



**GREETING FROM THE DEPARTMENT HEAD**

In January of 2008, Dr. Linda Houtkooper assumed a new position with the College of Agriculture and Life Sciences. As the new Department Head, I would like to take this opportunity to thank her for her leadership as Department Head for the past five years, for her help in my transition to Department Head and to wish her well in her new endeavors.

In this new role, I have learned much about our Department. Did you know that despite dwindling federal research dollars, everyone on our faculty engaged in research has extramural funding or that collectively, our faculty published more than 50 papers in peer-reviewed journals this past year? This issue of the newsletter highlights some of the numerous research presentations, grants, papers and press interviews of our faculty. Speaking of research accomplishments, new to the newsletter is an interview that details the exciting work of Dr. David Hartshorne. Did you know that David has published more than 220 papers and that his research in how muscles contract has been funded by the NIH for the past 40 years? Quite a research record!

Did you know that last year our extension programs reached more than 2 million people in the State of Arizona? Some of these very successful outreach programs are featured in this newsletter in a brief discussion provided by Vanessa Farrell, a graduate student and extension staff member.

Did you know that we currently train 23 graduate students and teach and advise approximately 400 undergraduates? Yep. This past year our faculty taught 32 courses and collectively taught over 4,000 student credit hours.

All of the many accomplishments of our faculty and students could not be achieved without the skill and cooperative efforts of our dedicated staff. I would like to acknowledge all our staff including those working our various programs, as well as in the main office and to welcome our newest office staff member Jennifer Murphy. Finally, I would like to thank all of you for your encouragement and support. Because you do your jobs so well, you make my job easier. Read and enjoy.

Sincerely,

Joy



**GRANTS**

*A Mediterranean Diet Emphasizing Walnuts in Lactating Women: Effects of Maternal Estrogen Concentrations, Inflammation, Oxidative Stress and Body Weight.*

Principal Investigator: Nicole Stendell-Hollis; Co-Principal Investigator: Dr. Cynthia Thomson  
Funded by: California Walnut Commission

*Novel Inhibitors of mPGES-1 as Anti-Cancer Drugs.*

Principal Investigator: Dr. Emmanuelle Meuillet  
Funded by: SPORE Pilot Project

*Novel Inhibitors of mPGES-1 as Anti-Cancer Drugs.*

Principal Investigator: Dr. Emmanuelle Meuillet  
Funded by: American Cancer Society-IRG Project

*Efficacy of Vegetables to Reduce Oxidative Stress & Inflammation in Overweight Women: A Dose Response Study.* Principal Investigator: Dr. Cynthia Thomson

Funded by: United States Department of Agriculture

*Human Intervention Study of Carrot Chemopreventive Properties in Breast Cancer Survivors.* Principal Investigator: Dr. Cynthia Thomson

Funded by: Texas AgriLife Research, Sub-Contract with United States Department of Agriculture

**WELCOME**

**Janki Bhakta** joined Dr. Winzerling's laboratory in April, 2008 as an Undergraduate Researcher.

**Adriana Gandara-Woongg** came to the Department as a Visiting Scientist from Mexico where she worked with Luz Vazquez Moreno. She joined Dr. Winzerling's laboratory in March, 2008.

**Jennifer Murphy** joined our Department in January, 2008 as an Accountant to support our business office. Jennifer previously worked at the University Research Instrumentation Center and has been with the University for 4 years.

**Oliver Grundmann, Ph.D.** joined Dr. Kirsten Limesand's laboratory in January, 2008 as a Research Associate. He received his B.S. in Pharmacy from the University of Muenster in Germany. He then received an M.S. in Forensic Toxicology and a Ph.D. in Pharmaceutical Sciences from the University of Florida. His research will focus on the prevention of salivary gland damage following radiation therapy in head and neck cancer by delayed IGF-1 administration.

**Ashleigh Sobczak** works in our business office as a Student Worker/Office Assistant. She joined our Department in September, 2007 and plans to continue with us through the summer. She is currently in her 2nd year with the University as a Nutritional Sciences major.

