

The UCI Undergraduate Research Journal

<i>Letter from the Advisors</i> Meredith Lee and Said M. Shokair	iii
<i>Letter from the UROP Student Editorial Board</i>	iv
<i>A Novel Approach: Pauline Hopkins and the Emerging New Woman of Color</i> Carole Autori	1
<i>Heterogeneous Biomedical Database Integration Using a Hybrid Strategy</i> Vadim Bichutskiy	11
<i>Spelling Proficiency of Native Speakers of Spanish: A Look at the Influence of Morpheme Structures in Spelling Errors</i> Camille Campion	19
<i>Phasing Segmented Telescope Mirrors with a Mach-Zehnder Interferometer</i> Loren Chang	27
<i>Odor-Binding Protein Expression in Female and Male Antennae of the Mosquito Anopheles gambiae</i> Jonathan Cheah and Diana Le	35
<i>The Benefits of a Java Message Service Implementation of the C2 Framework</i> Roshni Malani	43
<i>The Effects of Normal Tissue on E-Cadherin Expression in Breast Cancer</i> Haik Mkhikian	53
<i>Obstinate Nuns, Industrious Wives, and Independent Widows: Women and Power in New France, 1689-1730</i> Christine Nyholm	61
<i>Dynamic Decision-Making Processes in Recognition Memory of Images</i> Pooja P. Reddy	73
<i>Activation of the Steroid and Xenobiotic Receptor by Vitamin E Tocotrienol Isoforms Leads to Selective Target Gene Expression</i> Asal Sadatrafiei	81

Dedication, with Gratitude

This edition of *The UCI Undergraduate Research Journal* is dedicated to two outstanding individuals. Chancellor Ralph J. Cicerone and Dean Meredith Lee have actively supported faculty-mentored undergraduate research and creative activities at UCI for many years, helping to build it to the level of national recognition it holds today. During the Summer of 2005, both will be moving on to other endeavors. Chancellor Cicerone has been elected President of the National Academy of Sciences, one of the nation's oldest and most prestigious scientific societies. Dean Lee will retire, although remaining active in exploring her academic interests. We will miss them both, and it is in memory of their past friendship and support, and with best wishes for their futures, that we dedicate Volume VII of *The UCI Undergraduate Research Journal* to Chancellor Cicerone and Dean Lee.

The UCI Undergraduate Research Journal publishes outstanding research papers written by undergraduates from all disciplines who have completed faculty-mentored research projects. The *Journal* is published annually by the Undergraduate Research Opportunities Program (UROP) in the Division of Undergraduate Education. It is published in hard copy and on the Internet (www.urop.uci.edu). The Call for Papers is announced to all faculty and undergraduates early in the Spring Quarter. Submissions are initially reviewed by the UROP Student Editorial Board. Guided by this review, the UROP Faculty Advisory Board selects the papers to be published in the *Journal*. The Student Board and the UROP Journal Assistants handle the final editing and publication process for the selected papers.

Questions about *The UCI Undergraduate Research Journal* should be submitted to:

Said M. Shokair, Director
 Undergraduate Research Opportunities Program (UROP)
 Division of Undergraduate Education
 Student Services II, Suite 2300
 University of California, Irvine
 Irvine, CA 92697-5685
 Phone: (949) 824-4189
 Fax: (949) 824-1607
 E-mail: shokair@uci.edu
www.urop.uci.edu

Copyright © 2004 by the Regents of the University of California. All rights reserved. No part of *The UCI Undergraduate Research Journal*, Volume VII (December 2004) may be reprinted, reproduced, or transmitted in any form or by any means without permission in writing from the publisher.

The information in this publication will be made available in alternative formats for people with disabilities, upon request. Requests should be directed to the Disability Services Center; telephone (949) 824-7494, TDD (949) 827-6272.

A Letter from the Advisors

Knowledge gained in the classroom is a vital part of an undergraduate education, but there is much more to learn. For students who venture beyond the classroom into the world of research, there are exciting opportunities that can change the courses of their lives. At the University of California, Irvine (UCI) we are committed to helping undergraduate students move beyond the textbook and classroom into hands-on research experiences. The students whose papers are published in *The UCI Undergraduate Research Journal* spent time in archives, laboratories, and in the field gathering the data needed to answer their hypotheses. One student said that this research experience "made school come alive." The Undergraduate Research Opportunities Program (UROP), the organization behind the *Journal*, seeks to provide UCI undergraduates with opportunities to develop their talents and gain the expertise they will need to become tomorrow's leaders, thinkers and scholars.

