Spring/Summer 2005

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The Newell Family

A View from the Chair

NICHOLAS ERCOLANI, DEPARTMENT HEAD
AND PROFESSOR OF MATHEMATICS

In this newsletter, in addition to reporting on recent achievements and advances of our programs, we are pleased to take note of many honors and recognitions bestowed upon members of the Department during the year. In particular, our lead story pays tribute to Alan Newell who, this past year, received the John von Neumann prize from the Society for Industrial and Applied Mathematics and was also inducted, by the Arizona Board of Regents, as a Regents' professor. Both honors recognize Professor Newell's distinguished career in the field of Applied Mathematics. Dr. Newell has also been advisor and mentor to many students who have gone on to successful careers in mathematics. In this issue we hear about his influence from two recent graduates, Dr. Michael Kueken and Dr. Patrick Shipman.

I would also draw your attention to pages 3 and 4 where we highlight honors received by other faculty members. In future issues we will continue to take note of the achievements of our students, faculty and staff. Indeed, if you have been consulting recent webpages this summer, (www.math.arizona.edu) you will see a number of these current achievements being described.

We would also like to hear about the accomplishments of our alumni. I encourage you to let us know about any noteworthy distinctions you have received so that we can share this news with former classmates and teachers.

Dual Honors go to Dr. Alan Newell

In November 2004, the Arizona Board of Regents inducted Department of Mathematics Professor Alan Newell as **Regents' Professor**. The formal ceremony held at the new Stevie Eller Dance Theater, honored Dr. Newell along with four other Professors.

The title Regents' Professor, created by the Arizona Board of Regents in 1987, serves as recognition of the highest academic merit and is awarded to faculty members who have made a unique contribution to the quality of the University through distinguished accomplishments in teaching scholarship, research or creative work. Regents' Professors represent a maximum of three percent of tenured or tenure-track faculty.

At the ceremony, Dr. Newell was introduced both by The University of Arizona President Peter Likins and by Alejandro Aceves, his former student and Chair of the University of New Mexico Department of Mathematics. As part of the ceremony, a video presentation, created by the UA News organization, was played. (You can watch Dr. Newell's video at http://uanews.org/movies/alannewell.html).

President Likins and the new Regents' Professors.

The Arizona Board of Regents selected Dr. Newell for this honor because he "has made ground-breaking contributions to the study of pattern formation" and is "a pioneer in the study of solitons." The Induction Ceremony program added, "Newell has played a central leadership role both internationally and here at the UA" and "was instrumental in building an applied mathematics program that is the envy of major research universities worldwide."

Dr. Newell's opening comment brought applause and laughter when he said: "Those of you who know me well, know by the way I am dressed how much this honor means to me!" (He had on long pants, a jacket and tie.)

In 2004, Dr. Newell was also selected as the **John von Neumann Lecturer** at the Society for Industrial and Applied Mathematics (SIAM) Annual Meeting. The John von Neumann Lecture, established in 1959, surveys and evaluates a significant and useful contribution to mathematics and its applications. The recipient may be a mathematician or a scientist in a different field, but, in either case, he or she is chosen because of distinguished contributions to applied mathematics.

Professor Alan Newell was chosen in recognition of his pioneering research in nonlinear evolution equations modeling physical systems. "His deep analysis and creative insight into nonlinear waves and patterns have given us new ways to analyze and understand the creation and dynamical behavior of patterns and coherent structures. He has made seminal contributions to the analysis of integrable partial differential equations and turbulence and provided leadership in identifying new approaches to understanding the creation and dynamical behavior of solitons and patterns in optical and fluid systems."

For his lecture, Dr. Newell chose "Natural Patterns" (Please see the related story on page 11.)

From the very beginning of his scientific career, Alan Newell has been a dominant figure in applied mathematics. He has shaped research areas, built academic programs of international prominence, and promoted the growth of young scientists through his influence as mentor and teacher. The "Newell-Whitehead-Segel equation", "Cross-Newell equation", and "AKNS method" directly connect his name to fundamental ideas in convection, instability analysis, pattern formation, defect dynamics, and soliton theory; his many other insights have advanced the understanding of optics, coherent phenomena and turbulence. This award recognizes all of his profound contributions to modern applied mathematics.

