

ISSN 2027-1352 (online version)  
ISSN 0122-7483 (printed version)

Universitas.

# Scientiarum

Vol. 20 No. 2 May - August of 2015



Brocoli - 3D Tree Fractal - Paul Nylander - www.bugman123.com



Pontificia Universidad  
**JAVERIANA**  
Bogotá

Revista de Ciencias / Journal of Sciences / Journal das Ciencias  
<http://ciencias.javeriana.edu.co/investigacion/universitas-scientiarum>



*Universitas Scientiarum* (Univ. Sci.) (ISSN 0122-7483 printed version; ISSN 2027-1352 online version), was founded in 1987 by the Faculty of Science of the Pontificia Universidad Javeriana, Bogotá, Colombia. It is an Open Access, multidisciplinary, peer-reviewed Journal, directed to researchers in the exact and natural sciences.

The objective of our journal is to contribute original theoretical and practical knowledge to promote the understanding necessary to resolve environmental and health problems within a Latin-American context.

The journal has a distinguished editorial board composed of 70 Ph.D. leading researchers in different fields from around the world (20 countries).

*Universitas Scientiarum* publishes original articles, short communications, reviews, mini-reviews (meta-analysis, reviews of methods and concepts), methods articles, and book reviews. The journal accepts manuscripts in English.

### Advantages of publishing with us:

Unrestricted open access

First on-line (article is published as soon as it is accepted)

Fast review processing (***the time from submission to first on-line publication is less than three months***)

High quality peer-review

No page charges

Free PDF

Color page free of charge

Free, limited, paper reprints

Paper citation update (analytics)

The journal is indexed and referenced in SciELO Citation Index– ISI Web of Knowledge – Thomson Reuters, Scopus (Q3), Google Academic, ASFA, ZOOLOGICAL RECORDS, ULRICHSWEB, INDEX COPERNICUS, Chemical Abstracts Service (CAS), Directory of Open Access Journals (DOAJ), Periódica, Academia, HINARI, AGORA, SciELO, Latindex, Redalyc, e-revist@s, LILACS, Sherpa/Romeo, National Bibliographic Index (Publindex, A2), OAJI Open Academic Journals Index, ExLibris Primo Central, Electronic Journals Library (EZ3), Aquatic Commons, OARE Research in the Environment, NLM Catalog, NewJour and Zenodo. *Universitas Scientiarum* is ranked fifth among Latin American multidisciplinary journals.

Every paper submitted is subjected to international peer-review by experts in each discipline. In order to provide the highest publication quality, once a manuscript has been accepted for publication, it will undergo free language copyediting, typesetting, and reference validation.

The journal is printed three times a year (April, August and December); however, every paper is published, as first on line, once it has been accepted (open access).

All submissions are processed online through the management and publishing Open Journal System (OJS).

For further information please contact us at:

[scientiarum@javeriana.edu.co](mailto:scientiarum@javeriana.edu.co)

To submit a manuscript enter to:

<http://ciencias.javeriana.edu.co/investigacion/universitas-scientiarum>

Articles are available instantly and permanently on line for all readers, at no charge. No embargos apply.



Green Open Access Journal: The author can use the publisher's or published PDF version on their personal or their institution's web page or in a noncommercial repository. The journal has no processing fees for authors (no publication charge for page, color figures, processing, hosting, or PDF use).

**Address:** Oficina 627, Edificio 52 Carlos Ortíz,  
Carrera 7 No 43-82, Bogotá, Colombia, Suramérica.  
Tel: 57-1-3208320 ext 4159. Fax 57-1-3208320 ext 4070.



*Universitas Scientiarum* is registered under a Creative Commons Attribution 4.0 International Public License. Thus, this work may be reproduced, distributed, and publicly shared in digital format, as long as the names of the authors and Pontificia Universidad Javeriana are acknowledged. Others are allowed to quote, adapt, transform, auto-archive, republish, and create based on this material, for any purpose (even commercial ones), provided the authorship is duly acknowledged, a link to the original work is provided, and it is specified if changes have been made. Pontificia Universidad Javeriana does not hold the rights of published works and the authors are solely responsible for the contents of their works; they keep the moral, intellectual, privacy, and publicity rights.