Over the past seven years, *The UCI Undergraduate Research Journal* has published exceptional research papers by some of UCI's most outstanding students. It has been, and continues to be, a valuable part of how UCI's undergraduate research community demonstrates UCI's excellence on a national level. Since 1998, we have had the privilege of reading and reviewing the results of hundreds of remarkable undergraduate research and creative projects, and each year the selection process becomes more difficult. Nevertheless, we carefully select those few papers that we believe represent UCI's undergraduates at their very best. Although we have chosen to present only ten papers this year, more than 30 percent of students enroll in independent research courses, and thousands more carry out research projects or take other classes with research-related components.

Many people must work together to produce a journal of this size and scope. We commend the undergraduate authors and their faculty mentors for their commitment to the excellence of their projects. Our kudos go to the UROP Student Editorial Board, whose efforts were essential in evaluating, editing and producing the *Journal*. We express sincere gratitude to the UROP Faculty Advisory Board, whose distinguished members provided final evaluations of the papers selected for publication. Finally, we acknowledge the hundreds of students and faculty who participate in research each year, whether associated with UROP or not, and thank them for the wide array of exciting and innovative scholarship they bring to the UCI community.

UROP is committed to supporting and facilitating faculty-mentored undergraduate research projects and creative activities. Launched in 1995, UROP's programs now include advising and assisting students in pursuing on- and off-campus research opportunities, funding undergraduate research projects through Calls for Proposals in the Fall and Spring Quarters of each academic year, and sponsoring the annual UCI Undergraduate Research Symposium, in addition to the *Journal*. In the summer of 2001, UROP launched the Summer Undergraduate Research Program (SURP), through which close to 500 students have already conducted research projects. UROP continues to expand the opportunities it offers. The Inter-Disciplinary Summer Undergraduate Research Experience (ID-SURE), the Integrated Micro/Nano Summer Undergraduate Research Experience (IM-SURE), and the Summer Undergraduate Research Fellowship in Information Technology (SURF-IT), all introduced in the summer of 2005, provide undergraduates even more opportunities to conduct research, and to explore and grow. As the scope of undergraduate research continues to expand, a corps of young, inquisitive, boldly imaginative, and idealistic scholars is emerging—and we present just a few of them here.

Meredith Lee
Dean, Division of Undergraduate Education

Said M. Shokair
Director, UROP

Journal Advisors

Meredith Lee
Dean, Division of Undergraduate Education

Said M. Shokair
Director, UROP

UROP Faculty Advisory Board

Professor Wendy Goldberg
Professor Donald Hoffman
Professor John C. LaRue
Professor Richard Lathrop
Professor Hartmut Luecke
Professor James Nowick
Professor James Penrod
Professor Richard Robertson
Professor Martin Schwab

UROP Student Editorial Board

Gregoria Barazandeh
Elizabeth Black
Jennifer Channual
Ahmed Ibrahim
Sana Khan
Matthew Korn
Mercedes LaVoy
Vivek Mehta
Jessica Morreale
Chao Li
Jana Remy
Martin Vega

UROP Journal Assistants

Megan Nowell Kaufman, *Publications & Web Assistant*
Jerry McMillan, *Journal & Symposium Student Advisor*
Henry Yan, *Computer Resource Specialist*

Letter from the UROP Student Editorial Board

The application of knowledge is one of the most important aspects of learning. This principle is reflected in the high quality of the papers presented in this year's *UCI Undergraduate Research Journal*. The selection of papers by the Editorial Board was both a demanding and rewarding process. As a team of students from a variety of disciplines, we brought our expertise and passions to the table in discussing the merits of each submitted work. As selection was narrowed, we edited the articles for argument, style and cohesion. While working with our peers on the Editorial Board, we each bettered our editing skills and increased our commitment to the importance of undergraduate research at UCI. We expect that you will enjoy the efforts of the student researchers and their faculty mentors in this volume. In addition, we hope that the *Journal* encourages further faculty-mentored undergraduate research, and affirms UCI's strong commitment to undergraduate education.