Alan C. Newell received B.A. (Mod.) degrees in Mathematics and Physics at Trinity College, Dublin, and a M.Sc. and Ph.D. in Applied Mathematics from the Massachusetts Institute of Technology. For over thirty years, he has led and helped to build the Department of Mathematics and Computer Science at Clarkson University (1971-79), the Applied Mathematics Program at The University of Arizona (1981-85), the Department of Mathematics at The University of Arizona (1985-96), and the Department of Mathematics at the University of Warwick, UK (1996-2000). He is currently Professor of Mathematics and Research Professor of Arizona Research Laboratories, both at The University of Arizona. ▲

Distinguished Professor Vélez is MAA's James R. C. Leitzel Lecturer, QEM/MSE Network's Giant in Science, and in Salpointe High School's Distinguished Alumni Hall of Fame.

In the first of three awards received this year, Mathematics Distinguished Professor William Yslas Vélez was chosen as the **James R.C. Leitzel Lecturer**. This honor, established by the Mathematical Association of America's Board of Governors in 1998, provides a forum for the presentation and discussion of "issues or innovations in mathematical sciences education at the undergraduate or graduate level," and, in so doing, honors the many contributions of James R.C. Leitzel to the improvement of mathematical sciences education.

The QEM/MSE Network (Quality Education for Minorities/Math, Science & Engineering) also recently

honored Vélez by naming him a **Giant in Science** at their annual conference. This award recognizes individuals with distinguished research, teaching, and service records, who have had a significant impact on students and their participation in Math, Science and Engineering fields. The Network recognized Dr. Vélez as an outstanding mentor, teacher, and researcher, as well as a strong advocate for quality MSE education for all students.

Dr. Velez was also chosen for induction into the **Salpointe High School Distinguished Alumni Hall of Fame**. The Distinguished Alumni Hall of Fame honors, in perpetuity, outstanding alumni, faculty and support staff who through their contributions to the arts, science, business, education, government, humanities and philanthropy, have brought honor to themselves, Salpointe Catholic High School and the communities in which they live.

Professor Ildar Gabitov named 2005 Fellow of College of Science Galileo Circle. The College of Science Dean's Board, the Galileo Circle, developed their Fellows Program to honor distinguished faculty. This award is one of the highest honors the College of Science can bestow upon its faculty—only ten percent

of the faculty will receive it. The honor carries a $5,000 award, access to a small grants program available only to Galileo Circle Fellows, and a lifetime membership in the Galileo Circle.

Professor Deborah Hughes Hallett receives the Deborah and Franklin Tepper Haimo Award for Distinguished College or University Teaching of Mathematics.

This Mathematical Association of America (MAA) award honors college or university teachers who "have been widely recognized as extraordinarily successful and whose teaching effectiveness has influence far beyond their own institutions." Hughes Hallett was also the Distinguished Teaching Award recipient from the MAA's Southwest Section.

Associate Professor Bruce Bayly received both the Mathematics Department's Outstanding Advisor award, and the College of Science Outstanding Advisor Award for 2004. Dr. Bayly was also nominated for a Five Star Faculty Award, along with Associate Professor Ted Laetsch of the Mathematics Department. ▲

New Faculty Members

Robert Indik has been a part of our department since 1987. From 1988 until Spring of 2004 he was a Visiting Associate Professor. This last Spring he joined the department as a tenured Associate Professor. Indik received his PhD from Princeton University under the supervision of Professor Goro Shimura in the field of Automorphic Forms (Arithmetic Algebraic Geometry). After graduation, he was an assistant professor at Brandeis University. In 1986, when his wife Julia finished her PhD in astronomy at MIT and started a Post Doc position at The University of Arizona, he came with her to Tucson, and set himself up as a software consultant. He says,"What looked like a busy, interesting and profitable career choice in Boston was much more limited in Tucson in 1986." Fortunately, Indik was able to make connections with our department and began consulting for the newly-formed Arizona Center for Mathematical Sciences. A consulting position became a staff position, and then a visiting faculty position. He says he was

fortunate to become involved in teaching again, and this is something he continues to enjoy. He also manages our department's undergraduate research program. His own research is principally in numerical computation with an emphasis on problems coming from nonlinear optics. He is working closely with Professor Ildar Gabitov in this area.