Approving the intervention of the work (review, copy-editing, translation, layout) and the following outreach, are granted through an use license and not through an assignment of rights. This means the journal and Pontificia Universidad Javeriana cannot be held responsible for any ethical malpractice by the authors. As a consequence of the protection granted by the use license, the journal is not required to publish recantations or modify information already published, unless the errata stems from the editorial management process. Publishing contents in this journal does not generate royalties for contributors.

*Universitas Scientiarum* encourages authors to submit high quality, original, interdisciplinary and multidisciplinary research papers in the exact and natural sciences, within a broad variety of disciplines and topics:

**Mathematics and statistics**

**Bioinformatics and modeling**

**Information and computer sciences**

**Physics**

Material science

**Chemistry**

Organic chemistry

Natural products and

Medicinal plants

Inorganic chemistry

Analytic chemistry

Phytochemistry

Chemical biology

**Biochemistry**

Neuroscience

Human biochemistry

Clinical biochemistry

**Biology**

Cell biology and cancer

Morphology, physiology and behavior

Stem cell research

Zoology, Botany

**Natural history**

Life histories

**Genetics and Evolution**

Molecular biology

Population genetics

Molecular systematics

Microorganism genetics

**Taxonomy and Systematics**

**Biodiversity**

Ornithology

Entomology

Herpetology

Ichthyology

Mastozoology

**Biogeography**

**Ecology**

Population ecology

Conservation biology

Community ecology

Ecosystem ecology

Landscape ecology

Global change ecology

Monitoring

Plant ecology

Ecological niche

Dispersal and connectivity ecology

**Conservation biology**

Management

**Marine Sciences**

Oceanography

Marine ecology

Coral reefs and management

Coral reproduction and recruitment

**Limnology**

**Agricultural entomology**

**Land sciences**

**Geology**

Geochemistry

**Biomedical sciences**

Epidemiology

**Microbiology**

Applied microbiology

Intracellular bacteria

Antimicrobial resistance

Clinical microbiology

Virology

Environmental microbiology

Soil and water microbiology

**Immunology**

**Parasitology**

**Infectious diseases**

Protozoan diseases

**Nutrition sciences**

Food quality

Food chemistry

Health and nutrition

Clinical nutrition

**Biotechnology**

Environmental biotechnology

Soil and water treatment

Microbial biotechnology

**Veterinary**

**Multidisciplinary sciences**

(i.e. Astronomy)

Rejection rate: 65%



THOMSON  
REUTERS

SciELO Citation Index

Connections to the broader global

**Scopus** Zoological Record

COS<sup>®</sup>

A division of the American Chemical Society



OAJI  
.net

Open Academic  
Journals Index

INDEX COPERNICUS  
INTERNATIONAL



LILACS

Google<sup>TM</sup>  
Académico

re<sup>alyc</sup>  
BETA

e-revist@s

ULRICH'S WEB<sup>™</sup>

GLOBAL SERIALS DIRECTORY

SciELO

Scientific Electronic Library Online



Publindex  
Indexación - Homologación

ExLibris  
Primo Central

AGORA  
Research in Agriculture

HINARI  
Research in Health

EZB<sup>®</sup>  
Electronic  
Journals Library

DOAJ  
DIRECTORY OF  
OPEN ACCESS  
JOURNALS

SHERPA/ROMEÓ

OARE  
RESEARCH IN THE ENVIRONMENT

Aquatic Commons

NLM Catalog



Academia.edu  
share research

zenodo

Sistema Regional de Información  
en Línea para Revistas Científicas  
de América Latina y el Caribe, España y Portugal

latindex

NewJour

# *Universitas Scientiarum (Univ. Sci.)*

Vol. 20 N° 2      May -August of 2015

Available on:

