MathFest 2004

PRIZES and AWARDS

THE MATHEMATICAL ASSOCIATION OF AMERICA

Providence, Rhode Island

August 13, 2004

Program

Opening and Closing Remarks

Ronald L. Graham, President
Mathematical Association of America

Carl B. Allendoerfer Awards

The Carl B. Allendoerfer Awards, established in 1976, are made to authors of expository articles published in *Mathematics Magazine*. The Awards are named for Carl B. Allendoerfer, a distinguished mathematician at the University of Washington and President of the Mathematical Association of America, 1959-60.

Charles I. Delman & Gregory Galperin

"A Tale of Three Circles," ***Mathematics Magazine*****, February 2003, pp.15-32.**

The article by **Charles Delman** and **Gregory Galperin** begins with an intriguing basic question about the sum of the angles of curvilinear triangles formed by the arcs of three circles in the plane. In the course of analyzing the problem, the authors carry us along a wave that takes us through examples, a theorem that explains it all, and an overview of three classical geometries.

The authors consider three configurations of three intersecting circles in the plane: first, the case where the three circles intersect at a common point and no circles are tangent to each other; next, the case where the three circles have collinear centers; and finally, the case in which the three circles intersect as in a generic Venn diagram. Each of the three cases results in a different sum of the angles of a curvilinear triangle. A very interesting paper so far, but the fun is just beginning. The authors open a window with the basic question and lead us to a panoramic view of noneuclidean geometries.

With careful summaries of spherical and hyperbolic geometries and an introduction to stereographic projection, the authors succeed masterfully in sharing the beauty and fascination of noneuclidean geometries with those unfamiliar with these geometries. The new perspectives and the proof linking the three geometries to the three configurations of three intersecting circles are examples of elegant mathematics written in an accessible and clear style.

Biographical Note

Charles Delman, currently Professor of Mathematics at Eastern Illinois University, grew up in Manhattan. New York City's rich multi-cultural environment led to lifelong loves for - and dabbling in - art, music, and ethnic food, while trips to the nearby Museum of Natural History and summers in the Catskill Mountains cultivated his passions for nature and science. He enjoys backpacking with his children, Anna and Ben, and his partner, Barbara. He is also committed to political activism for environmental preservation, peace, and social justice. Charles received his Bachelor's in mathematics from Harvard and his Ph.D. from Cornell, under the guidance of Alan Hatcher, to whom he will always be grateful for demonstrating so well how to get at the essence of an idea. Before coming to EIU, he taught at The Ohio State University and Pitzer College. His mathematical interests include low-dimensional topology, classical geometry, and dynamical systems.

Response from Charles Delman

I am deeply honored and excited to receive the Allendoerfer Prize. Writing "A Tale of Three Circles" was a great pleasure, and I am greatly indebted to the people who enhanced both that pleasure and the quality of the article: the editor, Frank Farris, who kept us striving for greater clarity and liveliness with his many constructive criticisms, questions, and suggestions; my delightful geometry students, who have over the years so greatly stimulated my interest in the subject; my loving partner, Barbara Lawrence, who puts up with more than can be mentioned; and, of course, my co-author, Gregory Galperin, with whom I have shared many pleasurable hours of inquiry and collaboration, and who asked in the first place the innocent little question that led to this whole thing.

Biographical Note

Gregory Galperin, currently Professor of Mathematics at Eastern Illinois University, was born in Tbilisi, the capital of Georgia, USSR (Georgia is now a separate country). At age 14, he became a student of the famous A.N.Kolmogorov physics/mathematics school in Moscow (USSR), and later on a student of the Physical and Mathematical Department at the University of Moscow. He received his Ph.D. from the University of Moscow under the tutelage of prominent twentieth century mathematician Andrei N. Kolmogorov, to whom he will always be grateful for demonstrating the diversity of mathematics and illustrating the elegantly simple yet profound ideas that connect various branches of mathematics. Dr. Galperin's Ph.D. thesis concentrated on dynamical systems with local interaction, which arose partially from biology and partially from automata theory. Later on, he worked with Prof. Ya. G. Sinai (Moscow University and Princeton University) on the theory of billiards. He has published more than 50 mathematical articles on billiards and other dynamical systems, on combinatorial geometry, on differential geometry, and on celestial mechanics. Dr. Galperin has been an Alexander von Humboldt fellow since 1994, and has collaborated with Prof. S. Albeverio (the University of Bonn, Germany).

