



Location, Location, Location:
Oviposition Success in Two Species of Invasive Applesnails,
Pomacea insularum and *Pomacea canaliculata*

Mundy Faculty Fellowship Program
February 2008

A proposal by:

Romi L. Burks (faculty member, Biology)
Colin Kyle (junior, Biology Major)
James McDonough (junior, Biology Major)

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141 Fondren-Jones Science Hall
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Part I - Research Description: *To compare & contrast oviposition trends in two species of applesnails to better understand likelihood of invasion while furthering international collaborations and promoting close collaborative research opportunities.*

Background: As of 2005, estimates indicated that over 50,000 non-indigenous species have invaded the United States, annually causing over \$120 billion in damages (Pimentel et al. 2005). Historically, mollusks have been some of the most destructive and hard to manage exotic species (Ludyanskly & McDonald 1993; Rawlins et al. 2007). With large size and high reproduction rates, the freshwater gastropod family Ampullariidae (i.e. applesnails) contains notoriously destructive invasive species (Rawlings et al 2007). Discovered in Texas in 1989, the applesnail *Pomacea insularum* poses a potential threat to biodiversity in Houston's waterways and the Gulf coast as a whole (Howells et al. 2006).

Native to temperate South America, *P. insularum* snails typically reach fist size or larger when full grown and possess a round shell with a characteristic deep groove on the whorl (Howells et al. 2006). Unlike most snails, *P. insularum* voraciously consumes live plants rather than algae, which potentially allows them to be very damaging to plants and ecosystems (Carlson & Brønmark 2006, Boland et al. 2007). Because ecologists only recently identified *P. insularum* as a distinct species, little evidence exists about its invasive tendencies (Rawlings et al. 2007).

To gain perspective on *P. insularum*, we propose comparing it with a closely related species for which it is often mistaken, *P. canaliculata*. *P. canaliculata*, another temperate South American applesnail, has a well documented history of invading and causing severe damage in Southeast Asia (Rawlings et al. 2007) and it ranks globally as one of the 100 worst exotic species (Lowe et al. 2004). As fecundity best demonstrates a mollusk's destructive potential (Keller et al. 2006), our comparison of *P. insularum* with *P. canaliculata* will focus on parallels in their reproduction, specifically egg laying characteristics and behavior. To make the comparison between *P. insularum* and *P. canaliculata*, we propose observing natural snail behavior in the field and conducting a set of experiments on the non-native population of *P. insularum* in Texas. Then, we wish to travel to Uruguay to replicate observations and experiments with native *P. canaliculata*. Comparison of these two species will yield critical information about *P. insularum* that will be useful in creating a method to stop their spread to other areas beyond Houston.

Research Questions: Our collaborative investigation will answer 3 questions:

- Q1) Do applesnails show preferences for type of surface on which they lay eggs?
- Q2) Does the shape or height of the surface influence the frequency of egg laying?
- Q3) How do clutch dimensions, clutch volume, egg number or hatching efficiency vary across surface types? In other words, do some egg clutches laid on particular surfaces result in the most viable offspring?

These questions build on recent research on *P. insularum* by Colin and James, but also link unpublished field data on oviposition trends from Uruguay.

Photo 1 (top): *Pomacea insularum* laying an egg clutch in the lab. Photo 2 (bottom): Measurements of clutch.



Preliminary Data and Methods (summarized with predictions in Figure 1):

Q1) Oviposition Preference

P. insularum in Texas: Preliminary experiments indicate that *P. insularum* lay nearly exclusively on elephant ear (Figure 1, top panel, right box). In addition, we gathered field data haphazardly in summer 2007 that suggested a preference for elephant ear even when other emergent plants occurred (Photo 3). With funding from a Sam Taylor Faculty Fellowship, we will spend 6 summer field days in Armand Bayou (3 days in June and 2 days in August or early September) conducting a deliberate survey of all applesnail clutches.



Photo 3: Dr. Burks looking for clutches among elephant ear in the field at Armand Bayou.

P. canaliculata in Uruguay:

Proposed work: We first propose to share our findings about TX oviposition trends with other researchers and potential collaborators at the International Shallow Lakes meeting in Punta de Este, Uruguay, over this coming Thanksgiving (Nov. 2008). Following the meeting, we propose to conduct a field experiment, similar to our laboratory set-up, regarding the oviposition preferences of *P. canaliculata* (Figure 1, middle column). It is too time-consuming and laborious to set-up exactly the same experiment in Uruguay

and we have the necessary field help in Uruguay.

Using fence netting, we will create four large enclosures (10-m²) in a single Uruguayan shallow lake (to be determined). We will remove all snails from these enclosures and then add back adults of reproductive size in equal densities. Sets of 4 possible

substrates (natural plant, wood, metal and Astroturf) will be placed within the enclosures. It will take 1 day to set up and we will monitor the total number of clutches per substrate per day for a period of 10 days.

Q2) Surface Characteristics

P. insularum in Texas: In Spring 2008, James and Colin will further investigate how the surface characteristics of a site influence oviposition trends. With less of their preferred sites available, *P. insularum* may be forced to lay eggs in sites more prone to predation or water damage, thus resulting in fewer surviving snails (Youens and Burks, unpublished). *Proposed methods:* Colin and James will construct a new set-up that tests how the shape and height of the surface influences egg laying. In 12 containers (0.75-m²), we propose to present sexually active *P. insularum* females with four possible surface types (i.e. tall/curved, short/curved, tall/flat, and short/flat) on which to lay. We will design the set-up to force the females to deposit their eggs on one of the four surface types. We will then record the total number of egg clutches per surface type and the egg clutch height above the water line. A Chi-squared (X²) statistical test of our results will allow us to view any trends in oviposition behavior. Constructing the setup will require three to four days and the experiment will be monitored for 10 days.

P. canaliculata in Uruguay: No information in the literature exists regarding oviposition trends in native *P. canaliculata* populations. Dr. Burks and Brandon Boland '07 measured the height of clutches occurring on emergent vegetation in two Uruguayan lakes and found that these applesnails laid their eggs consistently about 15 cm above the water's surface (Figure 1, 2nd row, right panel). This could be due to the influence of avian predation that occurs in Uruguay (Cazzigna 2006). *Proposed methods:* After 3 days of observing oviposition trends among the various substrates found in Uruguay, Colin and James will set-up an independent

experiment to test the influence of shape and height on oviposition preference in *P. canaliculata*. During our 1st day in the field, we will collect snails that are copulating to identify females that will have a high likelihood of laying eggs within the time period for our experiment. Using the experimental setup for Question 1 in Uruguay, we will conduct the test of *P. canaliculata* in the field in Uruguay using smaller nested enclosures (1-m²) to which we can add these females at a high density (~4 m²) (Figure 1, 2nd row, middle panel). Data processing and statistical analysis procedures reflect the approach for Q1.

Q3) Hatching Efficiency

***P. insularum* in Texas:** After understanding where the *P. insularum* will most likely lay eggs, we propose to determine if the type or shape of the surface on which a snail lays a clutch influences the number of eggs in the clutch or how many of those eggs hatch (hatching efficiency). We will also examine how the dimensions and approximated volume of the clutch varies with different surfaces. Identifying the surfaces that allow the snails to deposit especially large clutches or that increase the likelihood of the eggs on them hatching will give management groups the ability locate and remove surfaces especially beneficial to *P. insularum* population growth. Because we previously determined that exotic *P. insularum* oviposit almost entirely on natural plants (elephant ear), we will only compare the egg number and hatching efficiency of clutches laid on different shapes of surfaces.

Proposed methods: In the spring of 2008, Colin and James will collect all clutches laid during the laboratory experiment for Q2 and record the shape of the surface on which we found the clutch. After collection, we will measure the dimensions of each clutch and calculate its approximate volume (Figure 1, 3rd row, middle panel). From this effort (Photo 4 and 5), we will be able to calculate the total number of eggs in the clutch and it's hatching efficiency. Using statistical tests, we will then compare the masses, dimensions, approximated volumes, egg numbers and hatching efficiencies of the clutches laid on different surface shapes.