<http://ciencias.javeriana.edu.co/investigacion/universitas-scientiarum>

---

Editor-in-Chief	Alberto Acosta, Ph.D. Juan Carlos Salcedo Reyes, Ph.D. Pontificia Universidad Javeriana	Editorial Assistant	Nayade Cortés Chong Luz Teresa Valderrama, M.Sc.
Editorial committee	Carlos Sarmiento, Ph.D. Universidad Nacional de Colombia Colombia  Eric Treml, Ph.D. University of Melbourne Australia  Erick C. Franklin, Ph.D. Hawaii Institute of Marine Biology USA  Jhon Mario González, Ph.D. Universidad de los Andes Colombia  Rubem Carlos A. Guedes, Ph.D. Universidade Federal de Pernambuco Brasil  Wanzhi Cai, Ph.D. China Agricultural University China	Design and diagramation  Proofreader  English revision  Portuguese revision  Editorial Secretariat  Sena Passant  Printed in  Cover picture	Marly Rincón López Martha Vallejo, M.Sc.  Catalina Rojas Valderrama Jorge Fernández, M.Sc. Sandra Constantino, M.Sc. Gypsy Español (T&T)  Humberto Gil Silva Rafeiro, Ph.D. Geison Modesti Costa, Ph.D.  Mayra Alejandra Roa Ordeñez Jorge Leonardo Castro Molina  Fernando Alexander Guaman C.  Editorial Letras y Libros SAS Carrera 70 No. 65A - 61 Ofc 221 Bogotá - Colombia  Full cover 3D Tree Fractal – Paul Nylander <a href="http://www.bugman123.com">www.bugman123.com</a>



Pontificia Universidad  
**JAVERIANA**  
Bogotá

Rector  
Vicerrector Académico  
Vicerrectora de Investigación:  
Secretario General  
Decana Académica Facultad de Ciencias  
Jorge Humberto Peláez Piedrahita, S.J.  
Ing. Luis David Prieto Martínez  
Dra. Consuelo Uribe Mallarino  
Dr. Jairo Humberto Cifuentes Madrid  
Concepción Puerta B., Ph.D.

## SCIENTIFIC COMMITTEE - ASSOCIATE EDITORS

---

Alexander Meskhi, Ph.D., D.Sc.

*Mathematics*

A. Razmadze Mathematical Institute  
- Academy of Sciences  
alex72meskhi@yahoo.com

Georgia 

Antonio R. Quesada, Ph.D.

*Mathematics*

University of Akron  
aquesada@uakron.edu  
USA 

Carlos L. Armando Cespedes Acuña

*Chemistry of Natural Products, Chemical Ecology, Natural Insecticides-Herbicides*  
Universidad Del Bío-Bío, Chile  
cespedes.leonardo@gmail.com  
Chile 

Elvira María Alvarado Ch, Ph.D.

*Ecology, Coral reproduction and Recruitment*  
Universidad Jorge Tadeo Lozano  
elvaradochacon@gmail.com

Colombia 

Eric Treml, Ph.D.

*Connectivity, Spatial analysis, Graph theory, Modeling, and Dispersal*  
University of Melbourne  
etreml@unimelb.edu.au

Australia 

Fredd Joop, Ph.D.

*Ecology, Modelling, Complex Systems*  
Justus Liebig-Universität Gießen  
Fred.Jopp@allzool.bio.uni-giessen.de

Alemania 

Gabino Garrido Garrido, Ph.D.

*Pharmaceutical Sciences, cardiovascular, inflammation, pain and natural products.* Universidad Católica del Norte  
gabinocd@yahoo.com

Chile 

George Barreto, Ph.D.

*Neuroscience*  
Pontificia Universidad Javeriana  
gsampaio@javeriana.edu.co

Colombia 

Igor Dimitri Forero, Ph.D.

*Entomology, Biodiversity, Systematics, Evolution, Biogeography*  
Pontificia Universidad Javeriana  
forero-i@javeriana.edu.co

Colombia 

Ismael Samudio, Ph.D.