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## FACULTY PUBLICATIONS

### S. GOING *et al.*

Dual-Energy X-Ray Absorptiometry is a Valid Tool for Assessing Skeletal Muscle Mass in Older Women. *Journal of Nutrition*, 137(12): 2775-2780, 2007.

Maintenance of Weight Loss Through Internet. *Obesity Research*, doi: 10.1038/oby.2008.19, Feb., 2008.

Psychosocial and Behavioral Profile and Predictors of Self-Reported Energy Underreporting in Obese Middle-Aged Women. *Journal of the American Dietetic Association*, 108, 114-119, 2008.

### D. ROMAGNOLO *et al.*

Involvement of a Specificity Proteins-Binding Element in Regulation of Basal and Estrogen-Induced Transcription Activity of the BRCA-1 Gene. *Breast Cancer Research*, 10(2): R29, 2008.

*Phytochemicals and Anticancer Mechanisms*. CAB International, Botanical Medicine in Clinical Practice, 40: 386-399, 2008.

### C. THOMSON *et al.*

Use of Recovery Biomarkers to Calibrate Nutrient Consumption Self-Reports in the Women's Health Initiative. *Am J Epidemiol.*, May; 167(10) 2008.

Plasma and Dietary Carotenoids are Associated with Reduced Oxidative Stress in Women Previously Treated for Breast Cancer. *CEBP*. 16(10): 2008-2015, 2008.

*The Psychosocial and Behavioral Profile and Predictors of Self-Reported Energy Underreporting in Obese Middle-Aged Women*. *Journal of the American Dietetic Association*, 108(1): 114-119, 2008.

## FACULTY IN THE NEWS

**DR. HOWELL** - On January 24th, Dr. Howell was featured in two articles in the Arizona Daily Star. One was titled "Take Care Using Salt." Featured is Dr. Howell and Susan Bristol, Clinical Nutrition Manager (R.D., University Medical Center) addressing the importance of not using too much salt in your diet and offered healthy alternatives at meal times, important information on food additives, and different types of salts available to consumers (<http://www.azstarnet.com/sn/printDS/220459>). The second, "UA Retention of Faculty Improves", featured Dr. Howell and President Shelton and covered the importance of retaining faculty at the University of Arizona (<http://www.azstatnet.com/sn/printDS/221019>).

On April 7th, Dr. Howell was again featured in an article in the Arizona Daily Star, titled "Report Cites UA Med School Crisis." Dr. Howell and Dr. Philip Malan, Vice Dean for Academic Affairs, addressed the impact of the amount of time UA doctors must give to their clinical practice, in order to generate profits, reducing their time spent on academic research and teaching (<http://www.azstarnet.com/sn/printDS/233182>).

**DR. ROMAGNOLO** - Congratulations to Dr. Romagnolo who is among the top three nominees for the Chair-Elect position for the Nutrient-Gene Interactions - Research Interest Section of the American Society of Nutrition. The elected officer will join the Advisory Board as Chair-Elect on June 1, 2008.

**DR. SPARKS** - The Tucson Citizen interviewed Dr. Sparks regarding her Mon Ami Bed and Breakfast. Read her interview at the following link (<http://www.tucsoncitizen.com/ss/taste/84505>).

## FACULTY PRESENTATIONS, SEMINARS AND CONFERENCES

### DR. GEISER

Presentation: "Effect of CI-976 on Ferritin Secretion and Viability in *Aedes Aegypti*," *Experimental Biology* 2008, San Diego, CA, April, 2008.

### DR. HONGU

Inited Presentation: "Where is the Fat? – How to Measure Body Fat Percentage" at the East Social Center, Green Valley, AZ, on January, 2008 and at City Hall Depot, Wilcox, AZ on February, 2008.

Inited Presentation: "Understanding Your Body Fat Percentage: How Much Body Fat is Healthy?" at Maricopa County Cooperative Extension Office, Phoenix, AZ, April, 2008.

Inited Presentation: "Healthy Bodies, Healthy Minds, a Healthy Environment." Dr. Hongu and Kristin D. Wisneski, B.S. of the Office of Arid Lands Studies at Healthy Lifestyle Meeting, Pima County Cooperative Extension Office, March, 2008.

