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# Newsletter

College of Physical and Mathematical Sciences

August 2008

## BYU-Cornell Study Reveals how Diet, Antioxidants Prevent Blindness in Aging Population

A new study reveals part of the magic behind a diet rich in antioxidants, showing how artichokes, blueberries and pecans can hold at bay the leading cause of age-related blindness in developed countries.

Researchers at Brigham Young University and Weill Medical College of Cornell University discovered a link between two processes in the retina that, in combination, contribute to a disease called macular degeneration. They found antioxidants disrupt the link and extend the lifetime of irreplaceable photoreceptors and other retinal cells.

“The implication is that people at risk of macular degeneration could help prevent the disease by consuming antioxidants,” said Heidi Vollmer-Snarr, a BYU chemist who earned a doctorate from Oxford and began work on this disease as a postdoctoral researcher at Columbia.

The study is online and will be published in an upcoming issue of the [\*Journal of Biological Chemistry\*](#).

Age-related macular degeneration affects more than 1.75 million people in the United States. With a rapidly aging population, that number will rise to 3 million by 2020. People struck with the disease first lose central vision and temporarily adjust by relying more on peripheral vision. Some eventually lose their vision entirely.

Dr. Paul Bernstein of the University of Utah’s Moran Eye Center says understanding the exact mechanisms of macular degeneration has remained elusive. Bernstein was not involved in the study.

“This work by Dr. Vollmer-Snarr and colleagues ties these two damaging processes together and demonstrates the harm they cause in combination is much more than would be expected,” Bernstein said. “This new knowledge suggests the possibility of interventions which could prove to be powerful ways to prevent or delay age-related macular degeneration.”



The new study finds a destructive synergy between the buildup of a compound called A2E and damage to cellular “power plants” called mitochondria. A2E is a natural byproduct of cellular activity that, unlike other compounds, won’t break down or be disposed by the body.

A problem occurs when A2E encounters oxidative stress created by light exposure. In these circumstances, A2E disrupts energy production in mitochondria. The resulting energy shortage pulls the plug on daily cleaning and maintenance of photoreceptors and another type of retinal cell.

(Continued on page 2)

## Important Dates & Events in the College

August 2008

University Week  
August 25th-27th, 2008

New Student Orientation  
August 29th, 2008  
WIII BNSN  
2:30pm

United Way Day of Caring  
September 4th, 2008  
LaVell Edwards Stadium  
7:30am– Noon

(Continued from page 1)

The result is more A2E buildup, and the cycle of destruction hastens the death of these vital visual cells, which are not replaced when they die. The experiments performed with visual cells from rats, cows and humans showed that antioxidants could completely counter the damage.

Seeing this process play out in the retina has given Vollmer-Snarr a novel idea for attacking harmful growths in the body. The strategy would involve delivering potentially disruptive compounds like A2E to the target and then using light to trigger the damage.

“Why not take a page out of one disease’s book in the fight against other diseases?” Vollmer-Snarr said.

BYU graduate student Junping Gao is also a co-author on the study. Joining as co-authors are Cornell medical researchers Silvia C. Finnemann, Cristofol Vives-Bauza, Monika Anand, Arash K. Shirazi, Jordi Magrane and Giovanni Manfredi.

Written by Joe Hadfield

## New Chair and Associate Chair for Department of Computer Science

Parris K. Egbert has accepted an appointment to serve as Chair of the BYU Computer Science Department effective June 1, 2008. Dr. Egbert replaces Tony R. Martinez who has served as Chair of the department the past nine years.

Christophe Giraud-Carrier has been appointed to serve as the Associate Chair of the department. Dr. Giraud-Carrier is Associate Professor and coordinator of the Data Mining laboratory in the Department of Computer Science at BYU. Prior to joining BYU, he was Senior Manager at ELCA, a Swiss IT services company, where his responsibilities included the capitalization of Data Mining expertise, responses to tenders and the management of various projects for companies, local governments and NGOs. Prior to this, he was Senior Lecturer in the Department of Computer Science at the University of Bristol, where he founded and led the Machine Learning Research Group. Dr. Giraud-Carrier received a B.S., M.S., and Ph.D. in Computer Science at BYU in 1991, 1993, and 1994, respectively.

Dr. Giraud-Carrier is married to the former Isabelle Maclair, and they are the parents of 8 children.

Parris K. Egbert received B.S. degrees in Computer Science and Mathematics from Utah State University in 1986. He then attended the University of Illinois at Urbana-Champaign where he completed M.S. (1990) and Ph.D. (1992) degrees in Computer Science. Upon completion of his Ph.D., he joined the BYU Computer Science faculty.