*Terry Fox Laboratory*  
British Columbia Cancer Agency  
ismael.samudio@gmail.com

Canada 

James M. Mair, Ph.D.

*Marine biology*

Heriot-Watt University  
j.m.mair@hw.ac.uk  
Escocia 

José Pastor Giménez Q., Ph.D.

*Mathematics*

Universidad de los Andes  
jgimenez@ula.ve  
Venezuela 

Juan C. Moreno Piraján, Ph.D.

*Chemistry*

Universidad de los Andes  
jumoreno@uniandes.edu.co  
Colombia 

León Dario Pérez Pérez, Ph.D.

*Chemistry*

Pontificia Universidad Javeriana  
leon.perez@javeriana.edu.co  
Colombia 

Luca Rastrelli, Ph.D.

*Natural products and Medicinal plants*

University of Salerno  
rastrelli@unisa.it  
Italia 

Luis Gonzalo Sequeda C., M.Sc.

*Analytic chemistry, Phytochemistry,*

*Quality systems and Food*  
Pontificia Universidad Javeriana  
lsequeda@javeriana.edu.co  
Colombia 

Manuel Ruiz, Ph.D.

*Population genetics*

Pontificia Universidad Javeriana  
mruiiz@javeriana.edu.co  
Colombia 

Maria Inés Giménez, Ph.D.

*Molecular biology and*

*Proteolysis of Haloarchaea*  
Universidad Nacional de Mar del Plata  
migimen@mdp.edu.ar  
Argentina 

Marylin E. Hidalgo Diaz, Ph.D.

*Microbiology of intracellular bacteria, Antimicrobial resistance*

Pontificia Universidad Javeriana  
hidalgo.m@javeriana.edu.co  
Colombia 

Nelson Rangel Buitrago, Ph.D.

*Geology and Land sciences*

Universidad de Cádiz (UCA)  
nelson.rangel@invemar.org.co  
España 

Norberto Chavarría Hernández, Ph.D.

*Biotecnología*

Instituto de Ciencias Agropecuarias  
norberto@uaeh.edu.mx  
México 

Pablo Sáenz Agudelo, Ph.D.

*Population genetics and Dispersal ecology*

University of Science and Technology  
Red Sea Research Center, King Abdullah  
pablo.saezaguadelo@kaust.edu.sa  
Arabia Saudita 

Raúl Poutou, Ph.D.

*Environmental biotechnology,*

*Biological treatment of water and soil*  
Pontificia Universidad Javeriana  
rpoutou@javeriana.edu.co  
Colombia 

Refugio Rodríguez V., Ph.D.

*Environmental biotechnology,*

*Biological treatment of water and soil*  
CINVESTAV-IPN  
rrodrig@cinvestav.mx  
México 

Sergio Eduardo de Carvalho Machado, Ph.D

*Psiquiatría - Neurociencia*

Universidade Federal do Rio de Janeiro  
secm80@yahoo.com.br  
USA 

Sunghoon Jung, Ph.D.

*Biodiversity, Entomology,*

*Molecular systematics, Heteroptera*  
Research Institute for Agricultural and Life Sciences,  
Seoul National University  
john23@snu.ac.kr  
Corea del Sur 

Víctor González Betancourt, Ph.D.

*Biodiversity, Natural history, Entomology*

University of Kansas  
Division of Entomology,  
Natural History Museum  
victorgonzab@gmail.com  
USA 

Victor Salceda Sacanelles, Ph.D.

*Population genetics, Drosophila,*

*Chromosomal polymorphisms, Radiation*  
Instituto Nacional de  
Investigaciones Nucleares  
victor.salceda@inin.gob.mx  
México 

Wanzhi Cai, Ph.D.