***P. canaliculata* in Uruguay:** As a reference to gauge the reproductive potential of *P. insularum*, we will repeat the same process to test if the surface bearing the eggs influences the size and hatching efficiency of *P. canaliculata* clutches. **Proposed methods:** We will use the same method for *P. canaliculata* in Uruguay as we did for *P. insularum* in Texas. However, because we do not yet know the preference of native *P. canaliculata* for different types of surfaces, we will include clutches laid during the field experiment for both Q1 and Q2. After we analyze the results from this experiment, we will compare the characteristics of the clutches laid by *P. insularum* with *P. canaliculata*.

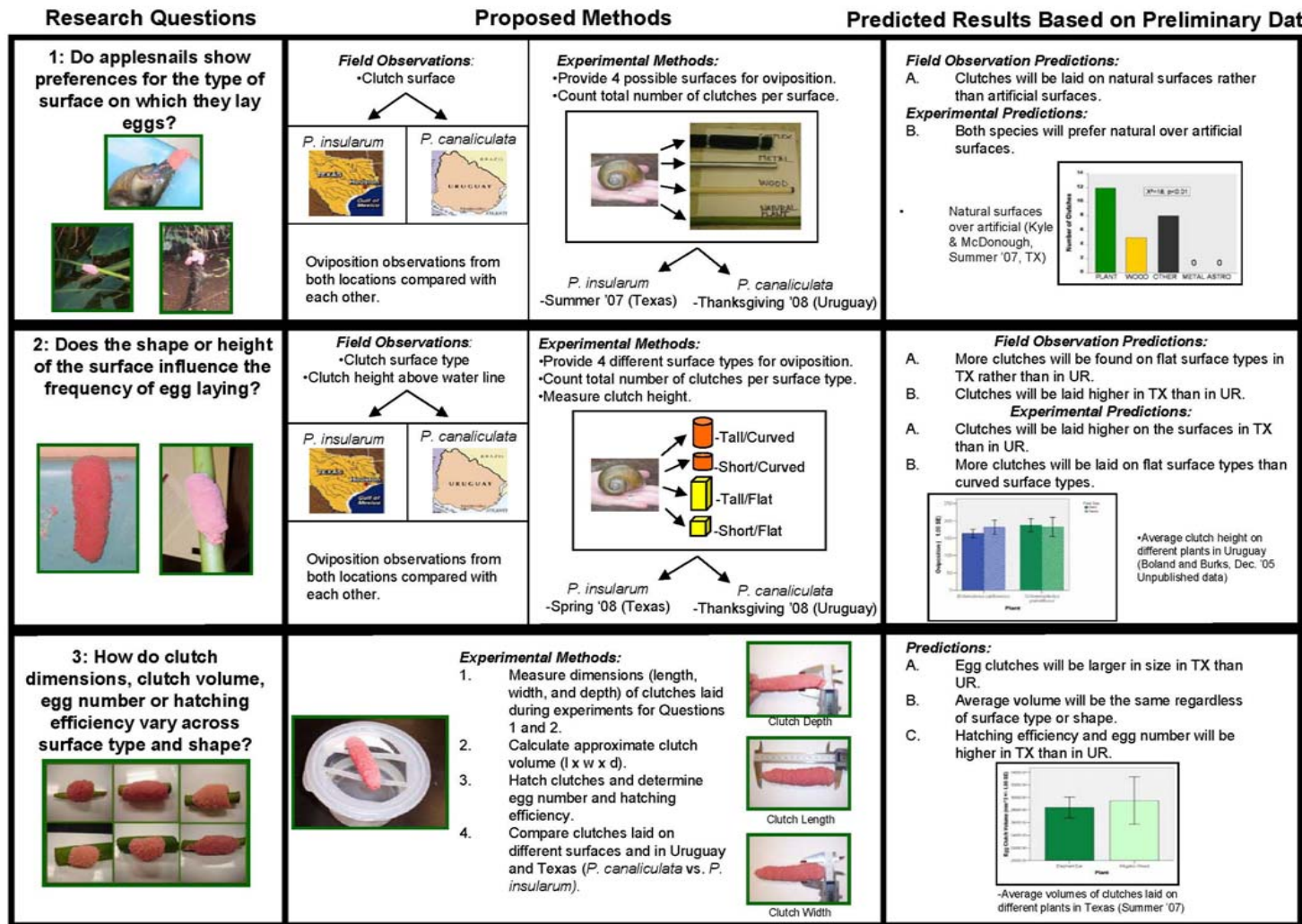


Photo 4 (left): Colin has experience counting eggs in the lab. Photo 5 (right): Established method for breaking up the clutches and counting the remaining eggs.

Project Description Summary:

Due to its recent introduction to the U.S., we propose comparing *P. insularum* with its close relative *P. canaliculata* to help determine *P. insularum*'s potential as a damaging exotic invasive species. With our proposed work, we will compare the reproductive behavior and potential of two species to gain perspective on the threat of *P. insularum* to the ecosystems of the U.S. This comparison will also yield information on how to minimize the damage and spread of *P. insularum* in and around Houston.

Figure 1: Experimental Design Schematic of Burks/Kyle/McDonough Collaborative Research



Budget Sheet

Funding Source (Mundy or Jones): Mundy Faculty Fellowship

Faculty Applicant(s): Dr. Romi Burks

Student Collaborator(s): Colin Kyle and James McDonough

1. Amount to be expended on supplies and materials:

Item	Expense
Material for field supplies (net, rope, buckets, etc...)	\$400
Car Rental in UR (\$41/day x 21 days)	\$860
Gas for field transport	\$300

Total: \$1540

2. Amount to be expended on travel to present work:

Lodging: <u>7 days in Punto de Este (2 students) x \$80/day</u>	\$560
<u>8 days in Montevideo (2 students) x \$50/day</u>	\$400
<u>22 days in Montevideo (1 faculty) x \$40/day</u>	\$880

Note: lodging includes breakfast

Total: \$1840

Transportation: American(AA): Austin to Montevideo (\$1400 x 2 students) \$2800

Conference Fees: Registration for Shallow Lakes (\$200 x 2 students) \$400

Other (explain): None (TX field work covered by Sam Taylor and Dr. Burks travel by Cullen)

Total: \$5040

3. Summer Stipends/Wages

Student Wages: 1.5 weeks of summer work/holiday (\$300/wk x 1.5 x 2) \$900

Faculty Stipend: 3 weeks summer work and preparation (\$500/wk x 3) \$1500

Form: STIPEND

Total: \$2400

4. Summer on-campus student housing

Dates that housing would be required: not necessary

Requested Amount: \$9000

ROMI L. BURKS

CURRICULUM VITA

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EDUCATION

University of Notre Dame (UND)	Ph.D. in Ecology, Evolution and Environmental Biology, 2000 Dissertation title: <i>Daphnia</i> in littoral zones: costs and benefits associated with diel horizontal migration; Advisor: D. M. Lodge
Loyola University Chicago (LUC)	B.S. in Biology with honors, <i>magna cum laude</i> , 1995 B.A. in English with honors, <i>magna cum laude</i> , 1995

POSITIONS HELD

2006-present	Chair, Animal Behavior Program, Southwestern University (SU)
2003-present	Assistant Professor, Department of Biology, Southwestern University
2003-present	Associate Doctoral Faculty, Texas State University
08/01 – 7/03	Research and Teaching Fellow, Rhodes College (RC)
12/00 – 7/03	Postdoctoral Fellow, The Ohio State University
08/00 – 12/00	Visiting Assistant Professor in Biology & Teaching Associate for the Kaneb Center for Teaching and Learning, UND
08/99&08/04	Invited SWALE and Guest Researcher, Netherlands Institute of Ecology, Centre for Limnology
1997-present	Invited Guest Researcher, National Environmental Research Institute, Silkeborg, Denmark
1995-1997	Teaching Assistant, Department of Biology, UND
1992-1995	Aquatic Ecology Research Technician, LUC

