of the National Academy of Sciences), the process of globalization could have beneficial effects for the planet as a whole. The study examines the economic decisions made by thousands of people in countries like Iran, South Africa, China, the United States, Argentina and Italy, and concludes that participation in global networks -and also exposure to them- positively determines the willingness to invest in resolving global problems, such as climate change and economic and humanitarian crises within planetary reach.

The global network that connects people who live in remote corners of the planet is causing changes in the perception of collective problems with a global dimension. Beyond their age, their participation in local social and political organisations, their level of education, their social origin and even their (urban or rural) habitat, the key variable explaining the cooperating will of individuals is their exposure to the various tentacles of the network. The more globalised the individual, the greater their availability for internalising the costs of the solutions to these problems.

The study has been developed by a multidisciplinary team of scientists from different European and American universities, and has relied on cooperation from Enrique Fatás, the director of the Research Laboratory in Experimental Economics (LINEEX, Laboratorio de Investigación en Economía Experimental) of the University of Valencia and associated lecturer at the University of Texas (Dallas, US).

The analysis has been carried out in different regions of Europe, America, Asia and Africa, based on a methodology called experimental economics, in the field of behaviour economics, a branch of economic science that has revolutionised the way to understand decision-making processes particularly in economic matters, and human behaviour in general. Feeding on social psychology, behaviour economics systematically resorts to this type of experimental observation of decisions made by different samples of the population.

EUGENIO CORONADO, NEW FELLOW OF THE ACADEMIA EUROPAEA

The Professor of Inorganic Chemistry of the University of Valencia Eugenio Coronado has been appointed member of Academia Europaea, in its chemistry section. He is the first researcher from the University of Valencia and the fifth Spanish chemist to become a fellow of this prestigious international organisation.

Academia Europaea is a humanities and science institution born in Cambridge in 1988 as a complement to the European Science Foundation, an agency dedicated to promoting basic research in Europe. It covers 16 different fields of knowledge and more than 2,000 members, including 40 Nobel Prize awardees.

Born in Valencia in 1959, Eugenio Coronado Miralles has been a lecturer in Valencia University since 1993 and has run the Institute of Molecular Science (ICMol) of the same institution since its inception in 2000. He has a PhD in Chemistry by this University and has a doctorate in Physics by the Louis Pasteur University in Strasbourg. His research focuses on the design and synthesis of new molecular materials with magnetic, electrical and optical properties. The results of his work are reflected in more than 400 articles in international scientific journals of chemistry and materials science, and some 30 review papers.

His research career in the field of molecular magnetism has earned him different awards. As national scientific distinctions, he was awarded the Prize Rey Jaime I for Research in New Technologies in 2003, and the National Science and Technology Research Prize Rey Juan Carlos I in 1997, apart from having recently been distinguished with the Award for Research and the Gold Medal of the Spanish Royal Society of Chemistry, the maximum award given by this institution dedicated to promoting, developing and disseminating the chemistry discipline.

According to the Web of knowledge, Eugenio Coronado is one of the most cited Spanish chemists in international scientific publications. With his appointment as a member of Academia Europaea, the University of Valencia sees its name included in this prestigious institution for the first time

At the international level he has been distinguished with the Van Arkel Professorship by the University of Leiden, in 2003, and since 2004 he is a fellow of the Royal Society of Chemistry of England.

Eugenio Coronado is one of the most cited Spanish chemists in international scientific publications along the years, as reflected in the last update of the Essential Science Indicator of the ISI Web of knowledge - the most recognised digital research platform worldwide. With his appointment as a member of Academia Europaea, the University of Valencia sees its name included for the first time in this prestigious institution.

DEMETRIO RIBES TRANSPORT RESEARCH AWARDS

The Demetrius Ribes Professorship -an initiative of the University of Valencia and Ferrocarrils de la Generalitat Valenciana- has made a call for proposals for the 6th edition of its research awards. The authors of unpublished research and graduates of any academic discipline are eligible. The proposals shall not be economically sponsored by companies or private institutions and will have to deal with research issues relating to the history of transport (land, air or sea), the history of civil works, civil engineering, or regional planning. The deadline for project submission is 15 September. More information on http://www.museodeltransporte.com//archivos/noticias/pdfs//Premio_06-2009-bases_154.pdf.

Created in 2003, the Demetrius Ribes Professorship aims to develop and implement the future Museum of Transport and Planning in the Valencian Community. Its constitution within the University provides this cultural project with the necessary scientific basis to create a lively and dynamic museum.

Thus, the Professorship is configured as a centre for research, training and dissemination on the history of transport, public works and regional planning in Valencia. Among its main activities, the Demetri Ribes Professorship undertakes research projects and technical reports on heritage assessment; organises cultural activities -seminars, congresses, conferences; and carries out teaching activities via university extension actions, seminars and masters courses.

IDEA AWARDS FOR TWO RESEARCHERS FROM UNIVERSITAT DE VALÈNCIA

Vasiliki Mitsou and Elena Martínez, University of Valencia researchers, have received the Award 'An Idea for the Future' in the categories of Basic Sciences and Social Sciences, Communication, Art and Humanities, respectively. These awards are granted by the Foundation Ciudad de las Artes y las Ciencias.

Vasiliki Mitsou's work is entitled The LHC accelerator and the Cosmos, connected through Dark Matter. Mitsou is a Ramón y Cajal researcher in the experimental unit of the Institute of Corpuscular Physics (IFIC, Instituto de Física Corpuscular), where she participates in the ATLAS experiment installed on the Accelerator of the CERN, the European Laboratory for Particle Physics.

