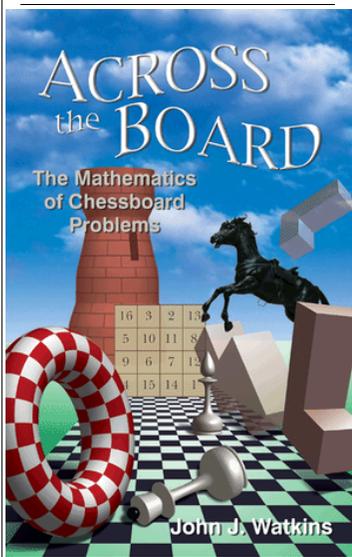


COUNTABLE BITS

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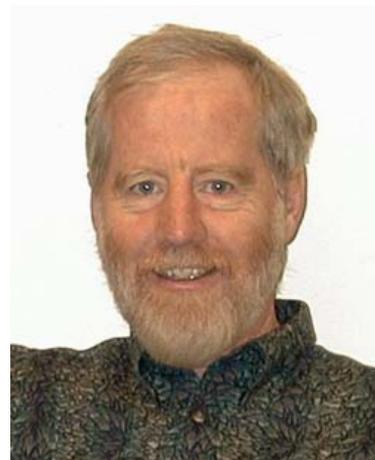
John Watkins' book on chessboard problems

"I ... did receive one job offer ... from IBM. Bear in mind I still had never seen a computer."

JOHN WATKINS RETIRES

On April 30th the department celebrated the contributions of our colleague John Watkins, who is retiring from the department after over 30 years of service. John studied mathematics as an undergraduate at Oberlin College, and received his Ph. D. in 1980 from the University of Kansas, specializing in commutative algebra. Once at CC, he switched his major research interest to graph theory and combinatorics. He has published many research papers in the area, including quite a number with Colorado College undergraduates as co-authors. John has also published several highly regarded books, including a text on graph theory (co-authored with Robin Wilson), a book on the mathematics of chessboard problems, and a text on commutative ring theory. He is presently at work on a text on algebraic number theory.

John's contribution to the department has been enormous, not only as a master teacher, but also as an essential contributor to curriculum development and administration of the department. He also served as Dean of the Summer Session at the college for three years. He has an abiding interest in African Studies, which grew out of his service as the director of the Associated Colleges of the Midwest semester program in Zimbabwe; John had served in the Peace Corps in Africa after his undergraduate degree. Even in his retirement, we all anticipate John's continuing participation in our mathematical community here at CC.



NEWS FROM ALUMNUS GARY ESCH — '60

My name is Gary Esch and I am a '60 CC graduate with a BA in Mathematics.

While I was at CC I was not aware of any computers on campus. After graduation, I attended graduate school at RPI and the University of Oklahoma. I received an MA in Mathematics from OU. In June 1963 I left school, fully intending to return to OU and complete my PhD.

I had an ROTC Army obligation that started in Jan 1964. I talked with my advisor at school and asked if he had any thoughts about what I might do for 6 months before going into the Army. He suggested I apply for some job interviews through the school. With my military obligation I thought it would be a waste of time. However, I went through the interview process and did receive one job offer. It was from IBM. Bear in mind I still had never seen a computer,

although they were on campus at OU.

That started a 30 year career in the computer business. (I never returned to school.) I was in the computer business at the onset of the explosion of a technology that was truly amazing. I was present when IBM launched the first series of computers, the IBM 360 systems, that made computers affordable for most medium sized businesses. I saw the first high resolution storage display that started the cadcam technology. I saw the introduction of the PC. And I worked for the company that invented the work station and developed the commercial LAN.

All of this was really started with my undergraduate days at CC. The environment there was unique. My advisor in the math department was Dr. Rawles. I think his underlying teaching philosophy was to make his students think. How profound that was.