HONORS & AWARDS

Fall 2007	Southwestern University Nomination for Piper Professor Finalist for Brown Junior Investigator Award
02/2007	Invited Panelist for DDIG Review in Ecology, National Science Foundation
2006	Nominated for Outstanding Teaching Award, SU
2005, 2006	Recognized as faculty work actively through disability issues, SU
2004-2005	Associated Colleges of the South (ACS) Environmental Fellow
Spring 2004	Associated Colleges of the South Technology Fellow
08/2004	Invited participant (16 chosen from 70 applicants) for SEEK (Science Environment for Ecological Knowledge) workshop in Ecoinformatics, UNM's Sevilleta Field Station.
10/2003	Invited Panelist for Grant Review in Ecology, National Science Foundation
09/2003	Website featured on-line at <i>The Chronicle of Higher Education</i>
03/2003:	Invited participant for "Teaching Green," an ACS workshop aimed at incorporating environmental issues into interdisciplinary teaching.
10/2001	Selected participant (44 chosen from 180) in DIALOG IV in Bermuda (Dissertation Initiative For the Advancement of Limnology and Oceanography). 2 Presentations.
04/2000	The Kaneb Center Graduate Student Award for Excellence in Teaching
1998-1999	Fulbright Scholar to Denmark
1997	UND Graduate Student Union Teaching Assistant of the Year Award
1995	Presidential Medal Recipient from the College of Arts and Sciences, LUC
1993 to present	<i>Phi Beta Kappa</i> , member

RESEARCH INTERESTS

- Predator-prey interactions (particularly invertebrate) & role of complexity in structuring littoral zones
- Chemical communication in aquatic systems
- Biomanipulation in shallow lakes, alternative stable states, impact of *Daphnia* on water quality
- Impacts of exotic species on community structure

PEER-REVIEWED PUBLICATIONS (* denotes undergraduate co-author)**2008**

- Youens, A. K. * and **R. L. Burks**. Comparing applesnails with oranges: the need to standardize measuring techniques when studying *Pomacea*. *Aquatic Ecology* DOI: 10.1007/s10452-007-9140-0.
- Boland, Brandon*, M. Meerhoff, C. Fosalba, N. Mazzeo, M. Barnes and **R. L. Burks**. 2008. Juvenile snails, adult appetites: Contrasting resource consumption between two species of applesnails (*Pomacea*). *Journal of Molluscan Studies* DOI: 10.1093/mollus/eym045.

2007

- **Burks, Romi L.** and L. Boles. 2007. Evolution of the Chocolate Bar: A creative approach to teaching phylogenetic relationships within evolutionary biology. *The American Biology Teacher* 69(4): 229-237. **PDF Available.**

EDITOR-REVIEWED BOOK REVIEW

Burks, R. L. 2007. Math for Wiser Decisions (a review of Rockwood's *Introduction to Population Ecology*). *BioScience* 57(3): 288-289.

2006

- **Burks, R. L.**, G. Mulderij, E. Gross, I. Jones, L. Jacobsen, E. Van Donk, and E. Jeppesen. 2006. Chapter 3 - Center stage: The Crucial Role of Macrophytes in Regulating Trophic Interactions in Shallow Lake Wetlands. Pages 37-59 in R. Bobbink, B. Beltman, J. T. A. Verhoeven, and D. F. Whigham (eds) *Wetlands: Functioning, Biodiversity Conservation, and Restoration*. Ecological Studies, Volume 191, Springer-Verlag Berlin Heidelberg.
- R. G. Howells, L. E. Burlakova, A. Y. Karatayev, R. K. Marfurt*, and **R. L. Burks**. 2006. Chapter 5 - Native and introduced Ampullaridae in North America: History, Status and Ecology. Pages 73-112 in R. C. Joshi (ed) *Global Advances in Ecology and Management of Golden Apple Snails*. Philippine Rice Research Institute (PhilRice), Philippines. **PDF available.**

2005

- Linquester, Gary, **Romi L. Burks**, and Carolyn R. Jaslow. 2005. Developing Information Fluency in Introductory Biology Students in the Context of an Investigative Laboratory. *Cell Biology Education* 4: 58-96. **PDF available.**

2004

- Tuchman, N. C., **R. L. Burks**, C. A. Call, and J. J. Smarrelli. 2004. Flow rate and vertical position influence ingestion rates of colonial zebra mussels (*Dreissena polymorpha*). *Freshwater Biology* 49: 191-198. (*revisions completed at SU*)

2002

- **Burks, R. L.** and D. M. Lodge. 2002. Cued in: advances and opportunities in freshwater chemical ecology. *Journal of Chemical Ecology*. 28(10): 1881- 1897.

- **Burks, R. L.**, N. C. Tuchman, C. A. Call, and J. E. Marsden. 2002. Colonial aggregations: the effect of spatial position on zebra mussel responses to interstitial water quality. *Journal of the North American Benthological Society* 21(1): 64-75. **PDF available.**
- **Burks, R. L.**, D. M. Lodge, E. Jeppesen and T. L. Lauridsen. 2002. Diel horizontal migration of zooplankton: costs and benefits of inhabiting littoral zones. *Freshwater Biology* 47: 343-366. **PDF available.**

2001

- **Burks, R. L.**, E. Jeppesen and D. M. Lodge. 2001. Pelagic prey and benthic predators: impact of odonate predation on *Daphnia* among complex structure. *Journal of the North American Benthological Society* 20(4): 683-696. **PDF available.**
- **Burks, R. L.**, E. Jeppesen and D. M. Lodge. 2001. Littoral zone structures as *Daphnia* refugia against fish predation. *Limnology and Oceanography* 46(2): 230-237. **PDF available.**

2000

- **Burks, R. L.**, E. Jeppesen and D. M. Lodge. 2000. Macrophyte and fish chemicals suppress *Daphnia* growth and alter life history traits. *Oikos* 88(1): 139-147. **PDF available.**

1999

- Lauridsen, T. L., E. Jeppesen, S.F. Mitchell, D. M. Lodge and **R. L. Burks**. 1999. Horizontal distribution of zooplankton in lakes with contrasting fish densities and nutrient levels. *Hydrobiologia* 408/409: 241-250.

MANUSCRIPTS SUBMITTED:

- Barnes, M.A.*, R. K. Marfurt, J. Hand and **R. L. Burks**. Egg-stravance: Fecundity of the exotic applesnail, *Pomacea insularum*. Submitted 01/12/08 to the *Journal of the North American Benthological Society*.
- **Burks, R. L.** A Kernel of Truth: Microwave popcorn makes it easier to teach basic statistics. Submitted 01/05/08 to *The American Statistician*.

MANUSCRIPTS IN REVISION:

- **Burks, R. L.**, H. Michels, M. González Sagrario, T. L. Lauridsen, and E. Jeppesen. Horizontally-challenged: dispersal of *Daphnia* requires multiple sampling techniques to capture variation in Diel Horizontal Migration (DHM).

PRINCIPAL INVESTIGATOR EXTERNAL GRANTS & FELLOWSHIPS

2007	Sam Taylor Fund, United Methodist, \$2000
2001	The Ohio State University Postdoctoral Fellowship
1999-2000	National Science Foundation Fellowship (Graduate Research Training)
08/1999	Netherlands Institute of Ecology, Centre for Limnology, @ \$400
07/1999	American Scandinavian Foundation Research Grant, \$3,000
1998-1999	Fulbright Fellowship for Study in Denmark, \$11,000
1999-2000	National Science Foundation Graduate Research Training Grant; \$2000 + salary

UNIVERSITY-SUPPORTED PROFESSIONAL ACTIVITY

Cullen Faculty Funds for International Travel (\$2000), Oral presentation at SIL 2007 in Montreal
 Fleming Funds for Collaborative Research, Southwestern Undergraduate Research Group Experience, 2007
 Brown Fund for Innovation in Teaching, 2007 (\$1250)
 Brown Junior Fellowship for Fall 2006 (3 course release + \$5000 in stipend and expenses)

Mundy Fellowship for Collaborative Research, 2005 (~\$4000)

Fleming Funds for Collaborative Research, Biology Summer Research Program Participant, 2005, 2006