Inited Presentation: Dr. Hongu also had hands-on activity with Global Positioning System (GPS); "Fun with GPS!" at the Healthy Lifestyle Meeting, Pima County Cooperative Extension Office. The activity with GPS receiver was designed by Dr. Barron J. Orr, Associate Professor and Geospatial Extension Specialist, March, 2008.

Presentation: "Healthy Bodies, Healthy Minds, A Healthy Environment," University of Arizona, Department of Nutritional Sciences Seminar Series, April, 2008.



Dr. Nobuko (Kay) Hongu



Dr. Barron J. Orr

### DR. LIMESAND

Inited Presentation: "Mechanisms of IGF-1 Mediated Rescue of Radiation-Induced Salivary Gland Dysfunction" within a symposium titled "NIDCR 60<sup>th</sup> Anniversary Symposium: Looking Toward the Future" at the American Association for Dental Research Conference in Dallas, TX, April, 2008.

### DR. MEUILLET

Presentation: "Nutritional Modulation of the Plasma Membrane Composition Affects the IGF-IR Signaling in Colon Cancer." University of Arizona, Department of Nutritional Sciences Seminar Series, February, 2008.

Seminar: "Development of Novel AKT Inhibitors," Biochemistry, Department of Nutritional Sciences Seminar Series, April, 2008.

Workshop: "A Novel Class of Drug for Cancer and Inflammation," McGuire Entrepreneurship Program Workshop, Eller College, University of Arizona, May, 2008.

### DR. THOMSON

Inited Presentation: "Diet, Nutrition & Cancer-The Latest Findings on Diagnosis, Treatment and Prevention," Arizona Cancer Center, Community Lecture Series, Oro Valley, AZ, March, 2008.

Conference: Washington State Fruit Commission, Yakima, WA, January, 2008.

Conferences: International Life Sciences Institute (ILSI) Annual Conference, Puerto Rico, January, 2008; Program of Integrative Medicine (PIM) Annual Conference, Phoenix, AZ, April, 2008.

## AWARDS, HONORS AND PROMOTIONS

**Donna Bourbon** was promoted to Program Coordinator for Instruction.

**Dawn Geiser, Ph.D.** was promoted to Research Assistant Professor and she also received an American Society for Biochemistry and Molecular Biology Post-Doctoral Travel Award.

**Wanda Howell, Ph.D.** received the Bumps Tribolet Award from the Arizona Student Union Association (ASUA) at their "Evening of Excellence" ceremony on April 17, 2008. This award is given by the ASUA Senate to a member of University faculty or staff for their commitment and dedication to service to the students of the University community.

**Jennifer Reeves, M.Ed.** was promoted to Associate Research Scientist.

## UNDERGRADUATE STUDENT AWARDS AND PRESENTATIONS

**Lauren Collick** - received the Outstanding Dietetic Student Award from the Arizona Dietetic Association.

**Stacey Borrego** - presented at the Biochemistry & Molecular Biophysics Undergraduate Thesis Poster Session, Tucson, AZ, May, 2008.

**Stacey Borrego** and **Lissette Velasquez** - each received Federation of American Societies for Experimental Biology (FASEB), Minority Access to Research Careers (MARC) Travel Award.

**Stacey Borrego** and **Lissette Velasquez** - each received a Honors College Undergraduate Research Grant.

**Jamie Elliott** - was accepted into the Undergraduate Mentoring Program in Research Education (UMPIRE) for the 2007 - 2008 academic year. She presented her poster at the UMPIRE/Outstanding Senior Luncheon in May, 2008. Jamie was also awarded Outstanding Dietetic Student Award from the Southern District Dietetic Association; and received a Shillingberg Travel Award from the College of Agriculture and Life Sciences.

**Lissette Velasquez** - was awarded the American Society for BioChemistry and Molecular Biology Undergraduate Poster Competition Honorable Mention.

**Jamie M. Wise** - presented, "Encouraging Physical Activity with Technology: Assessing the Potential Role of GPS and Geographic Information Systems (GIS)", 17th Annual Statewide Arizona/NASA Space Grant Symposium at Kuiper Space Sciences, The University of Arizona, April, 2008.