Shankar Venkataramani, Associate Professor and his wife Lay May Yeap, a Visiting Assistant Professor with the Department, moved to Tucson from the University of Chicago last fall. Shankar got his PhD in Physics from the University of Maryland under the supervision of Professor Edward Ott. After graduating in 1996, he moved to the University of Chicago where he spent 8 years in the physics and the math departments. His research interests lie in the intersection of math and physics, and his recent work has involved applying the tools of "pure" mathematics to problems that arise in applied contexts. May and Shankar have two bunny "babies" Brainy and Squiggy. When they are not playing with the bunnies, or busy working, they love to hike/bike/travel/get-sunburnt. ▲

Jerry Moloney, Nick Ercolani and Al Scott. During the event, Dr. Scott signed copies of his new book: *Encyclopedia of Nonlinear Science.*
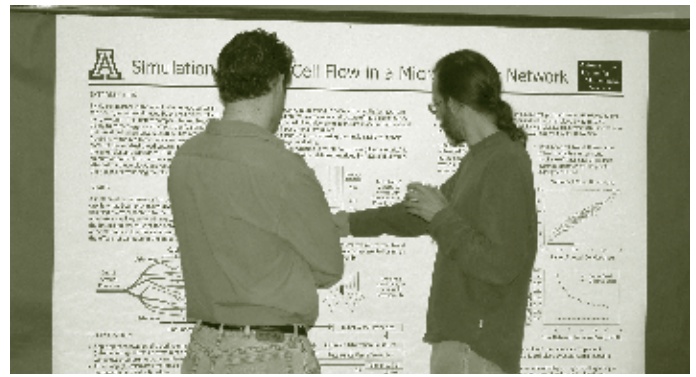
Simulation of Sickle Cell Flow in a Microvascular Network.

Math and the Real World: An ACMS Poster Session

Nicholas Ercolani, Department Head and Professor of Mathematics

The Arizona Center for Mathematical Sciences came into existence in the 1980's as an environment for research and learning in the Mathematical Sciences. It has been, and continues to be supported by external funding generated by faculty in the Department of Mathematics. The thematic focus that gave rise to the Center is the modeling, simulation and theoretical understanding of nonlinear processes that arise in the physical and life sciences. Over the years, specific research projects have related to pattern dynamics, percolation, behavior of lattice gasses, nonlinear optics, low dimensional chaos, fluid and optical turbulence, and the nature of integrable systems of differential equations.

In recent years, Nonlinear Optics has attained a special status at ACMS. The exceptional multi-disciplinary culture at The University of Arizona provides an environment for collaborative research with colleagues at the Optical Sciences Center. Graduate students in Mathematics, Applied Mathematics, Optical Sciences and Physics work together on research projects at the frontiers of this exciting field. Tucson's designation as "Optics Valley" reflects the large concentration of Optics industries in the region and provides a strong industrial link to The University of Arizona.

The scope of research at ACMS is broadening to include new developments in areas related to molecular biology, medicine and public health, materials science, information systems and encryption, and earlier this year, an ACMS poster session and reception was held in the UA Bookstores. Four of the posters are pictured here. Additional subjects covered were: Femtosecond Atmospheric Light Strings; A Comparison of Relational Database and GIS-based Methods of Adjusting for Interdecennial Changes in U.S. Census Geography; Optical Phenomena of Nanomaterials; Using Mathematical Models to Control the Spread of Malaria; and Assessing Repair of DNA Damage Caused by UV Light. The posters can be seen on a rotating basis in the UA Science-Engineering Library main lobby display case. ▲

Performance of Ultrafast Communications Systems
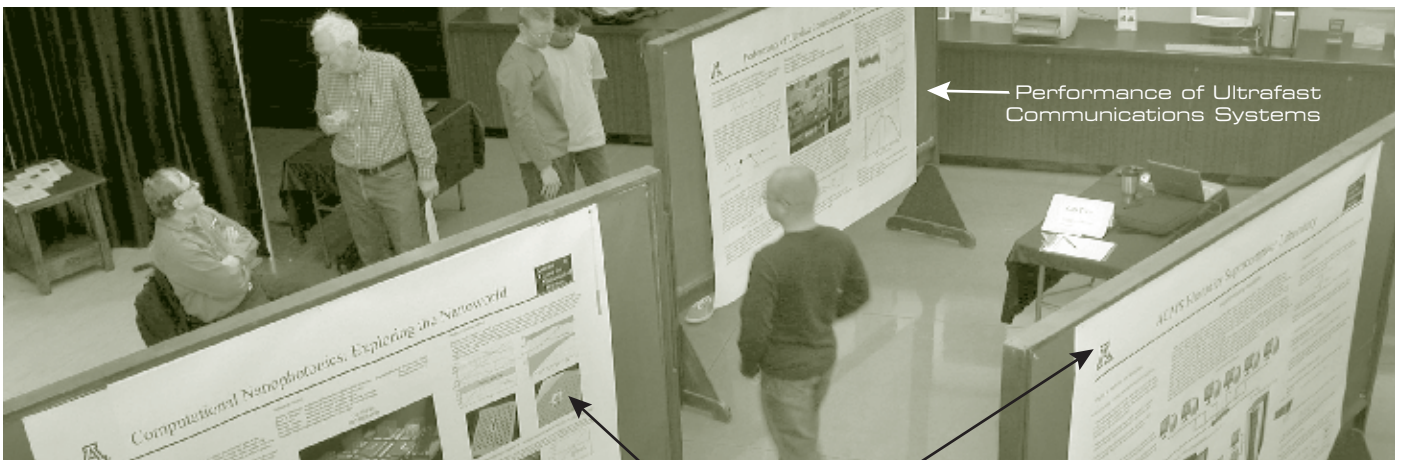
Computational Nanophotonics: Exploring the Nanoworld.   ADMS Phototonics Supercomputer Laboratory.