Cullen Faculty Fellowship, 2003-2004 (\$4700)

- Presentation at INTECOL, Utrecht, The Netherlands, research in exploring local adaptation in *Daphnia*, Leuven, Belgium and manuscript writing in Silkeborg, Denmark

Faculty Development Enhance Grant (\$5000), Rhodes College

Graduate Professional Development Fund (\$2300), UND

TRAVEL GRANTS

- Abercrombie Faculty Travel Funds
 - \$1500 for 2007/08, \$1550 for 2007/06, \$1450 for 2006/05 and \$1400 for 2005/04
- Professional Development Funds (\$315, Sept. 2006) for NSF Meeting in Washington, D.C.
- UND Department of Biological Sciences, Graduate Professional Development Fund (6/2000), \$450
- North American Benthological Society General Endowment Fund (05/2000), \$300
- American Society of Limnology and Oceanography Grant (06/1998), \$400
- UND Gordon Grants: (08/2000), \$437, (01/2000) \$200, (10/1999) \$319, (10/1998) \$236, (02/1997) \$350
- UND Zahm Grant for international research travel to Denmark (06/1997), \$1250

PEDAGOGICAL INTERESTS

- Examining the integration between teaching and research
- Developing hands-on laboratory experiences to enhance classroom performance
- Encouraging critical thinking analysis through graphing and statistics
- Understanding the mentoring process

MENTORING EXPERIENCE (i.e. UNDERGRADUATE RESEARCHERS)

April 07 – present	<i>James McDonough</i> , SU Junior, Patterns of field oviposition in <i>P. insularum</i>
January 2007 – present	<i>Colin Kyle</i> , SU Junior, Oviposition preference and offspring survival
August 2006 – present	<i>Sarah Hensley</i> , SU Senior, Juvenile growth patterns under predator influence
April 2006 – May 2007	<i>Abby Youens '07</i> , Growing at a Snail's Pace: Juvenile growth patterns. <i>Pursuing M.S. in Public Health at University of Texas Health Sciences Center in Houston.</i>
Fall 2004 – May 2007	<i>Brandon Boland '07</i> , Paideia Scholar, Understanding mechanisms behind food choice in the channelled applesnail species. <i>Employed as molecular laboratory technician and applying to medical soon.</i>
May 2005 – Summer '06	<i>Matthew Barnes, '06 Honors Student</i> , The Snail and the Egg: understanding the egg-hatchling transition in applesnails. <i>2nd Ph.D. student at Notre Dame.</i>
Fall 2004 – Spring '06	<i>Cathy Duong, '06</i> , DU, Paideia Scholar, Temperature and chemical cues influences on diel horizontal migration of <i>Daphnia</i> .
Fall 2003 – Spring '05	<i>Rebecca Marfurt '05</i> , SU, Life history and ecological impacts of the exotic channelled applesnail, <i>Pomacea "canaliculata."</i> <i>Finishing M.S. in Aquatic Ecology at Texas State.</i>
Fall 2003 – Fall '05	<i>Austin Hill '05</i> , SU, Investigating potential dual effects of pesticides and chemical cues on <i>Daphnia</i> growth and reproduction. <i>Beginning 2nd year of M.S. in Conservation Biology at Texas State.</i>
Spring 2003	<i>Valerie Hartman</i> , volunteer, Rhodes College, Examining diel horizontal migration of <i>Daphnia</i> from a lake dominated by an invertebrate predator <i>Chaoborus</i> . <i>Currently seeking career and graduate school in aquatic ecology.</i>
Fall '02 – Spring '03	<i>Lisa Harsch</i> , Rhodes College, Quantifying the refuge effect of water lilies (<i>Nymphaea</i>) for <i>Daphnia</i> : Is it structure or shade? <i>Pursuing M.S. at University of Tennessee Graduate Health Sciences Center.</i>
Fall '00 - Spring '02	<i>Andrew Haines</i> , University of Notre Dame, Daphnid behavioural and

	growth history responses to chemical cues from whole lakes, macrophytes and predators. <i>NSF Teaching Fellow at Duke School of the Environment.</i>
Spring '02	<i>Andrew Seiwel</i> , Rhodes Senior, Macrophyte preference in <i>Daphnia magna</i> during diel horizontal migration. <i>M. S. in Pharmacy, UT Austin.</i>
Spring '02	<i>Jessica Skyfield</i> , Rhodes Senior, Littoral versus pelagic food resources for <i>Daphnia</i> : impacts of size and food quality. <i>Received M.S. in Aquatic Ecology, Univ. of Georgia.</i>
Fall '01 - Spring '02	<i>Christopher Tolleson</i> , Rhodes Senior, Effects of multiple predators on <i>Daphnia</i> mortality and behavior. <i>Graduated medical school, U of Georgia.</i>
Fall '01	<i>Kathy Llewellyn</i> , Chemical cues impacts of odonates and submerged macrophytes, <i>Graduated Nursing School, Vanderbilt University.</i>
1998	<i>Michael Bombich</i> , Kalamazoo College Senior and National Science Foundation REU Student, Trophic interactions in an aquatic ecosystem: Relationships among predators, zooplankton, and macrophytes and their implications in shallow lake dynamics., <i>Received M. S. in Ecology from Bowling Green State University</i> and now works for Michigan DNR.
1997	<i>Christine McConaghy</i> , University of Notre Dame, Vegetated versus open water zones: <i>Daphnia</i> abundance across a structural complexity gradient. <i>Received M. S. from Duke School of the Environment. Employed at Shedd Aquarium, Chicago.</i>
1996 – 1997.	Abha Saddawi and Trevor Oren, High school students, each won competitive science fair awards.

EXTERNAL GRANTS SUBMITTED BY UNDERGRADUATES

Barnes: Texas Academy of Sciences Research Award (\$1500, **Funded for \$750**)

Submitted but not funded: National Science Foundation Graduate Fellowship, Sigma Xi Grants-in-Aid, North American Benthological Society (NABS) Travel Endowment

Boland: Texas Academy of Sciences Research Award (\$1500, **Funded for \$750**)

Submitted but not funded: Sigma Xi Grants-in-Aid, NABS Travel Endowment

AWARDS EARNED BY UNDERGRADUATES

2005: Rebecca Marfurt, Travel Award (\$285) to the Freshwater Mollusk Conservation Society Meeting in St. Paul, MN.

2006: Brandon Boland, Outstanding Oral Presentation in the Collegiate (i.e. Undergraduate) Academy at the Texas Academy of Sciences, Lamar University. \$300 presented to student.

PEDAGOGICAL WORKSHOPS GIVEN

- June 2006 & July 2005, SPSS and Basic Statistics Workshop. Centre College and St. Olaf College, respectively, Recruited by Associated Colleges of the South and NITLE
- June 2006 & June 2005. Poster Design and Printing. Biology Summer Research Program.

PEDAGOGICAL GRANTS

02/2005	Funds to Attend ACS Environmental Summit at Morehouse College
11/2004	Funds to Attend ACS Keck Workshop on Improving Non-major Science Education
02/2003	Hosting a Guest Speaker: Raising Campus Awareness about the Interaction between Science & Policy (\$946). Environmental Alliance of the Associated Colleges of the South.
03/2000	JumpStart Initiative (3/2000); UND Educational Technology Services, \$1000
Spring 2001	Lilly Fellows Program for the Humanities and Arts, Regional Conference Funding to the TA Program, \$5000

PEDAGOGICAL GRANTS SUBMITTED BUT NOT FUNDED

- 03/2006 Seeking Motivation for Collaborative Research: Understanding the behavioral mechanisms underlying motivation in animal models. \$25,000 Associated Colleges of the South.
- 03/2004 Non-majors poster symposium: Integrating presentation of class research in non-science major classes at Southwestern University. \$10,000 Associated Colleges of the South.