Mathematics:

Caroline Ewing
 Sarah Fletcher
 Marina Gresham (distinction)
 Timothy Hughes
 Michelle Laniohan
 Lung Li (distinction)
 Benjamin Rogers
 Casey Rommel
 Claire Skrivanos
 Sarah Tolman
 Sarah Wolff (distinction)

Computer Science:

Daniel Kaufman
 Samuel McDowell
 Patrick Ramsey

Mathematical Economics:

Smriti Agarwal
 Addison DeBoer
 Anna Glander
 Benjamin Gross
 Brian McMillin
 Jayash Paudel
 Marilyn Pease
 Daniel Quilico
 Kie Riedel
 Blair Sargent
 David Suhler
 William Sweatt

Lung Li and **Sarah Wolff** were the winners of the *Florian Cajori Prize*, for their distinguished work in mathematics as an undergraduate at CC. **Marina Gresham** was the winner of the *Sophie Germain Award*, recognizing her dedication and passion for mathematics, and her growth as a mathematician as an undergraduate at CC.

“It was a busy and productive year for our student scholars, as many of them took on the challenge of working on research problems.”

OUR PARAPROFESSIONAL: ANDREW BEAN

For many years, the Math and Computer Science department has had a recent graduate work for a year in our Paraprofessional position. Job duties include tutoring students in lower-level classes, running problem sessions for courses, organizing tutors and graders, and helping to foster a positive and fun atmosphere for all students of mathematics, majors and non-majors alike. This year, Andrew Bean joined the Mathematics and Computer Science Department to work as its Paraprofessional. Andrew graduated from Colorado College in May 2009 after a distinguished four-year career as a math major. As the department’s Paraprofessional, Andrew has enjoyed the opportunity to work with students and share his enthusiasm for the subject, while continuing to grow as a mathematician himself. He has also been glad for another year of playing for the school’s club baseball team, although he is technically not eligible and occasionally must sneak

onto the field under other players’ names and numbers. Next year, Andrew is considering moving to Washington, D.C. for an opportunity to apply his mathematical abilities before continuing his education in graduate school.

The department is excited to welcome another wonderful Colorado College math major Marina Gresham as its Paraprofessional for the 2010-11 school year.



STUDENT DO MATHEMATICS RESEARCH

It was a busy and productive year for our student scholars, as many of them took on the challenge of working on research problems here at CC or as visitors at other institutions. **Sarah Wolff** (’10) worked with Amelia Taylor on an open problem relating algebraic ideals to graph theory. They are currently writing up their work for publication. Sarah, a Division 1 soccer player, will begin pursuing a Ph.D. in mathematics at Dartmouth next fall. **Casey Rommel** (’10) carried out a statistical analysis of spatial patterns in insect populations, working with David Brown and environmental science professor Miro Kummel. Casey won the prize for best poster presentation by an undergraduate at the Front Range Ecology Symposium, and he will begin a dual master’s degree program in biology and statistics at the University of Nebraska next fall. **Marina Gresham** (’10) worked with Stefan Erickson on the problem of defining a zeta function for hypergraphs (a generalization of graphs that allows “edges” to connect more than two “vertices” at a time). Believe it or not, this has potential concrete applications in devising error-correcting codes for more reliable data transmission. After graduating, Marina will continue to be an invaluable member of the department – she will be our new Paraprof! **Lung Li** (’10) worked with Sunil Chetty on an open problem from algebraic number theory: how does the rank of an elliptic curve grow in relation to the field extension over which the curve is defined? As you are no doubt aware, elliptic curves played a central role in Wiles’s proof of Fermat’s Last Theorem, and they also find important applications in cryptography. **Caroline Ewing** (’10) spent the summer in an REU program at Wabash College. She worked with a team of students from around the country to investigate the properties of “zero-divisor graphs”, a recent construction that