What They Did on Their Summer Vacation: Summer Research and Internship Programs for Undergrads

WILLIAM YSLAS VÉLEZ, ASSOCIATE HEAD FOR THE UNDERGRADUATE PROGRAM

The Department continues to place a strong emphasis on increasing the professionalism of our undergraduate mathematics majors. Obtaining a summer internship is an important ingredient in that sense of professionalism. As you can see by reading this list of summer experiences, our students take this philosophy seriously. Many of our students obtain these positions because researchers and companies know the quality of our undergraduate mathematics majors. These internships are also an indication of the dedication of numerous faculty and working scientists, since an internship entails the creation of a mentoring relationship, and represents a considerable investment of time and resources.

The number of undergraduate mathematics majors is growing, and this growth requires that we find even more opportunities for our students. If your firm, your research group, or your academic unit is looking for summer interns, the Math Center would be happy to work with you in filling those positions, and would like to send you the resumes of several of our outstanding students. Please contact me at velez@math.arizona.edu. ⋏

NAME	BUSINESS/ORGANIZATION
Alexander, Sam	Research Experience for Undergrads
Anderson, Jae	Materials Science Engineering in Thailand
Baiba, Nir Jacob	Preston Capital, Beverly Hills, CA
Barrientos, Ivan	Lawrence Livermore National Laboratories
Bennett, Aaron	Honeywell
Blight, Sara	National Security Agency
Brandon, Michelle	Undergraduate Biology Research Program at UA
Broersma, Brittanie	Undergraduate Biology Research Program at UA
Byers, Tyler GRAD	IBM/Tucson
Calderon, Karl	Undergraduate Biology Research Program at UA
Calderon, Karl	Mathematical & Theoretical Biology Institute
Casey, Caitlin	Catalina Sky Survey - NASA Space Grant Program
Crites, Andrew	National Security Agency Internship
Divakaruni, Ajit	Yale University Center for Structural Biology, Dept. of Molecular Biophysics & Biochemistry
Dupuy, Taylor A	Research Experience for Undergrads
Durkin, Sandra	Computational aspects of fluid dynamics at Tulane University
Erhart, Matthew	LG Tech Links
Goodman, Jessica	REU Physics-University of Chicago
Green, Matthew	Research in Industrial Projects for Students IPAM
Hatch, Sarae	Undergraduate Biology Research Program at UA
Hollman, Derek	Undergraduate Biology Research Program at UA
McMurdie, Chris	Rose Hulman Institute, Indiana
Moore, Matthew D	Research Experience for Undergrads
Naff, Vanessa	Minority Access to Research Careers
Norwood, Dan	REU, Math
Patterson, Genevieve	IBM/Tucson
Robertson-Tessi Mark	Physics REU
Scharf, Henry	Charles University in Prague
Senkyrikova, Pavla	University of California in San Francisco, School of Dentistry
Smith, Dorian	Rice University Summer Institute of Statistics
Snyder, Rae Ana	Beckman Scholars
Summitt, Chris	Rice University Summer Institute of Statistics
Wallis, Andy	Hope College