COURSES TAUGHT

First Year Seminar: Multi-chocolated: An Aesthetic, Historical and Scientific Journey into the Wonders of Chocolate (new course, Fall 2007)

Methods in Ecology and Evolution (2 sections, Spring 2007)

Introduction to Animal Behavior (2 section at SU including Fall 2007)

Ecology (2 sections at SU)

Senior Seminar: Aquatic Invasive Species (1 section at SU)

Biodiversity (16 sections at SU including Fall 2007)

Environmental Science (POK) (4 sections at SU), Freshwater and Society (Rhodes, 2002)

Invertebrate Ecology (2 sections at SU)

First Year Seminar Wet N' Wild: Wetland Science in a Changing Landscape (2 sections at SU)

Wetland Ecology and Policy (1 section at Rhodes)

Ecology, Limnology Seminar & Zoology (co-taught at Rhodes with Dr. David Kesler)

INVITED PLENARY ADDRESS

- **R. L. Burks.** May 2002. Littorally complex: linkages between structural, chemical, and behavioural food web interactions in littoral zones. International Shallow Lakes Meeting, Balatonfured, Hungary.

NATIONAL OR INTERNATIONAL CONFERENCE PRESENTATIONS

Category 1: INVITED PAPERS OR SPECIAL SESSIONS (denotes undergraduate author, oral presentation unless otherwise noted, underline represents presenting author if not R. L. Burks)*

1. **Burks, R. L.,** M. A. Barnes, J. Hand, A. K. Youens* and S. A. Hensley*. August 2007. Bad Eggs: An investigation of how natural variability, submersion, and predation may act together to determine the fate of eggs laid by exotic applesnails, *Pomacea insularum*. Oral presentation, Special Session "Ecology and Ecotoxicology of Invasive Species in Inland Waters," 30th Congress of the International Association of Theoretical and Applied Limnology.
2. **Burks, R. L.,** B. B. Boland*, M. A. Barnes*, M. Meerhoff, C. Fosalba and N. Mazzeo. May 2006. The Tale of Two Snails: Comparing and contrasting the ecological roles of a natural versus exotic population of *Pomacea*. Oral Presentation in Applesnail Session. International Conference on Aquatic Invasive Species, Key Biscayne, FL.
3. Hill, A.E.* and **R. L. Burks.** February 2005. What doesn't kill you...may give cues to survival: N vs. P pesticides uniquely impact reproduction in *Daphnia magna* at different scales. American Society of Limnology and Oceanography (ASLO) Aquatic Sciences Meeting. Poster Presentation in Special Session in Undergraduate Research. Salt Lake City, UT.
4. **Burks, R. L.,** H. Michels, M. D. G. Sagarrio, and E. Jeppesen. February 2005. Spineless...but not wimpy: Invertebrate predator *Chaoborus* prompts diel horizontal migration of large-bodied *Daphnia*. ASLO Aquatic Sciences Meeting. Poster Presentation, Special Session: The Role of Zooplankton Predator-Prey Interactions in Structuring Plankton Communities. Salt Lake City, UT.
5. **Burks, R. L.** July 2004. Hierarchical responses by *Daphnia* to multiple cues in shallow lakes. INTECOL - International Wetlands Conference. Invited Special Session: Macrophytes & lakes. Utrecht, The Netherlands.

6. **Burks, R. L.** February 2003. Cues, cues and more cues. *Daphnia* swim away from *Chaoborus*, crushed-up conspecifics and pelagic lake water chemical cues. American Society of Limnology and Oceanography (ASLO) Aquatic Sciences Meeting, Special Session: Tribute to John Gilbert. Salt Lake City, UT.
7. **Burks, R. L.**, A. C. Haines*, and D. M. Lodge. June 2002. Do littoral and pelagic zones 'smell' different? Daphnid behavioral responses to chemical cues from whole lake zones, macrophytes and multiple predators. Poster Presentation in Special Session: Habitat Coupling. ASLO. Victoria, British Columbia.
8. **Burks, R. L.**, E. Jeppesen and D. M. Lodge. June 2000. *Daphnia* in littoral zones: costs and benefits associated with diel horizontal migration in shallow lakes. Invited Oral Presentation, Special Session: The role of aquatic macrophytes in lakes. ASLO. Copenhagen, Denmark.
9. **Burks, R. L.**, E. Jeppesen and D. M. Lodge. May 2000. Planktivorous fishes indirectly enhance prey resources (*Daphnia*) for predacious benthic macroinvertebrates. Invited Presentation, Special Session: The role of fish in benthic food webs. North American Benthological Society (NABS), Colorado.
10. **Burks, R. L.**, E. Jeppesen and D. M. Lodge. May 1999. Responses of pelagic and littoral macroinvertebrates to fish cue and foraging in experimental mesocosms. Special Session: Benthic-Pelagic Linkages, NABS, Duluth, Minnesota.
11. **Burks, R. L.**, E. Jeppesen and D. M. Lodge. October 1998. Chemicals from macrophytes depress *Daphnia* growth in shallow lakes. Invited Presentation. Oikos Nordic Ecology Symposium, Lund, Sweden.
12. **Snively, R. L.** (maiden name) and D. M. Lodge. February 1997. Littoral zone structures reduce *Daphnia* mortality due to fish predation. Special Session: Fish-Zooplankton Interactions. ASLO Aquatic Sciences, Sante Fe, New Mexico, USA.

Category 2: CONTRIBUTED PAPERS AT NATIONAL OR REGIONAL CONFERENCE

(* denotes undergraduate author, underline indicates presenting author if not R. L. Burks)

1. Youens, A. K.*, B. B. Boland* and **R. L. Burks**. March 2007. Growing at a Snail's Pace: Negative impacts of salinity and high density on growth measures of *Pomacea insularum*. Oral Presentation, Texas Academy of Science, Waco, Texas.
2. Boland, B. B.*, A. K. Youens*, M. Meerhoff, C. Fosalba, N. Mazzeo and **R. L. Burks**. March 2007. Juvenile Snails, Adult Appetites: Contrasting resource consumption between two species of applesnails. Oral Presentation, Texas Academy of Science, Waco, Texas.
3. Barnes, M. A.*, A. K. Youens*, S. A. Hensley* and **R. L. Burks**. 2007. In Too Deep: Egg clutch water exposure may suppress hatching and increase increase conspecific predation of eggs in the potentially invasive applesnail, *Pomacea insularum*. Oral Presentation, Texas Academy of Science, Waco, Texas.
4. Barnes, M. A.*, B. B. Boland*, M. Meerhoff, C. Fosalba, N. Mazzeo, and **R. L. Burks**. June 2006. That's the way the egg hatches: Determining patterns in egg size, clutch variability, and hatchling emergence in an exotic versus native population of applesnails. Poster Presentation, North American Benthological Society, Anchorage, AK.
5. Boland, B.*, M. Meerhoff, C. Fosalba, N. Mazzeo, and **R. Burks**. June 2006. Distinct palettes: feeding preferences between native and exotic applesnail populations and the implications for invasion. Poster Presentation, North American Benthological Society, Anchorage, AK.
6. Boland, B.*, M. Meerhoff, C. Fosalba, N. Mazzeo, and **R. Burks**. March 2006. Distinct palettes: Feeding preferences between native and exotic applesnail populations. Oral Presentation, Texas Academy of Science, Beaumont, TX.
7. Barnes, M. A.* and **R. L. Burks**. March 2006. The Snail or the Egg? Early life history factors contribute to invasive success of applesnails. Oral Presentation, Texas Academy of Science, Beaumont, TX.
8. Marfurt, R. K.*, B. Boland*, and **R. L. Burks**. June 2005. Life history variation in invading applesnails (*Pomacea canaliculata*) may pose ecological threat to wetlands. Poster Presentation at North American Benthological Meeting, New Orleans, LA.
9. Marfurt, R. K.* and **R. L. Burks**. May 2005. Invaders from the South: Ecology of the Channeled Applesnail. Poster Presentation at Freshwater Mollusk Conservation Society Meeting, St. Paul, MN.