allows mathematicians to use graph theory to study commutative rings (which you learned about in your abstract algebra classes). **Sarah Fletcher** (’10) spent her summer working in an integrative cancer research lab at Vanderbilt University. Sarah worked on the testing and statistical analysis of an automated procedure for determining cell lineages, and she will begin pursuing a Ph.D. in biostatistics at Vanderbilt in a year’s time. **Lauren Shoemaker** (’11) spent the summer working in Virginia Tech’s undergraduate research program on fisheries management. She worked with a team of students and faculty to develop mathematical models for sustainable fisheries management, explore the policy implications, and even develop teaching materials for use in high schools. **Ben Rogers** (’10) worked with Steven Janke and biology professor Brian Linkhart to develop population models for flammulated owls, which nest in the mountains to our west. Ben spent part of the summer collecting data in the field, which means that he won the award for “Student Researcher Most in Danger of Being Eaten by a Bear”. Over on the computer science side of the department, **Sam McDowell** (’10) worked with Jonathan Bredin on computer vision and robotic guidance. Using everyday hardware (a digital camera and a remote-controlled toy car) and his own computer code, Sam built a robot that could guide itself towards a predefined target. No word yet on when it will be equipped with atomic land torpedoes. Finally, **Patrick Ramsey** (’10) worked with Jonathan Bredin on a generalized framework for computerized matching – think of rideshare boards, or kidney donor matching services. Patrick’s approach distributes the computational problem across a network of computers, greatly increasing the speed and reliability of existing matching algorithms.

EUCLID SCHOLARSHIPS 2010



Nick Pascucci, Desiree Martinez, Linnet Vacha, Evan Ranken

The department announced the four winners of the Euclid Scholarships this spring. The goal of these merit-based \$2000 scholarships is to support the study of mathematics and computer science within the context of the liberal arts. They are awarded to underclassmen who exhibit unusual talent and interest in the mathematical sciences.

The Euclid scholarships are made possible by donations from alumni; John Tompkins (class of '89) made the initial generous gift.

We would encourage our alumni to help with this fund — every modest contribution will help. To donate, you

may send a check (made payable to "Colorado College" and with "Euclid Scholarship Fund" on the memo line) to: Development Office, The Colorado College, PO Box 1117, Colorado Springs, CO 80901-9897, or you can also do this online at the college website: www.coloradocollege.edu (click on "SUPPORT CC").

Math and Computer Science Faculty (2009-2010)

Marlow Anderson
Jonathan Bredin
David Brown
Andrea Bruder
Sunil Chetty
Stefan Erickson
Steven Janke
Molly Maxwell
Jane McDougall
Mike Siddoway
Amelia Taylor
Fred Tinsley
John Watkins

Departmental Staff

Marita Beckert (Staff Asst.)
Andrew Bean (Paraprof.)
Amy Pacheco (Tech. Dir.)

The faculty and students of the math department have enjoyed two alumni talks this spring.

John Tompkins ('89) talked about his liberal arts education at CC helped him in his career as a hedge fund manager.

Courtney Gibbons ('06) is a current graduate student in math at Nebraska. She gave our students the real scoop on graduate school and also gave a math talk related to her work in commutative algebra.

"I think of my days at CC with great fondness. I hope you all continue to inspire students the way I was inspired!"

DAVID BROWN GETS TENURE

The Math Department is excited to announce that Professor David Brown is now a permanent member of the faculty in the Mathematics and Computer Science Department. Following an extensive review, Colorado College has granted tenure to David. He is an applied mathematician in a department of primarily theoretical mathematicians. As a teacher he has had a dramatic impact on a wide variety of students. In many cases he has helped students change their lives in dramatic and positive ways. David's research projects span several fields including mathematics and biology (of course!) but also environmental science and economics. He has published a succession of research papers since graduating from the University of California at Davis in 2001 with his PhD. Peer reviewers from outside the College confirmed the quality and breadth of his contributions. In addition, David is principal investigator on a successful Undergraduate Bio-mathematics grant from NSF. Consequently he has been instrumental in inspiring numerous collaborations among students and faculty within the natural science division. We look forward to many years with David as a colleague.

NEWS FROM ALUMNA KIM SHAFER—'97

I just wanted to say thank you for sending out the department newsletter. It's nice to see what you guys are up to and hear that my old professor, Steven Janke, is still there and winning cool stuff. Please tell him that an old student, Kim Shafer (class of '97), sends her regards.