Math 485

Joceline Lega's Math 485 students gave poster presentations for their final project this spring. The session was held in the UA Bookstore's main lobby. ⏶
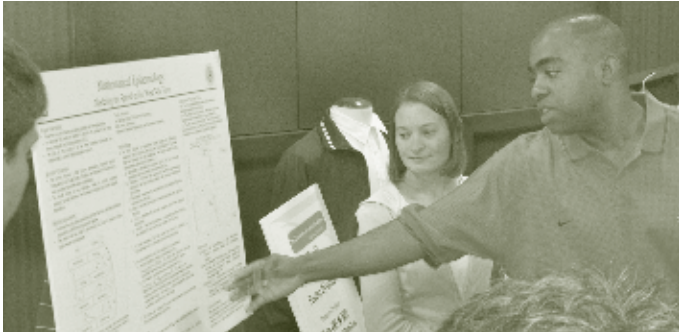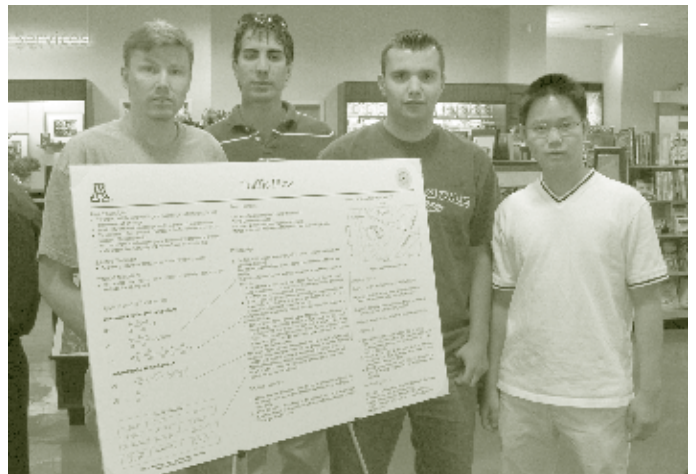

Katie Moore and Shaheed Shabazz.

Khoa Han and Michael Stoltenberg.

Jessica Ryder, Ryan Humphrey, David Sonenschein and Denise Brown.

Michael Stoltenberg, Gabriel Leake, Azer Novo and Khoa Han.

Putnam Mathematical Competition
John Leonard, Sr. Lecturer

On a rainy Saturday in December, ten stalwart undergraduates matched wits with the problem committee of the 65th Annual William Lowell Putnam Mathematical Competition. We thank Sam Rawlins, Genevieve Patterson, Taylor Dupuy, Christopher McMurdie, Andrew Lebovitz, James Hatch, Ted Glaza, Jeffrey Gilbert, Andrew Crites, and Samuel Alexander for representing our department. As an example of what they contended with, consider Problem 1a (Historically, the first question is usually a relatively easy one.):

Basketball star Shanille O'Keal's team statistician keeps track of the number, S(N), of successful free throws she has made in her first N attempts of the season. Early in the season, S(N) was less than 80% of N, but by the end of the season S(N) was more than 80% of N. Was there necessarily a moment in between when S(N) was exactly 80% of N?

If you would like to pursue more problems, a copy of the latest Putnam Competition Problems is available at: http://www.math.harvard.edu/putnam/. ⏶

Induction Teachers John Reid and Monica Vasquez from the CRR program get ready to attend the all-day graphing calculator workshop sponsored by the CRR and Tucson Unified School District.

The Center for the Recruitment and Retention of Secondary Mathematics Teachers

Ann Modica, Co-Director

The Center for the Recruitment and Retention of Secondary Mathematics Teachers (CRR) held two unique workshop opportunities, offered for the first time this year. These workshops were in addition to its continuing missions of recruiting college students into the mathematics teaching profession and providing professional development and support for teachers new to the profession.

In November, CRR and Tucson Unified School District (TUSD) sponsored an all-day TI-84 Graphing Calculator Workshop in Math East, here at The University of Arizona. Past and present inductees were invited to participate, as well as their mentors. Representatives from TUSD's middle and high schools were among the participants as well. Both novice and experienced user sessions were offered. Teachers received a notebook of hands-on activities for use in their classroom. The energy, enthusiasm and concentration were palpable as teachers enhanced their own expertise and worked on ways to augment their instruction, and to expand the mathematical abilities of their students.

In January, a Mathematics Teacher Appreciation Day/ Professional Development Conference, free to all math teachers in the Tucson area, was held at The University of Arizona Math Building and Math East. The day consisted of morning sessions offered by outstanding presenters from our community, as well as by professional workshop presenters from Texas Instruments, McDougal Littell and Key Curriculum Press. The Center was pleased to have Dr. David Gay, Dr. Peter Wiles, and Professor Emeritus and former

Several student tutors from the Center start an impromptu game of football at the semester appreciation picnic.

Teachers work cooperatively at a professional development session.