Dr. Egbert is the director of the 3D Computer Graphics Lab in the Computer Science department at BYU, which is currently conducting research in several areas related to interactive 3D graphics and virtual environments. This work has been published in SIGGRAPH, CVPR, Transactions on Graphics, Computational Intelligence, and other journals and conferences. He is also a member of the executive committee for the Center for Animation at BYU.

Dr. Egbert’s research interests include real-time 3D computer graphics, Global Illumination for Computer Graphics, Object-oriented graphics, tools for Computer Animation, and the Creation and Navigation of Virtual Environments.

Dr. Egbert is married to the former Lori Gurr, and they are the parents of nine children.



# New Chair for Department of Mathematics Education

Steven R. Williams has accepted an appointment to serve as Chair of the BYU Mathematics Education Department effective June 1, 2008. Williams replaces Gerald M. Armstrong who has served as Chair of the department since its formation in August 2000.

Blake E. Peterson will continue his service as Associate Chair of the department. Born and raised in Logan, Utah, Peterson graduated from Utah State University receiving a B.S. degree in Secondary Education with an emphasis in Mathematics and Computer Science. He received his M.S. (1990) and Ph.D. (1993) degrees from Washington State University, and subsequently taught at Oregon State University for three years. Dr. Peterson joined the BYU Mathematics Education faculty in 1996. His research interests include the nature of the mathematical dialogue that occurs among teachers, particularly during student teaching, both in the United States and Japan.



Dr. Peterson is married to the former Shauna Davis, and they are the parents of four children.

Steven R. Williams received his B.S. (1980) and M.S. (1983) degrees in Mathematics from Brigham Young University, and his Ph.D. (1989) from University of Wisconsin-Madison. He subsequently taught at Washington State University for four years, and joined the BYU Mathematics Education faculty in 1993. His current research surrounds the uncovering and understanding of the discursive practices that underlie mathematics as done by mathematicians, traditional school mathematics, and reform-oriented school mathematics, and the implication of these discursive practices for schools and students, especially in regards to equity issues.

## UNITED WAY – LIVE UNITED

Together, **united**, we can inspire hope and create opportunities for a better tomorrow. That's what it means to **Live United**. Join the **Live United** movement as part of our **Day of Caring on Thursday, September 4, 2008**.

The United Way Day of Caring will be held on Thursday, September 4<sup>th</sup>, 2008. Volunteers from more than 30 county agency partners will gather at the LaVell Edwards Stadium at 7:30am for a breakfast hosted by BYU. Participants will be given a listing of service opportunities to choose from, and will then be directed to the location of their choice. President Samuelson has approved 4 service hours "with pay" for each full time employee who clears Day of Caring attendance with his/her immediate supervisor and is registered. Several members of our college have participated in this event in past years, and have enjoyed the opportunity to work side-by-side in giving service in the community. For more information or to register your participation in this event, please contact Lynn Patten at [lynn\\_patten@byu.edu](mailto:lynn_patten@byu.edu) or by calling 422-4022.

The BYU Board of Trustees is very supportive of the services offered by United Way to help relieve human suffering and improve the quality of life for everyone in the community. The Church considers United Way an effective complement to their own work in humanitarian relief for the breadth of society. Just as the Church sponsors a United Way employee-giving campaign, BYU does the same with the intent of inviting each employee to participate in this worthy cause.

Under President Samuelson's direction, the BYU United Way campaign will begin mid-September and will continue throughout the month of October 2008. United Way of Utah County focuses on addressing underlying causes of the most serious problems which affect families and children of our community. United Way is the only philanthropic effort in which BYU gives to the community, and 100% of the contributions provide direct assistance to residents of Utah County. Please consider ways in which you might contribute to United Way either in service hours or monetarily.

# University Week

The 2008 Annual University Week will be taking place Monday August 25th through Friday August 29th.

“In Thy Light Shall We See Light”

-Psalm 36:9

## **Monday, August 25th**

8:00 a.m.-9:00 a.m.	President's Reception & Breakfast for New Faculty (By Invitation Only, Ticketed Event)	Skyroom Restaurant WSC
11:00 a.m.– 12:20 p.m.	ORCA Workshop (Deans and Dept. Chairs)	251 TNRB Associate Academic Vice President
12:30 p.m.– 2:00 p.m.	Graduate Studies Workshop (Graduate Coordinators, Associate Deans, Dept Chairs)	251 TNRB Associate Academic Vice President
1:00 p.m.– 4:30 p.m.	New University Personnel Orientation (Pre-Registration Required at ext. 2-6868)	3228 WSC Human Resource Services
2:15 p.m.– 3:45 p.m.	Deans and Department Chairs Session	Assembly Hall HC Academic Vice President