Like Karin Boes, I also want to say thank you for introducing me to computer science while I was focusing on my math major. I, too, ended up spending my career working with computers as a web and database application developer. Since then, I've gone on to get my MS in Technology and Innovation Management. Currently I'm living in Tampa, FL working as a knowledge management specialist and business analyst for an international defense contractor, S.A.I.C., in support of United States Central Command. I'm happily married with two wonderful children.

I think of my days at CC with great fondness. I hope you all continue to inspire students the way I was inspired!

**The Colorado College Department of
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Dept/MA](http://www.coloradocollege.edu/Dept/MA)

EDITOR'S NOTE:

Thanks so much to Kim Shafer and Gary Esch for sharing your memories and thoughts about our department! It's always great to hear from you, and we look forward to including more stories about our alumni in this newsletter, so that classmates can re-connect, and so that current students can learn about the many successful paths that can be taken by math and computer science majors.



COLORADO COLLEGE
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NEW COMPUTER SCIENTIST SIGNS ON

Since Professor Jonathan Bredin will be on leave next year, we have a new computer scientist joining the department. Matthew Whitehead is currently finishing his Ph.D. in Computer Science at Indiana University and will be moving to Colorado this summer. His background is appropriate for our liberal arts setting since he spent his undergraduate years at Willamette University in Oregon where he majored in mathematics (and enjoyed the courses he took from the English department.)

Matthew's dissertation research comes under the category of artificial intelligence and specifically addresses machine learning. Using large data sets often drawn from web sources, he studies algorithms for classifying the data in various ways. During his interview last February, he spoke to the students about programs for classifying a variety of online customer reviews as either "good" or "bad". This whole field of data mining and classification is both an active area of research and a source of some exciting student projects. In fact,

Matthew will, no doubt, draw on his experiences while teaching our artificial intelligence course next spring. Our computer science program (and our relatively young major) is experiencing a steady increase of student interest and Matthew's background including his internships at Apple and Google should bring even more opportunities for our students. It even looks like the number of computer science majors may match the number of mathematics majors next year!



BRUDER IS THE NEW TENURE-TRACK HIRE

Last year the department hired applied mathematician Andrea Bruder in a temporary position. This spring, we were pleased to offer her the tenure track position, vacated by John Watkins' retirement.

Andrea received Ph. D. in applied analysis from Baylor University; she did her undergraduate work in her native Germany. She will

strengthen and broaden our offerings in applied mathematics.

When not teaching and studying mathematics, she may be found rock-climbing, or playing with her new puppy Leo.



SUNIL CHETTY AND MATH EDUCATION

We are pleased that Sunil Chetty will join us as a Riley Scholar for a second year. The Riley Scholar program brings minority scholars to CC who are working on their dissertations, or have just completed their Ph. D. The intention is to acquaint them with the advantages of teaching at a liberal arts college like CC. Sunil received his Ph. D. in number theory from the University of California at Irvine in 2009, and has been a great success for us, teaching in the classroom, working informally with students, collaborating on number theory with Stefan Erickson, and working with Lung Li for his senior capstone project.

Sunil is very interested in EL-HI education, and has helped design a new MA110 Mathematical Explorations course for next year, with this interest in mind. He will be co-teaching the course with Sandie Gilliam, a veteran K-12 math teacher from the education department.

The course topics will center around recognizing and using patterns in mathematics, with an emphasis on approaching math with an exploratory outlook and creating clear and coherent (written and

oral) presentations of solutions. While these skills can be viewed as universally important, much of the motivation lies in providing a course that sheds light on the inseparable processes of learning and teaching mathematics.

As such, students aiming for a career in teaching, particularly at the elementary school level, are a major part of the intended audience. In a broader sense, the course will be a great step toward building a more complete and competitive teacher-preparation program here at Colorado College by providing a mathematics course with content directly relevant to a K-12 classroom. In the same vein, we hope that this course will help create a more cohesive community of math educators at all levels and possibly inspire further collaboration between the math department and the education department.