*Entomology, Agricultural entomology, Heteroptera*

China Agricultural University  
caiwz@cau.edu.cn  
China 

## SCIENTIFIC ADVISORS

---

### COLOMBIA

**Concepción Puerta Bula, Ph.D.***Biomedical sciences*

Pontificia Universidad Javeriana  
cypuerta@javeriana.edu.co

**Humberto G. Silva Rafeiro, Ph.D***Mathematics*

Pontificia Universidad Javeriana  
silva-h@javeriana.edu.co

**John Mario González, Ph.D.***Inmunology*

Universidad de los Andes  
johgonza@uniandes.edu.co

**Ludis Morales Álvarez, Ph.D.***Human biochemistry*

Pontificia Universidad Javeriana  
ludis.morales@javeriana.edu.co

**Pedro Monterrey, Ph.D.***Mathematics, Epidemiology and Statistics*

Universidad del Rosario

pedro.monterrey@urosario.edu.co

### INTERNACIONAL

**Antonio R. Quesada, Ph.D***Matematicas*

University of Akron  
aquesada@uakron.edu

USA 

**Jordi Jordana, Ph.D.***Veterinary*

Universidad Autónoma de Barcelona  
jordi.jordana@uab.cat

España 

**Blanca Estela Barragán Huertas, Ph.D.***Biotechnology*

Escuela Nacional de Ciencias Biológicas  
bbarraga59@yahoo.com

México 

**Constantino González, Ph.D.***Conservation biology, Biodiversity, Ecology*

Universidad Nacional Autónoma  
de México (UNAM)  
cgs@ibiologia.unam.mx

México 

**Enrique Martínez, Ph.D.***Ecological niche*

Universidad Nacional Autónoma  
de México (UNAM)  
emm@ibiologia.unam.mx

México 

**Fanny Guzman Quimbayo, Ph.D.***Biomedical sciences*

Universidad Católica de Valparaíso  
fanny.guzman@ucv.cl

Chile 

**Gabriel Padilla, Ph.D.***Microorganisms genetics*

Universidad de Sao Paulo  
gpadilla@icb.usp.br

Brasil 

**José Manuel Siverio, Ph.D.***Microbial biotechnology, Biochemistry*

Universidad de la Laguna

jsiverio@ull.es

España 

**Joseph Mark Shostell, Ph.D.***Biology*

Penn State University  
joseph.shostell@gmail.com

USA 

**Manuel Carlos López, Ph.D.***Biomedical sciences*

Instituto de Parasitología y Biomedicina, CSIC  
mlopez@ipb.csic.es

España 

**María Carmen Thomas Carazo, Ph.D.***Biomedical sciences, Protozoan diseases*

Instituto de Parasitología y Biomedicina, CSIC

mcthomas@ipb.csic.es

España 

## WE ACKNOWLEDGE TO THE VOL. 20 No. 2 REVIEWERS

---

Alix Elena Loaiza Salazar, Ph.D. <i>Pontificia Universidad Javeriana</i> Colombia 	María del Refugio González Ponce, M.Sc. <i>Instituto Tecnológico Superior de Irapuato</i> México 	Luis Alvarez Fernández, Ph.D. <i>Universidade do Porto</i> Portugal 
Anil K. Saikia, Ph.D. <i>Indian Institute of Technology Guwahati</i> India 	Antonio Morán Palao, Ph.D. <i>Universidad de León</i> México 	Satish Kumar, Ph.D. <i>Texas Biomedical Research Institute San Antonio</i> USA 
Carlos M. Meléndez Gómez, Ph.D. <i>Universidad Industrial de Santander</i> Colombia 	Silvia Bonetta, Ph.D. <i>Università del Piemonte Orientale</i> Italy 	Phillip E. Melton, Ph.D. <i>University of Western Australia</i> USA 
Sandra Milena Leal Pinto, Ph.D. <i>Universidad Industrial de Santander</i> Colombia 	Roberto E. Reis, Ph.D. <i>Pontificia Universidad Católica de Río Grande del Sur</i> Brazil 	Mostafa Ali Elmadawy, Ph.D. <i>Kafrelsheikh University</i> Egypt 
Sébastien Thibaudeau, Ph.D. <i>University of Poitiers</i> France 	Matthew Keefer, M.Sc. <i>University of Idaho</i> USA 	Marian M. de Pancorbo, Ph.D. <i>Universidad del País Vasco</i> Spain 