10. Marfurt, R. K.* and **R. L. Burks**. February 2005. Invaders from the South: Ecology of the Channeled Applesnail. Oral presentation for Associated Colleges of the South Environmental Summit, Atlanta, GA.
11. Haines, A. C.*, **R. L. Burks** and D. M. Lodge. June 2001. Impact of chemical cues from odonates fed different diets on daphnid growth and reproduction. Poster Presentation, NABS, La Crosse, Wisconsin.
12. **Burks, R. L.**, E. Jeppesen and D. M. Lodge. August 1998. Chemicals from macrophytes and fishes depress *Daphnia* growth in shallow lakes. Poster Presentation, Shallow Lakes '98 Conference, Blossin, Germany.
13. Beklioglu, M., F. Landkildehus, E. Jeppesen, M. Søndergaard, O. Ince and **R. L. Burks**. August 1998. Diel changes in distribution of plant-associated microcrustaceans at contrasting densities of 0+ perch (*Perca fluviatilis*) and macrophytes. Oral Presentation, Shallow Lakes '98 Conference, Blossin, Germany.
14. Lauridsen, T. L., E. Jeppesen, S. Mitchell, D. M. Lodge and **R. L. Burks**. August 1998. Horizontal distribution of zooplankton in lakes with contrasting fish densities and nutrient levels. Oral Presentation, Shallow Lakes '98 Conference, Blossin, Germany.
15. **Burks, R. L.**, E. Jeppesen and D. M. Lodge. June 1998. Chemicals from macrophytes and fishes suppress *Daphnia* growth in shallow lakes. Poster presentation. Trophic Interactions. ASLO and The Ecological Society of America (ESA) Joint Meeting, St. Louis, MO, USA.

INVITED LECTURES AND PRESENTATIONS

- **R. L. Burks**. Tale of Two Snails. March 2006, Baylor University. October 2006. Loyola University Chicago.
- **R. L. Burks** and M. A. Barnes.* Feb. 2006. Tale of Two Snails. Rice University.
- **R. L. Burks**. December 2005. Going from Top to Bottom: Connecting Lessons Learned from Research with *Daphnia* and Snails. Facultad de Ciencias, Universidad de Republica de Montevideo, Uruguay.
- **R. L. Burks** and R. Marfurt. March 2005. Abiotic and biotic life history influences on the channelled applesnail (*Pomacea canaliculata*). United States Department of Agriculture Mollusk Action Plan Working Group Meeting. Houston, TX.
- **R. L. Burks**. March 2004. What about the flipside? Reorienting one's view of *Daphnia* migration in shallow lakes. Texas State University.
- **R. L. Burks**. 2002/3 Littorally complex: Understanding food web interactions in shallow lakes (Bucknell University, Muhlenberg College, Oglethorpe University, Rowan University, University of Central Arkansas, Southwestern University, University of Tampa).
- **R. L. Burks**. 2002. To Switch or Not To Switch? How *Daphnia* and aquatic plants act to stabilize alternative stable states in lakes. Austin College.
- **R. L. Burks**. 2001. *Daphnia* in littoral zones: potential costs and benefits associated with diel horizontal migration in shallow lakes. University of Memphis.

ON-CAMPUS PRESENTATIONS (bold indicates presenters; * denotes undergraduate author)

1. **J. P. McDonough***, **C. H. Kyle***, and R. L. Burks. July 2007. The Flow of Research: in Aquatic Ecology: How ecologists reach a research question. Poster presentation. Southwestern Undergraduate Research Group Experiences (SURGE) Banquet.
2. **Kyle, C. H.***, **J. P. McDonough*** and R. L. Burks. July 2007. Pink Eggs and Snails: Oviposition behavior in *Pomacea insularum*. Poster presentation. Southwestern Undergraduate Research Group Experiences (SURGE) Banquet.
3. **Boland, B. B.*** and R. L. Burks. April 2007. A World Apart. Biology Oral Capstone Presentation, Biology Seminar Series.
4. **Youens, A. K.*** and R. L. Burks. April 2007. Moving to Houston: The exotic invasive applesnail *Pomacea insularum*. Biology Oral Capstone Presentation, Biology Seminar Series.

5. **Youens, A. K.***, B. B. Boland* and R. L. Burks. July 2006. Growing at a Snail's Pace: Negative impacts of salinity and high density on growth measures of *P. insularum*. Poster Presentation. SU Biology Summer Research Program Banquet.
6. **Boland, B. B.***, A. K. Youens* and R. L. Burks. July 2006. Dinner for two, but hold the salt: Resource assimilation by juvenile *P. insularum* changes under salinity and density stressors. Poster Presentation.
7. SU Biology Summer Research Program Banquet.
8. **Barnes, M. A.*** and R. L. Burks. April 2006. The Snail or the Egg? Early life history factors contribute to invasive success of applesnails. Oral Presentation, SU Undergraduate Research and Creative Works Symposium.
9. **Boland, B.***, Meerhoff, M., Fosalba, C., Mazzeo, N., and R. Burks. April 2006. Distinct palettes: Feeding preferences between native and exotic applesnail populations. Oral Presentation, SU Undergraduate Research and Creative Works Symposium.
10. **Burks, R. L., M. A. Barnes*** and **B. B. Boland***. April 11th 2006. A Tale of Two Snails: Collaborative research experiences with applesnails. Board of Visitors.
11. **Burks, R. L., M. A. Barnes*** and **B. B. Boland***. February 2006. A Tale of Two Snails and Two Biologists: Insights gained by studying Texas and Uruguayan populations of applesnails. Biology Seminar Series.
12. **Barnes, M. A.*** and R. L. Burks. July 2005. Growth under Pressure: Effects of predator cues on egg clutch efficiency and hatching growth of the Channeled Applesnail, *Pomacea "canaliculata."* SU Biology Summer Research Program.
13. **Boland, B. B.*** and R. L. Burks. July 2005. Getting it to "Gel": Developing field and laboratory assay methods to investigate invasive channeled applesnails. Poster Presentation. SU Biology Summer Research Program Banquet.
14. **Marfurt, R. K.*** and R. L. Burks. April 2005. Abiotic and biotic influences on the life history of the Channeled Applesnail (*Pomacea canaliculata*). Oral Presentation. SU Undergraduate Research and Creative Works Symposium.
15. **Hill, A. E.*** and R. L. Burks. April 2005. What doesn't kill you...may give cues to survival: N vs. P pesticides uniquely impact reproduction in *Daphnia magna* at different scales. Poster Presentation. SU Undergraduate Research and Creative Works Symposium.
16. **R. L. Burks**. April 2004. Taking the Red Pill: A Journey into Ecoinformatics. Biology Seminar Series.

UNIVERSITY SERVICE - Southwestern University

- Nov. 2007 Homecoming Lecture: The Wonders of Chocolate for Development Event
- 2007 Search Committee Mathematics, Outside Member
- 2006 – current Chairperson, Animal Behavior Program
- 2003-2006 Animal Behavior Program Committee (completed 10-year review)
- 2006 - current Natural Sciences Division Secretary
- 2006-2007 Integrated Marking and Advisory Board
- 2005-2007 Cullen Faculty Development Committee
- 2005 - current Intercultural Perspective Committee
- 2002-2006 Environmental Studies Program Committee (completed 5-year review)
- 2002 – current *Phi Beta Kappa* Committee

DEPARTMENTAL SERVICE - Southwestern University

- 2003-2007, Biology Assessment Exam Coordinator; Maintain department website
- Creator and Publisher of *BioScope*, Biology Department newsletter (12 issues as of 11/2007)
- 2005 Coordinator, Biology Summer Research Program
- Participant in Biology Department 5-year Review
- Participant in Curricular Reform and Grant Preparations for Howard Hughes Grant
- Search Committees: 2003-2004, Molecular Biologist. Spring 2004, Visiting Biologist (Chair), 2004-2005 Brown Chair in Evolutionary Biology
- Capstones: Research Advisor: Rebecca Marfurt '05, Austin Hill '05, Cathy Duong '06, Matt Barnes '06, Brandon Boland '07, Abby Youens '07 and Sarah Hensley '08

Ecology Capstone Advisor: Jason Jones '07, Josh Weinstein '07 and Jacob Dickson '08
 Capstone Committee: Jana Marshall, Aaron Guel;
 ES Intern Supervisor: Sarah Wolters, Courtney Bleche
 Faculty Advisor: 19 students currently