Elena Martínez García is a professor of administrative and procedural law at the law school of Valencia University. Her award-winning project is the Centre for the prevention and eradication of gender-based violence. Elena Martínez directs the Interdisciplinary Research Group on gender-based violence of the University of Valencia, composed of lecturers of law, communication sciences and educational science.

Among other articles, she has published Protocols on gender violence, Gender violence and media, Judicial guardianship in gender violence, and The new act against gender violence.

The Idea Awards are aimed at young lecturers and researchers, creators and experts in communication, under the age of 40 and attached to one of the universities, research centres or technological institutes in the Valencian Community. They are meant to encourage and promote the knowledge of science, technology and art.

Apart from the Idea Prize as such, the award-winning professors received a commemorative diploma and five thousand Euros each.

UNIVERSITAT DE VALÈNCIA AND CSIC RECEIVE INTERNATIONAL PRIZE FOR GRAVITATION STUDY

A team of researchers from the University of Valencia and the CSIC has received one of the five International Awards on Gravitation, annually granted by the Gravity Research Foundation of Massachusetts, USA. The paper submitted by Ivan Agulló, José Navarro-Salas, Gonzalo J. Olmo and Leonard Parker proposes a new way of calculating the influence of quantum fluctuations in the very primitive universe -prior to the Big Bang- on current anisotropies present in the cosmic microwave background. The study modifies the theoretical prediction of the influence of gravitation before of Big Bang on the cosmic microwave background. The theoretical calculations presented in the study will be soon compared to observational data currently captured by the Planck satellite ESA, whose primary mission is to detect and study with high precision the very small temperature variations in the cosmic background to be able to compare physical theories about the origin and the first moments of the universe.

AMPARO MAÑÉS, HEAD OF THE ANALYSIS AND PLANNING SERVICE

Amparo Mañés Barbé has run the Analysis and Planning Service of the University of Valencia since 1998. This university section provides technical support and advice for decision making. Under the supervision of Mañés, a team of eight people work on different projects which, in recent times, have gone from the development of the Strategic Plan and its indicator system for follow-up to the analysis of the scientific production of the Valencian University System (SUV) and the preparation of studies and reports on doctorate programmes or research productivity of lecturers and researchers, to give just a few examples.

The Service's wider objective is to provide all decision-making bodies with relevant and timely information with a view to improving university work.

She has a degree in philosophy and educational science-psychology (UV) and a master's degree in quality management by UNED, the Spanish Open University.

She was the former bursar of the College of Philosophy and Chief of the Economic Management Section in the university's central services, but it was surely her fourteen years as Deputy Manager of the institution that forged her background as an expert in university management.

CHEMISTRY, PHYSICS, CLINICAL MEDICINE AND NEUROSCIENCE AT UNIVERSITAT, AREAS OF MAXIMUM INTERNATIONAL IMPACT

The ISI Web of Knowledge in its Essential Science Indicator highlights thirteen areas of the University of Valencia in its rankings of most cited researchers in international scientific publications. In general, these areas include researchers whose works are frequently cited, which positions their work field on the list, with the University of Valencia ranking among the 300 most cited institutions worldwide and ranking third in the list of Spanish universities.

The rank is headed by chemistry, with researchers like Francisco Lloret, Eugenio Coronado or Miguel Julve, whose works in the field of molecular science places them among the first 1,000 chemists out of the almost 7,000 mentioned by the rank worldwide. Nine more chemists from the University of Valencia are also mentioned by the list.

Next on the list is physics, with three researchers from the IFIC, in the field of matter elementary constituents: Juan J. Hernández Rey, JWF Valle and Eulogio Oset. It is followed by clinical medicine, with Josep Redón, from the Department of Medicine, and José Manuel García Verdugo, who works on clinical aspects and neuroscience conducting studies about neurogenesis in the adult brain.

> La Universitat de València es la tercera universidad española más citada del mundo en publicaciones científicas de referencia

The list continues with biology and biochemistry, the science of plants and animals, microbiology, pharmacology and toxicology, engineering, psychiatry and psychology, agricultural science, materials science, ecology and the environment.

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UNIVERSITAT DE VALÈNCIA ON THE LEAD OF QUALITY IN MOLECULAR BIOLOGY AND GENETICS

A recent article published by César Nombela PhD in the journal of the Spanish Society for Biochemistry and Molecular Biology reported on a study commissioned by the CSIC to the prestigious independent organisation ISI-Thomson about the quality and quantity of the publications of several Spanish public centres. In the study, the University of Valencia stands out for the quality of its publications in the field of molecular biology and genetics. According to the survey, the relative index of quality of the published articles - which measures the number of times that a paper is cited in other publications, taking into account all the articles published in the same area worldwide (the average score is 1) - shows that the quality of the publications of the University of Valencia has experienced a sevenfold increase in recent years (from a value of 0.18 in 1981 up to 1.3 in 2003).

In this way the University of Valencia has exceeded all Spanish universities included in the study, and even CSIC, thus being on the lead of research quality in this area.

Although the final data refer to 2003 -as these rates vary slowly and depend on citations of many years- the improvement trend seems to have remained in subsequent years.

For the whole of the scientific areas analysed, the University has also increased in comparison with the rest of Spain, but the rise in the area of genetics and molecular biology is the highest.