Ana Salazar, Ph.D. <i>University of Miami</i> USA 	Pablo Lehmann A., Ph.D. <i>Universidade do Vale do Rio dos Sinos</i> Brazil 	Maere Reidla, Ph.D. <i>University of Tartu</i> Estonia 
Maria del Carmen Dorca Fornell, Ph.D. <i>University of Sheffield</i> United Kingdom 	Takashi Maie, Ph.D. <i>Lynchburg College</i> USA 	Manuel Sacristán de Alva, M.Sc. <i>Universidad Nacional Autónoma de México</i> Mexico 
Gerhard Fischer, Ph.D. <i>Universidad Nacional de Colombia</i> Colombia 	Ulrich Reinhardt, Ph.D. <i>Eastern Michigan University</i> USA 	Luis Diego Alfaro Alvarado, Ph.D. <i>National University of Costa Rica</i> Costa Rica 
Tebogo Selebatso, Ph.D. <i>Botswana university of Agriculture and natural resources</i> Botswana 	Heiko L. Schoenfuss, Ph.D. <i>St. Cloud State University</i> USA 	Allan F. O'Connell, Ph.D. <i>Patuxent Wildlife Research Center, USGS</i> USA 
Amanda Lozano, M.Sc. <i>Universidad Nacional de Colombia</i> Colombia 	Encarnación Fernández Valle, Ph.D. <i>Universidad Complutense de Madrid</i> Spain 	Jorge Palacio Núñez, Ph.D. <i>Universidad del Centro de México</i> Mexico 
Lillian Frioni, Ph.D. <i>Universidad de la República</i> Uruguay 	Claudio Inostroza Blancheteau, Ph.D. <i>Universidad Católica de Temuco</i> Chile 	Leroy Soria Díaz, Ph.D. <i>Universidad Autónoma Del Estado De México</i> Mexico 
Vitaly Vodyanov, Ph.D. <i>Auburn University</i> USA 	José Francisco Morales Domínguez, Ph.D. <i>Universidad Autónoma de Aguascalientes</i> Mexico 	Mauro Alini, Ph.D. <i>AO Research Institute</i> Switzerland 
James Watling, Ph.D. <i>University of Florida</i> USA 	Esperanza del Pilar Infante L., Ph.D. <i>Universidad Distrital Francisco José de Caldas</i> Colombia 	Richard Balint, Ph.D. <i>University of Manchester</i> United Kingdom 
Maureen A. Donnelly, Ph.D. <i>Florida International University</i> USA 	Michelle de Saint Pierre Barrera, Ph.D. <i>Universidad de Chile</i> Chile 	Nicola Volpi, Ph.D. <i>Universidad de Módena y Reggio Emilia</i> Italy 
Hartwell H. Welsh, Ph.D. <i>Pacific Southwest Research Station</i> USA 	Angélica González Oliver, Ph.D. <i>Universidad Nacional Autónoma de México</i> Mexico 	Raúl S. Lavado <i>Universidad de Buenos Aires</i> Argentina 
José Antonio Barrios Pérez, Ph.D. <i>Universidad Nacional Autónoma de México</i> México 	Virginia Ramallo, Ph.D. <i>Centro Nacional Patagónico - Consejo Nacional de Investigaciones Científicas y Técnicas</i> Mexico 	
Giorgio Gilli, Ph.D. <i>University of Turin</i> Italy 	Francisco M. Salzano, Ph.D. <i>Federal University of Rio Grande do Sul</i> Brazil 	

## CARTA EDITORIAL

---

Desde el pasado primero de enero de 2015 fui nombrado por la decana de la facultad de ciencias, Dra. Concepción Puerta, como editor en jefe de la revista *Universitas Scientiarum* (Univ. Sci.). Además del honor que este nombramiento significa para mí y de mi profunda admiración por los editores anteriores (Dr. Raúl Potou y Dr. Alberto Acosta), el reto es grande: i) Lograr la inclusión de Univ. Sci. en la base de datos bibliográfica ISI Web of Knowledge (WoK), ii) Lograr que Univ. Sci. forme parte de la editorial Elsevier, iii) Mejorar el posicionamiento de Univ. Sci. tanto en Scopus como en Publindex.