## **Tuesday, August 26th**

8:00 a.m.– 9:30 a.m.	AUC Breakfast for all university personnel, full & Part-time faculty, retirees, surviving spouses, and partners	Brigham Square (WSC)
10:00 am.– 11:30 a.m.	Joint meeting for all university personnel, retirees, and partners	Marriott Center President Cecil O. Samuelson
11:30 a.m.– Noon	Awards Recipients' Reception	Marriot Center President Cecil O. Samuelson
1:30 p.m.– 3:00 p.m.	General Faculty Sessions	de Jong Concert Hall, HFAC Academic Vice President
4:00 p.m.– 5:00 p.m.	Meeting for Religious Education (CES Faculty)	103– 107 JSB Dean, Religious Education

## **Wednesday, August 27th**

10 a.m.– Noon	College Meetings (All college personnel, full-time faculty, staff, & Admin)	W-111 BNSN
Noon– 1:00 p.m.	College Luncheon	W-170 BNSN
1:00 p.m.– 3:00 p.m.	College Grant-Writing Workshop (All interested college faculty)	W-111 BNSN
3:00 p.m.	Chemistry Department Meeting (Contact Dept. for more Info.)	W-140 BNSN
3:00 p.m.	Mathematics Education Department Meeting (Contact Dept. for info.)	197 TMCB
3:30 p.m.	Physics and Astronomy Department Meeting (Contact Dept. for info.)	To Be Decided

## **Thursday, August 28th**

Noon	3K Fun Walk sponsored by Wellness Center (Sign-in begins at 11:45 a.m.)	Backyard HC
8:00 a.m.– 5:00 pm	Statistics Department Meeting (Contact Dept. for more Info.)	Provo Marriott Hotel
8:00 a.m.– 5:00 p.m.	Computer Science Department Meeting (Contact Dept. for more Info.)	Spring Haven Retreat
1:00 p.m.– 5:00 p.m.	Geological Sciences Department Meeting (Contact Dept. for more Info.)	4116 JFSB

## **Friday, August 29th**

8:15 a.m.– 8:30 a.m.	T.A. Training Conference Sign Ins	Pendulum Court, ESC
8:30 a.m.– 4:00 p.m.	T.A. Training Conference (All new department T.A.s)	ESC

## College Publications

### **Chemistry & Biochemistry**

J.E. Patterson, Z.A. Dreger, M. Miao and Y.M. Gupta, "Shock Wave Induced Decomposition of RDX: Time-Resolved Spectroscopy," *J Physical Chemistry*, **112**, 7374-7382 (2008).

M. Miao, Z.A. Dreger, J.E. Patterson, and Y.M. Gupta, "Shock Wave Induced Decomposition of RDX: Quantum Chemistry Calculations," *J Physical Chemistry*, **112**, 7383-7390 (2008).

R.G. Harrison, A.L. Washburn, A.T. Pickett, and D.M. Call, "Assembly of CdSe Nanoparticles into Microspheres by a Liquid Droplet Emulsion Process," *Journal of Materials Chemistry*, **18**, 3718-3722 (2008).

### **Computer Science**

### **Geological Sciences**

### **Mathematics**

Doud, Darrin, 2008. Local Correlations of Discriminant Bounds and Small Degree Extensions of Quadratic Base Fields, *International Journal of Number Theory*, Vol. 4, No. 3, P. 349-361.

### **Mathematics Education**

### **Physics and Astronomy**

S.D. Bergeson and F. Robicheaux, "Recombination fluorescence in ultracold neutral plasmas," *Physical Review Letters*, Volume 101, Issue 7, Article 073202, 2008

L. L. Boyer, H. T. Stokes, M. M. Ossowski, and M. J. Mehl, "Self-consistent Atomic Deformation Method for Application of Density Functional Theory," *The American Physical Society, Physical Review B* **78**, 045121 (2008).

M. R. Perez, B. McCollum, M. E. van den Ancker, and M. D. Joner, "The Enigmatic Young Object: Walker 90/V590 Monocerotis", *Astronomy and Astrophysics*, Vol. 486, pp. 533-544 (2008).

Christopher J. Erickson, Marshall Van Zijll, Greg Doermann, Dallin S. Durfee. *An ultrahigh stability, low-noise laser current driver with digital control*. *Rev. Science Instruments*. **79**, 073107 (2008).

### **Statistics**

Jensen, W.A., Bryce, G.R., Reynolds Jr, M.R., "Design issues for Adaptive Control Charts," *Quality and Reliability Engineering International*, **24**, 429-445, 2008. ([www.interscience.wiley.com](http://www.interscience.wiley.com)) doi: 10.1002/qre.911.

Lawson, J.S., "Bayesian Interval Estimates of Variance Components Used in Quality Improvement Studies," *Quality Engineering*, **20**, 334-345, 2008.

Reese, C.S., Deiningger, P., Hamada, M.S., Krabill, R., "Exploring the Statistical Advantages of Nondestructive Evaluation Over Destructive Testing," *Journal of Quality Technology*, **40**, (3) 259-267, 2008.