Jamie Wise

## NUTRITIONAL SCIENCES CLUB

**The Nutritional Sciences Club** is currently selling recipe books as a fundraiser. The recipes can help to expand knowledge of nutrition and lifestyle and how these can lead to a longer and healthier life. This book is full of great ideas and offers a variety of recipes for any occasion. The books are available for purchase in the business office, Shantz Building, Room 309 for \$5.00.

## POSTER PRESENTATIONS

by our students at Experimental Biology 2008, San Diego, CA, April, 2008.

**Cori Sweet** - "Effects of a Green Tea Intervention on Anthropometrics, Intake, and Glucose Levels in Breast Cancer Survivors."

**Lissette S. Velasquez** - "Transferrin Expression Profile During Bacteria Infection in *Aedes aegypti* Mosquitoes."

**Stacey L. Borrego** - "Characterization of Mosquito Iron Regulatory Protein 1 in *Aedes aegypti* Mosquito."

**Jamie L. Elliott** - "The Effects of Iron Overload and Deprivation on Iron Metabolic Proteins in *Anopheles gambiae* 4a3b Cells."

## GRADUATE DEGREES



**Doctor of Philosophy, Laura L. Hernandez**

In June, Laura will begin her new journey as a Post-Doctoral Fellow at the University of Cincinnati, working for Dr. Nelson Horseman, in the Department of Cellular and Molecular Biology. Dr. Nelson is a mammary physiologist and was the original discoverer of serotonin's function in the human and mouse mammary glands. Laura will continue to study serotonin and its effects in a variety of models, mouse, human and bovine. They will continue collaborating with Dr. Bob Collier of the Department of Animal Sciences, University of Arizona.



**Doctor of Philosophy, Melanie Hingle**

In August, Melanie will begin a 1-year position as a Post-Doctoral Associate at the USDA-ARS Children's Nutrition Research Center at Baylor University in Houston, Texas working with Dr. Tom Baranowski. Her research will focus on behavioral nutrition theory, specifically how parental attitudes, beliefs and values influence child feeding practices.



**Doctor of Philosophy, Renu Stephen**

Renu is a faculty member at the Arizona Cancer Center working on a clinical imaging project with Alison Stopeck. The project is evaluating the use of Diffusion-Weighted MRI as an early predictor of therapeutic response in breast cancer patients with metastases to bone and liver.

## DEPARTMENT OUTREACH Increases Nutrition Education and Physical Activity in the Community

The **Arizona Nutrition Network** (AzNN) is a state-wide partnership of health departments, community organizations, and health professionals, including the Nutritional Sciences Department at the University of Arizona. The \$2 million USDA Federal Reimbursement Grant managed by Dr. Scottie Misner, encourages families to adopt behaviors consistent with the Dietary Guidelines of America and MyPyramid, as well as to foster positive behaviors that promote nutrition and health, and reduce the risk of obesity and chronic diseases. AzNN activities are directed towards low income families and their children.



*Nutrition Students Hannah Berge and Randi Byrd teach students about MyPyramid*



*Food, Fun, and Fitness Field Day*

This year the Nutritional Sciences Department AzNN has provided more than **\$108,000** in funds to support nutrition and physical activity in qualifying schools and recreation programs, in reimbursement for over **20,000** hours of nutrition and physical activity education. Over **26,000** low income students have been reached. In addition to providing funding and technical assistance, AzNN has facilitated nutrition and physical activity events in over 17 elementary schools, 6 middle schools, and 2 high schools this year. Laurel Jacobs, Program Coordinator, met with City Councilwoman, Karen Ulich and Erin Nurs, MPH intern and with U.S. Congresswoman Gabrielle Gifford's office to foster greater collaborations. The Department of Nutritional Sciences AzNN team includes: Vanessa Farrell M.S. R.D., Jennifer Reeves M.Ed., Heather Ottenbacher M.S., R.D., Laurel Jacobs MPH, and Jennifer Martinez.