Desde mi punto de vista, a pesar de toda la controversia que esto pueda implicar, el principal indicador para alcanzar estas metas es el factor de impacto (índice de impacto) y, por lo tanto, son varias las estrategias que planteo para mejorar dicho indicador: i) Publicación solo en inglés. ii) Aceptar únicamente artículos originales y algunas veces, por invitación directa, artículos de revisión. iii) Mejorar los procesos de sometimiento de los trabajos, en el sentido de hacerlos más transparentes y amigables para los autores. iv) Plantear una contundente estrategia de difusión tanto al interior de la PUJ como a nivel nacional y latinoamericano. v) Adherir la revista al COPE (Committee On Publication Ethics) que plantea, a nivel mundial, principios de transparencia y buenas prácticas en procesos editoriales.

El hecho de que Univ. Sci. sea una revista científica, en el sentido de que, además de ser la revista de la facultad de ciencias de la PUJ, el objetivo principal es publicar artículos en ciencias físicas, exactas y naturales, implica que debe seguir los estándares propios de esta metodología, incluyendo el aseguramiento de la autenticidad, la precisión y la exactitud de los trabajos publicados en ella. Además, debe cumplir con el objetivo de ser un ente difusor que expande el postulado de que el “desarrollo” de cualquier país se sustenta a partir del Desarrollo del conocimiento tanto científico (ciencias físicas, exactas, naturales, sociales y humanas) como tecnológico. Desarrollo entendido no solo como posibilidad económica, sino desarrollo también como la posibilidad de ser ciudadanos libres, críticos, tolerantes y democráticos.

Les presento, entonces, el Vol. 20(2) de Univ. Sci., mi primer volumen. En esta ocasión presentamos ocho artículos en biología, microbiología, ecología, bioquímica, genética y ciencias ambientales. En este número tenemos autores de cinco países y contamos con la colaboración de 49 evaluadores de 18 países. Espero que disfruten estos trabajos tanto como el equipo editorial de Univ. Sci.

Juan Carlos Salcedo Reyes, Ph.D.

Profesor Asociado

Grupo de Películas Delgadas & Nanofotónica (GPD&NF)

Departamento de Física

Editor

Universitas Scientiarum

Facultad de Ciencias

Pontificia Universidad Javeriana

Bogotá, D.C., Colombia

[editorus@javeriana.edu.co](mailto:editorus@javeriana.edu.co)

<http://ciencias.javeriana.edu.co/investigacion/universitas-scientiarum>

## EDITORIAL NOTE

---

On January 1st, 2015 I was honoured to be appointed as the editor in chief of *Universitas Scientiarum* (Univ. Sci.) by the Dean of the Faculty of Science, Dr Concepción Puerta. I wish to acknowledge my deep admiration for the previous editors Dr Raul Poutou and Dr Alberto Acosta and to express my commitment in facing the three greatest challenges of our journal: i) achieve the inclusion of Univ. Sci. in the bibliographic database ISI Web of Knowledge (WoK); ii) sign an agreement on co-edition with the scientific/academic publisher Elsevier; and iii) improve the positioning of Univ. Sci. in both Scopus and Publindex.

From my point of view and despite all the controversy that this may raise, the impact factor is the main indicator for achieving these goals; therefore, there are several strategies that I suggest to improve this indicator: i) publish only in English; ii) accept only original articles and sometimes, by direct invitation, review articles; iii) improve the process of manuscript submission making it more transparent and friendly for authors; iv) work on a strong dissemination strategy both within the Pontificia Universidad Javeriana (PUJ) and at the national and Latin American levels; v) adhere the journal to the Committee on Publication Ethics (COPE) which proposes worldwide principles of transparency and best practice in editorial processes.