COMMUNITY SERVICE

Biology Alumni Advisory Board, Loyola University Chicago
 Professional Mentor for Meg Fencil, 5th yr graduate student from UT Marine Science Institute (07/2007-now)
 SMARTeams Outreach Program, Williamson Elementary, Georgetown, TX (Spring and Fall 2007)
 Question & Answer Session, Liberal Phrases: Language lessons from life on the tenure track at a small liberal arts college (Oct. 2006, University of Notre Dame)
 Guest lecture on Biodiversity and Texas, Houston-Tillotsen (Oct. 2005)
 DIALOG Panel, Careers within and beyond Academia, ASLO Salt Lake City, Utah (Feb. 2005)
 Member, Biology Action Team, Williamson County, TX (appointed Spring 2005)
 Mentor, Georgetown High School Senior Capstone, Spring 2004
 Panelist, How to Land an Academic Job, University of Texas, August 2003
 Results Analyst, Information Fluency Survey for General Biology Curriculum, Summer 2002,
 Associated Colleges of the South Grant (PI = G. Lindquister)
 Poster Judge, Battle of the Minds: Undergraduate Research & Creative Activity Symposium, April 2002, RC
 Invited Workshop Speaker, Topics in Teaching: Integration of Teaching and Results, February 2002, RC

PROFESSIONAL MEMBERSHIPS

- 2006 – present, Scientific Committee, Shallow Lakes Meeting '08
- 2005 – present, *Sigma Xi* Research Society elected member
- 2004 – present, Texas Academy of Sciences member
 - 2007, Chair for Marine and Freshwater Section
 - 2006, Vice-Chairperson for Marine and Freshwater Ecology Section
- 2004 – present, National Association of Biology Teachers member
- 1997 – present, American Society of Limnology and Oceanography:
 - 2005-2007, Meetings Committee
 - 2001-present, Student Poster Judge
 - 1997 – 1999 ASLO Endowment Committee Member
- 1997 – present, Ecological Society of America (ESA) member
- 1992 – present, North American Benthological Society (NABS) member:
 - 2006, Appointed Sponsorship Committee (2007 Chair)
 - 2002, International Profile Committee
 - 2001, Organized Student Presentation Judging
 - 2001-present, Student Presentation Judge (orals and posters)
 - 1999, Appointed member of the NABS Long-Range Planning Committee
 - 1998 – 1999 Chairperson, NABS Graduate Resources Committee (GRC)
 - 1996 – 1997 NABS Endowment Festivities Coordinator
 - 1996 Co-founder, NABS GRC to address student concerns, 3 year member
- 2002 – 2004, American Institute of Biological Sciences member
- 2001 – 2003, Council for Undergraduate Research (CUR) member
- 2001 – 2003, Tennessee Academy of Sciences (TAS) member
- 1999 – 2003, Association of Women in Science (AWIS) member
- 1999 – 2002, American Scandinavian Foundation (ASF) member
- 1999 – 2002, Fulbright Alumni Association member

REVIEWER ACTIVITIES - *Biological Invasions (new in 2007), Fresenius Environmental Bulletin, Archiv für Hydrobiologie, Canadian Journal of Fisheries and Aquatic Sciences, Ecology, Ethology, Functional Ecology, Freshwater Biology, Hydrobiologia, Journal of Chemical Ecology, Journal of Experimental Marine Biology and Ecology, Limnology and Oceanography, Marine & Freshwater Research, Ecology Program, National Science Foundation*

PEDAGOGICAL - *John Wiley & Son, Current Contents, Pearson (new: Campus Ecology), Sinauer Publishing (new: Cain's Ecology), ETS (new)*

MEDIA COVERAGE –

- **General Publicity:**
 - Who's Who at Southwestern: <http://www.southwestern.edu/whoswho-archive/0507fac.html> and 12/05
- **Teaching:**
 - 12./06/07: SU Website: Class uses chocolate to help students learn about topics from advertising to evolution:
 - <http://www.southwestern.edu/cgi-bin/newsroom/article.cgi?id=55>
 - 12/30/07: *The Houston Chronicle*: "A course that's coated in chocolate"
 - <http://www.chron.com/disp/story.mpl/metropolitan/5410714.html>
 - Also carried by *The Austin American Statesman* as "Southwestern professor finds a calling in chocolate."
- **Research:**
 - May and December 2006, Filmed for Texas Parks and Wildlife show;
 - Documentary premiering on TV show March 9th 2008
 - 01/18/06: *The Williamson County Sun*; "Sizable snails lure SU Prof, student to Uruguay"
 - Southwestern University Student, Professor To Spend Holidays Conducting Research In Uruguay at <http://www.southwestern.edu/newsroom/news/051205.html>
- **Outreach:**
 - 04/26/07: *The Williamson County Sun*, "Results of Pairings: No Doubt, they're SMArT"

COLIN KYLE

CURRICULUM VITA

Box 7252, Southwestern University, 1001 E. University Ave., Georgetown, TX 78626
tel: 817-914-5851 || kylec@southwestern.edu

EDUCATION

Southwestern University Pursuing *B.S. in Biology and a Minor in Mathematics*;
Georgetown, TX Anticipated Graduation: 5/2009
Cumulative GPA: 3.59/4; Biology GPA: 3.41/4

Lamar High School Graduated with Honors (#14 of 554)
Arlington, TX May 2005

PROFESSIONAL EXPERIENCE

- Jan. 2007 - current Undergraduate Researcher in Aquatic Ecology lab
Advisor: Dr. Romi L. Burks
Topic: Oviposition preferences of *P. insularum*
- May 2007 – July 2007 Southwestern Undergraduate Research Experience
(SURGE) Program Participant
Advisor: Dr. Romi L. Burks
- Aug. 2006 – Dec. 2006 Lab Manager of Aquatic Ecology Lab
Advisor: Dr. Romi L. Burks
- Jan. 2006 – May 2006 Lab Assistant in Aquatic Ecology Lab
Advisor: Dr. Romi L. Burks

ABSTRACTS SUBMITTED

- **Kyle, C.**, McDonough, J., and Burks, R. Anticipated March 2008. Location, Location, Location: Laboratory experiment shows invasive *P. insularum* choose elephant ear as oviposition sites. Oral presentation, Texas Academy of Science, Corpus Christi, TX.

RELEVANT COURSEWORK

- Introductory Biology (Genes and Molecules, Genetics and Evolution, Biodiversity and Interactions, Cell Biology)
- Upper-Level Biology: Methods in Ecology and Evolutionary Biology, Methods in Cellular and Molecular Biology, Ecology, and Independent Research
- Physical Sciences: Physics 1 and 2, Statistics, Calculus 1, 2 and 3, Geometry and, Topology
- Chemistry: General Chemistry, Organic Chemistry 1 and 2, and Biochemistry

PROFESSIONAL MEMBERSHIPS AND AWARDS

- 2008-Present
 - Texas Academy of Science Undergraduate member
- 2007-Present
 - *Beta Beta Beta* active member
- Dean's List (3 semesters)

GRANT WRITING EXPERIENCE

- CURRENTLY SUBMITTED:
 - Joe S. Mundy Fellowship for Faculty-Student Collaborative Research (~\$9000)

RESEARCH SKILLS

- Proficiency in Microsoft Excel, Word, PowerPoint and SPSS
- Experience constructing and maintaining large flow-through aquarium setups
- Experience collecting data and specimens in the field (Armand Bayou and Town Lake)
-

REFERENCES

- DR. ROMI L. BURKS (burksr@southwestern.edu; Phone: 512-863-1280)
 - Assistant Professor, Department of Biology, Southwestern University
- DR. MARIA C. TODD (toddm@southwestern.edu; Phone: 512-863-1983)
 - Assistant Professor, Department of Biology, Southwestern University

JAMES McDONOUGH

CURRICULUM VITA

Box 6998, Southwestern University, 1001 E. University Ave., Georgetown, TX 78626
tel: 210-854-4905 || mcdonouj@southwestern.edu

EDUCATION

Southwestern University
Georgetown, TX

Pursuing *B.S. in Biology*;
Anticipated Graduation: 5/2009
Cumulative GPA: 3.32/4; Biology GPA: 3.13/4

Texas Military Institute
San Antonio, TX

Graduated with Honors
May 2005

PROFESSIONAL EXPERIENCE

- May-July, 2007 Undergraduate Research Student, SURGE (Southwestern Undergraduate Research Group Experience) Southwestern University
- Aug. 2007 - current Undergraduate Researcher in Aquatic Ecology lab
Advisor: Dr. Romi L. Burks

ABSTRACTS SUBMITTED

- **Pink Eggs and Snails: Oviposition Behavior in *Pomacea insularum*.**
James P. McDonough, Colin H. Kyle and Dr. Romi L. Burks, Department of Biology, Southwestern University, Georgetown, TX. Oral presentation, Texas Academy of Science, Corpus Christi, TX.