## RETIREMENTS

**Margareta Berggren** Congratulations to Margareta on her retirement in December, 2007. Margareta attended the Chemical Technological Institute in Sodertalje, Sweden, where she received her B.S. in Biological Research in 1963. Her experience and background include working at Stockholm University, University of California-Davis, and the Mayo Clinic and Foundation in Minnesota. She arrived at the University of Arizona in 1992 where she worked as the Research Specialist Senior in the laboratory of Dr. Powis at the Arizona Cancer Center. In July, 2004 she joined Dr. Meuillet's laboratory where she assumed the position of Coordinator, Cancer and Diabetes Research in the Department of Nutritional Sciences. In her 15 years of working for the University, she made significant contributions. She is an accomplished scientist and her track record includes over 54 publications. Her knowledge and experience in the field of cancer, drug development and diabetes made her a very valuable lab manager and coordinator in the laboratory. She is a mother of two children with 3 grandchildren. Margareta has gone back home to Sweden for the summer. She is traveling and enjoying her family.



*Phyllis Reid*

**Phyllis Reid** Phyllis earned a B.S. in Chemistry from Marywood College, Scranton, PA in 1968 and worked for a pharmaceutical company in New York before moving to Tucson in January, 1971. She was hired in February, 1971 as a Laboratory Technician in the Poultry Science Dept., advancing to Research Specialist, Sr. in the Animal Sciences Dept. by 1991. For 24 years she managed Dr. Bobby Reid's laboratory. Following his death in 2005, she managed Dr. Wanda Howell's laboratory. She also provided technical support for Dr. Cynthia Thomson for 6 years and for Dr. Scott Going since July, 2003. During 37 years at the University she co-authored 26 journal articles, 43 abstracts, and completed all of the requirements for a Ph.D. in Nutritional Sciences with the exception of writing her dissertation. In 2000, Phyllis received the College of Agriculture and Life Sciences Research Staff of the Year Award. In December, 2007 she retired. Phyllis' retirement plans include providing day care for her grandchildren, and expanding her volunteer activities at St. Cyril of Alexandria. She is also looking forward to traveling, learning Italian and Hebrew, working on stitchery projects, and walking more half-marathons.

## ALUMNI AWARD

Alumnus **Robyn DeBell, M.S. R.D.** was honored at the Annual Spring Awards Banquet at the Student Union Memorial Center on May 2, 2008 and received the College of Agriculture and Life Sciences Alumni Achievement Award. Robyn received her Bachelor of Science in Nutritional Sciences in 1968, and her Master's in Dietetics in 1972. She is a member of the Center for Physical Activity and Nutrition (CPAN) Advisory Committee. Robyn is currently a Nutrition Educator and Instructor for Scottsdale Healthcare Shea, Scottsdale, Arizona.

## DEPARTMENTAL ENDOWMENT FUNDS

The Nutritional Sciences Department is thankful for the continuing support we receive from our alumni and friends. Some of these past contributions have been given with a specific project in mind. For example, Dr. Fred Wolfe and Dr. William MacCaughy together raised \$10,000 to create the Nutritional Sciences Department Endowment Fund to support highest priority Departmental Programs.

If you would like to help support programs such as this or for information on other available Endowment opportunities, please contact Joy Winzerling, Department Head and Associate Professor at [jwinzerl@ag.arizona.edu](mailto:jwinzerl@ag.arizona.edu).

## DEPARTMENTAL SEMINARS

**Dr. Darl Ray Swartz**, Professor, Purdue University. **Topic:** Fast Kinetics in the Slow Lane: Insight into Troponin Function Through Protein Exchange Kinetics in Isolate Myofibrils. February 6, 2008

**Dr. James Hill**, Professor, Pediatrics and Medicine, University of Colorado Health Sciences Center, Director of the Center for Human Nutrition (funded by NIH) and Co-founder of America on the Move. **Topic:** Physical Activity and the Obesity Epidemic: America on the Move. February 26, 2007

**Dr. John W. Regan**, Professor, Department of Pharmacology & Toxicology, College of Pharmacy, University of Arizona. **Topic:** Up-Regulation of Hypoxia Inducible Factor-1 $\alpha$  by Prostaglandin-F<sub>2a</sub> Under Normoxic Conditions: Discovery of a Novel Mechanism Involving FP Receptor Mediated Generation of Reactive Oxygen, Activation of MAP Kinase/Tcf Signaling and Induction of the Orphan Nuclear Receptor Nurr1. April 16, 2008

This newsletter is also available online at: <http://nutrition.arizona.edu>. If you would like to receive our newsletter via email, please contact Theresa Spicer at 621-7126 or email [tspicer@ag.arizona.edu](mailto:tspicer@ag.arizona.edu).