NCTM president (National Council of Teachers of Mathematics) Dr. Steven Willoughby presenting. The day culminated in the Teacher Appreciation Luncheon at the University Park Marriott with Lee Stiff (another former NCTM president) as the keynote speaker. The Center wishes to express its appreciation to The University of Arizona Mathematics Department for the use of their facilities and to McDougal Littell, Texas Instruments, Prentice Hall, Key Curriculum Press, and Pima County Regional Support Center for their generosity. ▲

New Math Center
Professor Marta Civil and Assoc. Professor, Virginia Horak

In August of 2004, the NSF funded The Center for the Mathematics Education of Latinos/as (CEMELA) with a grant of $10,000,000 over five years. The project is an interdisciplinary, multi-university consortium of The University of Arizona, University of California Santa Cruz, University of Illinois at Chicago, and The University of New Mexico. CEMELA focuses on the research and practice of teaching mathematics to Latinos/as in the United States. CEMELA brings together experts in mathematics education, language and culture, and mathematics to improve the teaching and learning of mathematics in working class Latino settings.

The CEMELA program's Principal Investigators here at The University of Arizona include Professor Marta Civil and Associate Professor Virginia Horak, in the Mathematics Department, and Luis Moll, Professor of Language, Reading and Culture and Associate Dean in the Department of Education. Other Principal Investigators are: Julia Aguirre and Judith Moschkovich of University of California at Santa Cruz; Eric Gutstein, Lena Licón Khisty and Pamela Quiroz at University of Illinois at Chicago; and, Sylvia Celadón-Pattichis and Richard Kitchen at University of New Mexico.

Goals in the first year were to recruit CEMELA Fellows (Cynthia Anhalt, Heather Cavell, Gabriela Dumitrascu, Laura Kondek, Matthew Ondrus, Beatriz Quintos Alonso, Ksenija Simic, and Maura Varley here at UA); to define their research agenda; to initiate activities at the various sites and partnering districts; to determine the structure of the research database; and, to create materials for communication and dissemination of information (logo, brochure, listserves, and website, etc.).

CEMELA aims to understand the interplay of mathematics education and the unique language, cultural, and policy issues that affect Latino/a students' learning of mathematics. Their holistic approach involves all the parties interested in the education of children: parents and teachers. The three primary goals of the program are to:

- Develop leaders in mathematics education who have the integrated knowledge needed to improve the mathematics education of Latino students.
- Conduct research projects that address learning and teaching mathematics for Latino students.
- Strengthen teachers' ability to promote achievement of Latinos in mathematics.

CEMELA will be relevant not only to Latinos/as but also to other groups of linguistically and culturally diverse students. It will develop theory and practice that turns language and cultural diversity into educational assets for the mathematics education of all students. For more information, please contact Kelley Merriam Castro, Program Coordinator: kmerriam@math.arizona.edu or see the CEMELA website: http://cemela.math. arizona.edu. ▲

A View through the palms of the UA Math Building.

Presentations, Symposia, Workshops

Jim Cushing, Professor, gave the Plenary Address for the International Conference on Difference Equations, Special Functions, and Applications in Munich in July. He was a main lecturer for the Graduate Summer School in Mathematical Biology, a Program of the Institute for Advanced Study, in Park City Utah. In August, he was an invited speaker at MAA MathFest 2005, Special Session in Dynamical Systems: Chaos, Convergence and Control, in Albuquerque. A special issue of the *Journal of Difference Equations and Applications*, dedicated to Cushing in honor of his 60th birthday, will appear this fall.

Nick Ercolani, Professor and Department Head, will speak at the Isaac Newton Institute workshop on *Theoretical Aspects of Pattern Formation* in Surrey, England in September, and at the Mathematical Sciences Research Institute (MSRI) workshop on *Probability, Geometry and Integrable Systems* in Berkeley in December.

Ildar Gabitov, Professor, gave invited talks at the International Conference on Coherent and Nonlinear Optics in St. Petersburg, Russia, and at the Nonlinear Waves 50 Years after Fermi-Pasta-Ulam, at INSA in Rouen, France, both in June. He also organized the Spring School for the Binational Consortium of Optics here in Tucson in April.

Yi Hu, Associate Professor, gave invited talks at the IMS Conference "Recent Trends in Algebraic Geometry" at the Chinese University, and for the International Congress of Chinese Mathematicians (ICCM). Both events were held in Hong Kong in December 2004.

Joceline Lega, Associate Professor, gave a colloquium at the University of Notre Dame in December, and gave both a colloquium and seminar at the College of Charleston in February 2005. She gave an invited mini-symposium talk at the SIAM conference in Snowbird in May 2005. In September 2005, she will be at the Newton Institute in Cambridge, UK, as a participant in the *Pattern Formation in Large Domains* program, and will give an invited talk at the meeting entitled *Theoretical Aspects of Pattern Formation*, held at the University of Surrey, UK.