Besides being the journal of the Faculty of Science of the PUJ, Univ. Sci. is a scientific journal and in that sense the main aim is to publish articles in exact, physical and natural sciences, what means to follow proper standards of scientific methodology, including the assurance of authenticity, precision and exactitude of the published work in it; it must also comply with the objective of being a dissemination means that expands the postulate that the development of any country is sustained by the improvement of both scientific (physical, exact, natural, social and human sciences) and technological knowledge. Development should be understood not only as an economic possibility but also as the opportunity to allow the growth of free, critical, tolerant and democratic citizens.

I present then number 2 of Vol. 20 of Univ. Sci., my first volume. This issue contains eight articles in biology, microbiology, ecology, biochemistry, genetics and environmental sciences contributed by authors from five different countries. We thank the collaboration of 49 reviewers from 18 countries. I hope you enjoy reading this work as much as the editorial team of Univ. Sci. enjoyed preparing it.

Juan Carlos Salcedo Reyes, Ph.D.  
Associate Professor  
Thin Films & Nanophotonics Group (TF&NPG)  
Physics Department  
Editor in Chief  
*Universitas Scientiarum*  
Faculty of Sciences  
Pontificia Universidad Javeriana  
Bogotá, D.C., Colombia  
[editorus@javeriana.edu.co](mailto:editorus@javeriana.edu.co)

<http://ciencias.javeriana.edu.co/investigacion/universitas-scientiarum>

Comité Editorial y Comité Científico / Editores por temática / Asesores científicos / Evaluadores

**Comité Editorial / Editorial Committee**

Alberto Acosta, Ph.D., Juan Carlos Salcedo Reyes, Ph.D.

170

Biología Química / Chemical Biology / Biología Química

*Original Article. Synthesis and in vitro Evaluation of Antifungal Properties of Some 4-Aryl-3-Methyl-1,2,3,4-Tetrahydroquinolines Derivatives*

Arnold R. Romero Bohórquez, Vladimir V. Kouznetsov, Susana A. Zacchino

177

Biología Vegetal / Plant Biology / Biología Vegetal

*Original Article. Effect of light quality on Tabebuia rosea seed germination*

Sofía Basto, Claudia Ramírez

191

Microbiología Aplicada / Applied Microbiology / Microbiología aplicada

*Short Communication. Preservation of Azotobacter chroococcum vegetative cells in dry polymers*

Daniel Rojas-Tapias, Oriana Ortega Sierra, Diego Rivera Botía, Ruth Bonilla

201

Ecología / Ecology / Ecología

*Short Communication. Climbing behavior of Cordylancistrus sp. in the Colombian Andes*

Javier Alejandro Maldonado Ocampo, Juan David Carvajal, Alexander Urbano Bonilla

209

Contaminación/Contamination/Contaminação

*Original Article. Assessment of indicators of fecal contamination in soils treated with biosolids for growing grasses*

Maria Claudia Campos, Luz Karime Medina, Nancy Piedad Fuentes, Gustavo Ignacio García

217

Reptiles y Anfibios/Reptiles and Amphibians/Répteis e Anfíbios

*Review Article. Ecological functions of neotropical amphibians and reptiles: a review*

Angela María Cortes, César Augusto Ruiz-Agudelo, Anyelet Valencia-Aguilar, Richard J. Ladle

229

Bioquímica / Biochemistry / Bioquímica

*Original Paper. Xylanase activity and T<sub>2</sub> (MRI) relationship during lulo la selva P32 ripening process*

Yenny Maritza Dueñas Gómez

247

Genética, Sistemática, Evolución y Biogeografía / Genetics, Systematics, Evolution and Biogeography

*Original Article. Mitochondrial DNA analysis suggests a Chibchan migration into Colombia*

Maria Claudia Noguera-Santamaría, Carl Edlund Anderson, Daniel Uricoechea, Clemencia Durán, Ignacio Briceño-Balcázar, Jaime Bernal-Villegas

261