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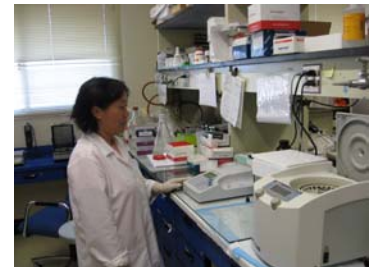
### RESEARCH FEATURE: AN INTERVIEW WITH DR. DAVID HARTSHORNE

#### Q. Why did you come to the U of A?

I had known Darrel Goll for many years, as we both worked on muscle, and when he was head of the Nutrition and Food Science Department he was interested in building a Muscle Biology Group. There was a job opening and the rest is history.

#### Q. Tell us briefly what you study in your research.

Our research program is quite varied and to understand how it developed it might be useful to give a short history. Initially in the early 70's we worked on skeletal muscle, which was the muscle type most studied at that time and which is thought of as "muscle" by most people. It was assumed that anything that moved had to do so by some modification of a basic skeletal muscle model. However, another very important muscle type is smooth muscle and this is the contractile element in all hollow organs, except the heart. For example, it is essential to the function of blood vessels (arteries and veins), the gastrointestinal tract, airways, uterus, bladder and vas deferens. All muscle types are activated by an increase in  $Ca^{2+}$  inside the muscle cell and we were interested in what the  $Ca^{2+}$ -regulatory mechanism was in smooth muscle. We had worked on this in skeletal muscle and started out by assuming that similar mechanisms might operate in smooth muscle. We were completely wrong! The picture that emerged was that smooth muscle was "activated" by post translational modification, namely phosphorylation, of a major muscle protein, myosin. In the simplest terms, phosphorylation of myosin is the "on" switch and is required for contraction and dephosphorylation is the "off" switch that leads to smooth muscle relaxation. Two enzymes are involved, a kinase for activation and a phosphatase for inactivation. The level of myosin phosphorylation depends on the balance of the activities of these 2 enzymes. This is the basic mechanism, but what is the  $Ca^{2+}$ -dependent step? We isolated the kinase (termed myosin light chain kinase, MLCK) and discovered that its activation was  $Ca^{2+}$ -dependent and required the ubiquitous  $Ca^{2+}$ -binding protein, calmodulin. Binding of  $Ca^{2+}$ -calmodulin activated the kinase by unlocking an inhibitory interaction within the MLCK molecule. We worked on this system and associated aspects for several years, but then turned our attention to the other player, ie. myosin phosphatase (MP). Nothing was known about this and it was a very exciting time. Our lab and collaborators in Japan plus a lab in Dundee, Scotland, found that MP was composed of several proteins (subunits): the phosphatase enzyme and 2 regulatory subunits. A more recent finding is that MP activity can be regulated and both activation and inhibition are claimed. This discovery drastically changed the situation in that contractile activity of smooth muscle could be regulated both by MLCK - calmodulin and also by changes in MP activity. Many pharmaceutical interventions have targeted MP (so far mostly in Japan) in smooth muscle disorders, such as high blood pressure, angina, bronchial asthma and several others. These focus largely on an associated player, Rho-kinase, that is critical for inhibition of MP. The work on MLCK and MP was done initially on smooth muscle (gizzard in our lab) but it was soon realized that the "smooth muscle" model was much more widespread and indeed represented the prototypical contractile mechanism, rather than the specialized troponin system found in skeletal and cardiac muscle. The importance of myosin phosphorylation is now accepted in most non-muscle cells and is involved in cell motility, cell division, secretion, platelet activation, cancer metastasis and endothelial cell function.



**Shizhen Luo**  
Research Technician

#### Q. You have listed several collaborations, how do these fit in with your program?

The collaborative work probably is the most enjoyable part of our research. We get bombarded with new ideas and this leads to a more balanced appreciation of a given topic. Some of the collaborations were natural offshoots from the phosphatase main line. Examples are the role of MP, and (MYPT ( the myosin phosphatase target subunit)) in particular, in the control of mitosis (with Dr. F. Matsumura, Rutgers University) and in cardiac function (with Dr. M. Ito, Mie University, Japan).