David Lomen, Professor, was the Keynote Speaker for the College of Science Honors Convocation.

Jerome Moloney, Professor, gave three tutorial talks for the *August International Seminar and Workshop on Intense Laser-Matter Interaction and Pulse Propagation* at the Max Planck Institut. He will also give an invited talk at the *Security and Defense 2005 International Conference* being held in Bruges, Belgium in September.

Donald Myers, Professor Emeritus, gave invited talks at the *International Conference on the Future of Statistical Theory, Practice and Education* in Hyderabad, India in December, and *CCOMAS Thematic Conference on Meshless Methods* in Lisbon, Portugal in July. Professor Myers will be listed in the 2005 version of *Who's Who in America*.

Juan Restrepo, Associate Professor, was a special invited topical speaker to the SIAM Annual Meeting in New Orleans in July 2005.

Elias Toubassi, Professor, gave a presentation at the University of Connecticut in October and one at the Math Institute in Wuerzburg, Germany in November.

William Yslas Vélez, Professor, was co-organizer of the Arizona Mathematics Undergraduate Conference (AMUC) held in November 2004, and of an AMS Workshop on Mentoring and Nurturing Students in December 2004. As part of the Department's efforts to recruit for CEMELA, he gave colloquia at Southwest Texas State University, University of Texas in San Antonio, Texas A&M University in Corpus Christi, and both the University of Texas, Brownsville and Pan American in February 2005. ▲

Patterns: Fingerprints & Cacti

Patrick Shipman, Postdoc,
Max Planck Institute for
Mathematics in the Sciences and
Michael Kuecken, Postdoc,
University of Bayreuth,
Dept. of Theoretical Physics 3

Many graduate students wish that they could spend more time with their advisors. As graduate students, Michael Kuecken and I sometimes had the opposite problem with Alan Newell. Often I wondered how someone who did so many things would want to meet three or more times a week, even during spring break.

It wasn't that we were so interesting to him, but fingerprints and cacti certainly were. While Michael studied his and everyone else's fingers, I got to count the number of ribs on Saguaro cacti. Michael needed to understand why fingerprints come in arches, loops and whorls (Fig. 1), and I why some cacti form ribs (Fig. 2 A), others form hexagonal planforms (Fig. 2 C), and yet others form parallelogram planforms (Fig. 2 E). *See Figure 2 on page 12.*

As it turns out, we think that if your fingertips were curvy enough and developed uniform growth stresses, you too could have hexagonal planforms as your
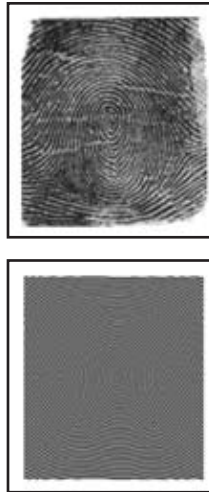

Figure 1: A fingerprint whorl pattern and a reproduction of the pattern by Kuecken and Newell [1].

fingerprints (as do some koalas). Both Michael and I developed, with Prof. Newell, models based on finding the elastic energy-minimizing buckling pattern of a thin sheet on an elastic foundation [1,2]. For fingerprints, the thin sheet is one of the many layers of skin in a prenatal finger, while other layers of skin provide the elastic foundation. Similarly, plants have an outer layer of skin (called the tunica) attached to a squishy foundation (the corpus). For most plants, the energy-minimizing configuration is built from triads of periodic deformations whose local wavevectors add to zero. But, for fingerprints and plants such as saguaros, whose growth tips have relatively little curvature, one periodic deformation dominates.

So, the next time that you are in Arizona, you should take a close look at the saguaros. You will see lots of ribs, but if you look closely enough, you will occasionally find a few regions where a hexagonal planform takes over from the ribs, an indication that even the mighty saguaro sometimes likes a little bit of curvature. And, in case you were wondering, Alan Newell is not a koala—his fingerprints are perfectly normal for a human. ⏶

[1] M. Kuecken and A. C. Newell. *A Model for Fingerprint Formation. Europhys. Lett. 2004.* [2] P. D. Shipman and A. C. Newell. *Phyllotactic Patterns on Plants. Phys. Rev. Lett. 92 (16), 2004, 168102.*

## Math Department's Tyler Byers in International Paralympic Games

On Friday, August 27, the Disabilities Resource Center (DRC) at The University of Arizona hosted a reception for the six athletes who represented the UA at the Paralympic Games in Athens in September 2004.

