EDITORIAL BOARD

Editor-in-Chief Marco Nemesio E. Montaño, PhD

Associate Editors

Ma. Patricia V. Azanza, PhD Food Science & Nutrition

Jose Maria P. Balmaceda, PhD Mathematics

Zubaida U. Basiao, PhD Biology

Carlos Primo C. David, PhD Earth Sciences

Joel Joseph S. Marciano, Jr., PhD

Engineering

Giovanni A. Tapang, PhD *Physics*

Irene M. Villaseñor, PhD Chemistry

Managing Editor
Violeda A. Umali, PhD

Editorial Assistant
Dercylis G. Mararac

EDITORIAL ADVISORS

Rigoberto C. Advincula, PhD

Department of Chemistry University of Houston radvincula@uh.edu

Alfonso M. Albano, PhD

Department of Physics Bryn Mawr College, Bryn Mawr, Pennsylvania aalbano@brynmawr.edu

Kenneth Buckel, PhD

Food Science and Technology Group School of Chemical Sciences and Engineering The University of New South Wales, Sydney, Australia k.buckle@unsw.edu.au

Jose B. Cruz, PhD

Department of Electrical and Computer Engineering Ohio State University cruz@ece.osu.edu.

Flor Crisanta F. Galvez, PhD

Quality Assurance & Technical Manager Kerry Ingredients and Flavours (Americas Region) 7989-82nd St., Delta, VC V4G 1L7, Canada ffgalvez1@yahoo.com



A Journal of Pure and Applied Sciences

SCIENCE DILIMAN (ISSN 0115-7809) is published bi-annually by the University of the Philippines Diliman through the Office of the Vice-Chancellor for Research and Development (OVCRD). Address all communications to the Editor-in-Chief, **SCIENCE DILIMAN**, Research Dissemination and Utilization Office, Office of the Vice-Chancellor for Research and Development, Lower Ground Floor, Phivolcs Bldg., C. P. Garcia Ave., University of the Philippines, Diliman, Quezon City 1101 Philippines.

Subscription Rates: P650.00/year (two issues), inclusive of postage US\$50.00/year (two issues), inclusive of postage

Tel. No: (632) 981-85-00 loc. 4048

(632) 436-87-20 TelFax: (632) 927-2568

E-mail: rduo.ovcrd@up.edu.ph

rduo.ovcrd2012@gmail.com http://www.ovcrd.upd.edu.ph

COVER PHOTO

Website:

The *Hippopus porcellanus* in Tubbataha Reefs National Park. Note the fringing tentacles on the inhalant siphon, *top photo* and the shell that is globose in shape and semicircular in outline with smooth and regularly shaped dorsal margin, *bottom photo* (see Dolorosa, this issue). Photo courtesy of R.G. Dolorosa.

Contents of this journal may not be reproduced without the publisher's written permission except for fair use, i.e., for personal, educational and research purposes, in accordance with Copyright law. Reprinting and re-publication in any other journal or compilation is likewise prohibited except as provided in the Copyright Agreement when the author reprints his/her article for inclusion in any publication where he/she is the author or editor, subject to giving proper credit to the original publication of the article in the journal.

Victor C. Gavino, PhD

Department of Nutrition University of Montreal, Canada victor.gavino@umontreal.ca

Kelvin S. Rodolfo, PhD

Department of Earth and Environmental Sciences University of Illinois, Chicago, Illinois krodolfo@uic.edu

Rudolf A. Roemer, PhD

Centre for Scientific Computing and Department of Physics University of Warwick r.roemer@warwick.ac.uk

Luis G. Sison, PhD

Electrical and Electronics Engineering Institute University of the Philippines Diliman luis.sison@up.edu.ph

Raul K. Suarez, PhD

Department of Ecology, Evolution and Marine Biology University of California, Sta. Barbara suarez@lifesci.ucsb.edu