A more speculative venture was the project on molluscan smooth muscle. The bivalve mollusks have the ability to remain tightly closed for several hours. Try opening a living mussel or oyster! Almost 100 years ago a German scientist proposed

that the muscle was caught in an extended contractile state, which he called “Sperrung”, translated as “catch”. The catch state utilizes very little energy and it is difficult to rationalize it with any contractile mechanism. (The amount of ATP required would burn up the mollusk). We were interested in it because it might have a equivalent in mammalian smooth muscle and we began a study initially with Tom Butler and Marion Siegman (Thomas Jefferson University) and later included Shugo Watabe and Dai Funabara (Tokyo University). Initially we found that a key player was a giant protein called twitchin and several publications later we proposed that an important part of catch was a phosphorylation-dependent cross-linking of myosin and actin by twitchin. This mechanical connection does not utilize ATP and is reversed on activation of the muscle (in these muscles by  $Ca^{2+}$  binding to myosin) to allow active contraction. We are still looking for the mammalian smooth muscle equivalent.



**Andrea Muranyi**  
Assistant Research Scientist

A more applied aspect of our research is that several years ago we found, in collaboration with scientists from Sweden and Japan, that several food toxins (shell fish toxins), contaminants of drinking supplies, bacterial toxins and some commonly-used herbicides and pesticides were potent inhibitors of MP activity and posed a serious health concern. One of the toxins is synthesized by blue-green algae and is a particular problem in cattle water supplies.

Other research directions involve the touch response of *Mimosa pudicans* (thought to implicate tyrosine phosphatases; with Taka Tsuchiya, Sophia University, Japan) and aspects of proteomics (with Tim Haystead, Duke University).



**Norma Hogate**  
Research/Lab Attendant

**Q. What do you think is the most important contribution that you have made to your area of science?**

Hard to summarize over 40 years of research in a few sentences. We have had over 40 postdoctoral fellows and several visiting scientists involved and each might give a different answer. But one favorite is that we identified the  $Ca^{2+}$  target in both striated (skeletal and cardiac) and smooth muscle that initiates contraction. For striated muscle this is troponin C (in 1968 we called it troponin A) and in smooth muscle it is calmodulin via the MLCK connection (1978). In a more general view our work helped establish the myosin phosphorylation mechanism as a critical component of eucaryotic cell function.

We have shown that many proteins bind to MYPT and also that MYPT is translocated to different cell locations. An exciting and emerging theme is that MP is involved in many cell functions, not just the dephosphorylation of myosin and this may become an important consideration for future research. Examples are that MP regulates certain stages of mitosis and also that MP appears to regulate some transcription factors. A large step from the original smooth muscle objectives!

**Q. Why is it important?**

A rather glib answer is that without smooth muscles we could not live! We can illustrate the critical role played by the myosin phosphorylation system and its individual components by the observations that both under- and over-expression of MYPT in cell cultures leads to cell death and in KO mice is embryonic lethal. Thus this system is central to the contraction/relaxation cycle of smooth muscle and also is involved in many aspects of non-muscle cell function.

**Q. Anything else to consider?**

An obvious question is why is this research relevant to Nutrition or any other applied science? The intent for any basic science project is to establish the mechanism that operates in normal cell function. Obviously we have a long way still to go, but we can begin to look at MP function in various perturbed states. For example, we suspect that inhibition of MP is involved in various smooth muscle disorders, notably vascular disorders. It is also suggested that MP activity is modified in diabetes type 1 and in hypoxia. Our hope is that our research will benefit future studies on more applied topics and will make some contribution to health concerns.

***Dr. David Hartshorne is also affiliated with the Department of Biochemistry and Molecular BioPhysics, and a member of the Sarver Heart Center. He has published approximately 220 publications and most of the studies mentioned in the interview were supported by a grant from the National Institutes of Health titled “Biochemistry of Contractile Proteins”. This grant has been funded continuously for 40 years.***