The Paralympics are the Olympic equivalent for athletes with disabilities.

Tyler Byers, an Honors College graduate with a degree in engineering mathematics, raced in the 800, 5K, 10K in Athens. The Adaptive Athletic Program at the UA Disabilities Resource Center, where these and other athletes train, is a nationally respected facility and a model for schools with disabled athletes.

In addition to training for wheelchair track events, Byers, 22, has taken on a new role as coach of the track team for The University of Arizona Adaptive Athletics program. He also got married last May and graduated with a degree in mathematical engineering, all while holding down a co-op job at IBM, which has recently hired him full time as a software engineer. ⏶

Photos courtesy of James S. Wood / Arizona Daily Star.
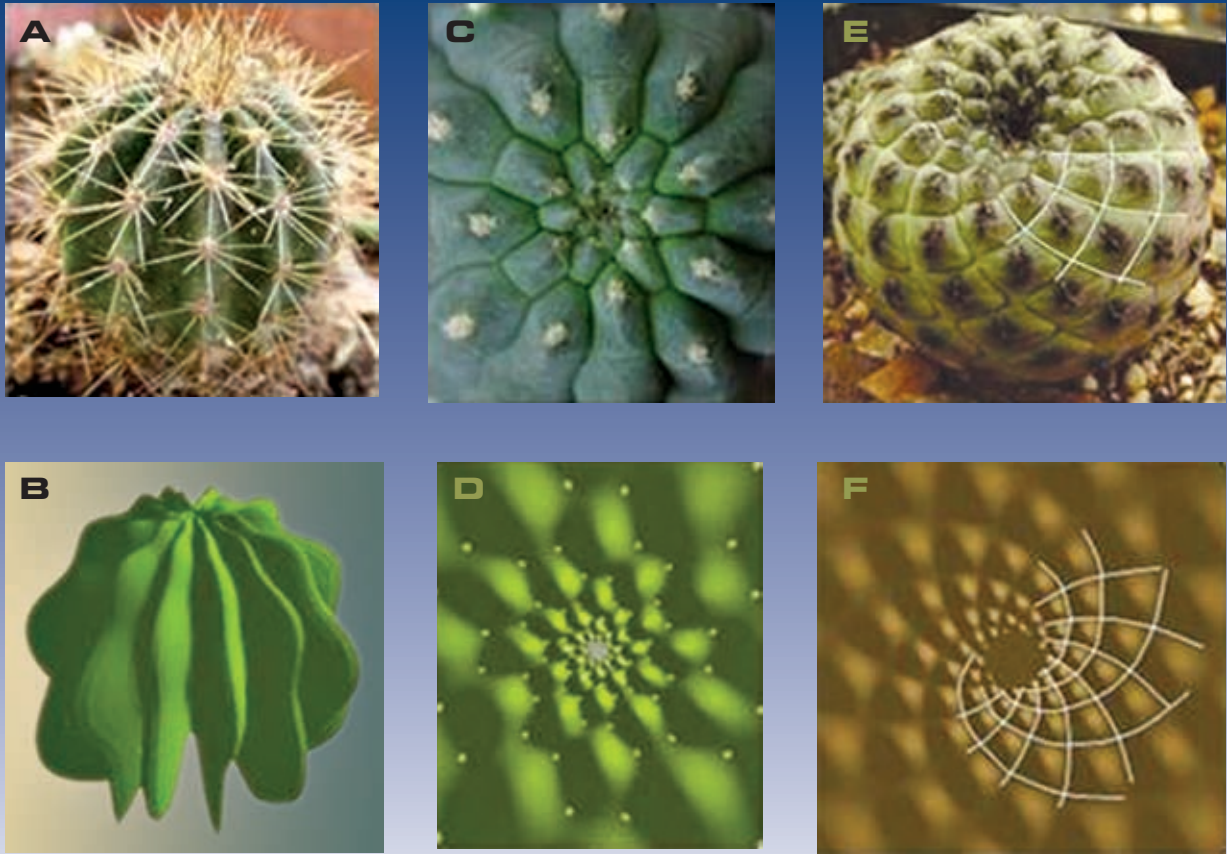
See story on PAGE 11 "Patterns: Fingerprints & Cacti"

Figure 2: Photographs and reproductions of ribbed (a,b), hexagonal (c,d) and parallelogram (e,f) plant patterns [2].