RELEVANT COURSEWORK

- Introductory Biology (Biodiversity, Cell Biology, Genetics and Evolution, Genes and Molecules)
- Upper-Level Biology: Methods in Ecology and Evolution, Methods in Cellular and Microbiology, Ecology, Cell Physiology
- Physical Sciences: Calculus, Statistics and Physics
- Chemistry: General Chemistry, Organic Chemistry, and Biochemistry

PROFESSIONAL MEMBERSHIPS

- 2008-Present
 - Texas Academy of Science Undergraduate member
- 2006-Present
 - *Beta Beta Beta* active member
 - *Kappa Upsilon Chi* Fraternity

GRANT WRITING EXPERIENCE

- CURRENTLY SUBMITTED:
 - Texas Academy of Science Student Research Award (this grant; \$1500)
 - Joe S. Mundy Fellowship for Faculty-Student Collaborative Research (~\$9000)

RESEARCH SKILLS

- Proficiency in Microsoft Excel, Word and PowerPoint
- Moderate degree of experience with SPSS

REFERENCES

- DR. ROMI L. BURKS (burksr@southwestern.edu; Phone: 512-863-1280)
 - Assistant Professor, Department of Biology, Southwestern University
- DR. MARIA C. TODD (toddm@southwestern.edu; Phone: 512-863-1983)
 - Assistant Professor, Department of Biology, Southwestern University

Part II: Project Outcomes

Outcomes:

1. Dr. Burks will present a poster about applesnails at the North American Benthological Society meeting in May 2008.
2. James and Colin will present oviposition trends by *P. insularum* at the Shallow Lakes Meeting in Uruguay.
3. Colin and James will present at the Texas Academy of Sciences in March 2008, at the Creative Works Symposium in April 2008 and 2009.
4. This project will be the foundation of 2 capstones in the Biology Department.
5. We expect that this work will contribute to at least one peer-reviewed publication regarding the basic ecology of applesnails.
6. The results of this project will also provide more fuel for a revision of an external grant proposal to the Ecology Program of the National Science Foundation.

Nature of the collaboration: Dr. Burks, Colin and James have worked together establishing their research direction since May of 2007. During summer 2007, our initial efforts culminated in a successful laboratory experiment and preliminary field data from Armand Bayou. The proposed research works best with two students because of the intensive field work. The students retain responsibility for experimental design and construction under the guidance of Dr. Burks. The students also collect the majority of the data themselves. In late November and early December in Uruguay, Dr. Burks, Colin and James will be working side by side, either collecting applesnails in the field or conducting experiments. Following each experiment and continuing through the 2008-2009 academic year, the team will collaborate with data analysis and manuscript writing.

Past Success with Mundy: Dr. Burks has an established record of success in collaborating with students on scholarship and with international collaborations. Using Mundy funding during 2005-2006, Dr. Burks and Brandon Boland '07 planned and executed a series of experiments with these two populations of snails that resulted in 12 presentations (3 national, 2 regional and 7 on-campus). In addition, this past work has been accepted for publication in *The Journal of Molluscan Studies* with Brandon as the first author (Boland et al. 2008).

Student Qualifications for the work: Both Colin Kyle and James McDonough comprise solid biology majors with respectable grade point averages that have demonstrated their commitment to research through participation in the Southwestern Undergraduate Research Group Experience (SURGE) during summer 2007. Both show promise as researchers. James and Colin work very effectively as a pair, each bringing a different skill set. As juniors now, they have already worked in the lab for nearly a year and will also still be here the semester following the conclusion of the experimental work proposed.

References

1. Boland*, B. B., M. Meerhoff, C. Fosalba, N. Mazzeo, M. A. Barnes* and R. L. Burks. Juvenile snails, adult appetites: Contrasting resource consumption between two species of applesnails. *Journal of Molluscan Studies* DOI: 10.1093/mollus/eym045.
2. Carlsson, N. O. L., and C. Brönmark. 2006. Size-dependent effects of an invasive herbivorous snail (*Pomacea canaliculata*) on macrophytes and periphyton in Asian wetlands. *Freshwater Biology* 51: 695-704.
3. Cazzigna, N. 2006. *Pomacea canaliculata*: Harmless and useless in its natural realm (Argentina). In: Joshi R, Sebastian L, editors. *Global Advancements in Ecology and Management of Golden Apple Snails*. Philippines: Philippine Rice Research Institute: 37-60.
4. Howells R.G., L.E. Burlakova, A.Y. Karatayev, R.K. Marfurt, and R.L. Burks. 2006. Native and Introduced Ampullariidae in North America: History, Status, and Ecology. In: Joshi R, Sebastian L, editors. *Global Advancements in Ecology and Management of Golden Apple Snails*. Philippines: Philippine Rice Research Institute: 73-112.
5. Keller, R. P., Drake, J. M., and D. M. Lodge. 2006. Fecundity as a basis for risk assessment of nonindigenous freshwater molluscs. *Conservation Biology* 21: 191-200.
6. Lowe, S., Brown, M., Boudjelas, S., De Poorter, M. 2004. 100 of the world's worst invasive alien species. In: *Global Invasive Species Database, The Invasive Species Specialist Group*, 1-12.
7. Ludyansky, M. L. and D. McDonald. 1993. Impact of the zebra mussel, a bivalve invader. *BioScience* 43: 533-554.
8. Pimentel, D., Zuniga, R., and D. Morrison. 2005. Update on the environmental and economic costs associated with alien-invasive species in the United States. *Ecological Economics* 52: 273-288.
9. Rawlings, T. A., Hayes, K. A., Cowie, R. H., and T. M. Collins. 2007. The identity, distribution, and impacts of non-native apple snails in the continental United States. *BMC Evolutionary Biology* 7: 97-111.

Timeline:

Note: To attend the meeting and maximize our time in Uruguay, we will need to depart the weekend before Thanksgiving. Dr. Burks will be teaching Biodiversity. Group projects and the last exam will be conducted on-line during the last week of classes and final grades will be submitted via WebAdvisor. Colin and James acknowledge that they will need to make whatever accommodations necessary to make up coursework and take examinations. January is not an option for our collaborators.

TBD	Late May/early June	3 field days at Armand Bayou
TBD	August or September	2 field days at Armand Bayou
Friday	11/21	Departure
Saturday	11/22	arrival in Montevideo, Uruguay; unload supplies
Sunday	11/23	Travel to Punta de Este; 1st look for sites
M - F	11/24 - 11/28	Shallow Lakes meeting; present poster
Sa - Su	11/29 - 11/30	Field scouting, collect snails and gather materials; return to Montevideo
Monday	12/1	set up 1 st field experiment on oviposition (Q1 & Q3)
Tu - Sa	12/2 - 12/6	Dr. Burks, Colin and James do field work
Thursday	12/4	Set up 2 nd field experiment on surface characteristics (Q2)
Sunday	12/7	Colin and James depart; Dr. Burks stays to continue data collection
Sunday	12/21	Dr. Burks departs Uruguay

The timeline looks very intense and it is. However, the logistical resources in Uruguay will help make it possible.