As an undergraduate, Dr. Galperin was involved in mathematical olympiads, mainly as a creator of new mathematical problems. He helped conduct the Moscow Mathematical Olympiads and the Russian National Mathematics Olympiads from 1970-1980. In 1986 he published the book *Moscow Mathematical Olympiads*. He wrote and published many popular articles and problems on mathematics in the journals *Kvant* (in Russian) and *Quantum* (in English). He has also played a big role in conducting the American National Olympiads, the USAMO, since 1996, has served as Coordinator at the 42nd International Mathematical Olympiad in Washington, D.C., and was the Deputy Leader of the USA team at the 44th International Mathematical Olympiad in Japan, 2003.

Gregory Galperin plays table tennis, likes to draw and listen to music, and enjoys reading literature.

Response from Gregory Galperin

Being awarded the Allendoerfer Prize comes as an unexpected honor and a very delightful surprise for me. In all of my mathematical investigations, I have always tried to express the beauty and uncommonness of that one key idea that resolves an initially impenetrable challenge. Such an idea could consist of just a single unusual expression or word, or an unorthodox mathematical construction, or even an unusual mathematical theory. In my article with C. Delman, the initial challenge consisted of finding the angle sum of the curvilinear triangle formed by three upper semicircles with collinear centers, and noticing the hyperbolic geometry behind the picture turned out to be the key idea that solved the problem. Inspired by this unusual association, and having long aspired to reveal the unity of three famous geometries – the Euclidean, spherical, and hyperbolic – to a broad audience, we materialized our dream through a narrative of the workings of the three geometries in a standard sphere. In the course of our many years of work on the article, we both enjoyed seeing our project materialize, as well as having the opportunity to share the beauty of the geometrical ideas we used with numerous other lovers of mathematics. We presented our article at various workshops and colloquia, and only after much long-term polishing did we submit our final text to *Mathematics Magazine*. I kindly thank everyone who gave me good advice, and I especially thank the Mathematical Association of America for its deep appreciation of my collaborative efforts with Dr. Delman, my co-author and friend.

Trevor Evans Awards

The Trevor Evans Awards, established by the Board of Governors in 1992 and first awarded in 1996, are made to authors of expository articles that are accessible to undergraduates and are published in *Math Horizons*. The Awards are named for Trevor Evans, a distinguished mathematician, teacher, and writer at Emory University.

Douglas Dunham

"A Tale Both Shocking and Hyperbolic," ***Math Horizons*****, April, 2003, page 22+.**

This delightful paper describes artist M.C. Escher's shock in reading a paper by Coxeter. Geometer Coxeter had indeed solved a problem that had been plaguing Escher for years: how to create a repeating pattern within a limited circle. Later the author of this paper was shocked to see an Escher sketch that mapped out Escher's famous Circle Limit III – using the very method that the author had used in creating his computer generated rendition of that work.

This colorful paper takes us through an introduction to hyperbolic geometry and provides many good references for further study of the subject. It should appeal to both students of mathematics and of computer science.

Biographical Note

Douglas Dunham is a professor at the University of Minnesota Duluth, where he has taught for 27 years. He holds a B.S. from Caltech in physics, an M.A. in mathematics from California State University at Long Beach, and a Ph.D. in mathematics from the University of California at Berkeley, where his thesis was in differential geometry under Shiing-Shen Chern. Shortly after arriving in Duluth, Dr. Dunham pointed out some of the transformation group aspects of M. C. Escher patterns to his colleague Joe Gallian (another Trevor Evans Award winner). This chance conversation led to a continuing collaboration that has included the development of algorithms to create repeating hyperbolic patterns, theoretical work on Hamiltonian paths, and selection of "Mathematics and Art" as the theme of the 2003 Mathematics Awareness Month. His research interests include color symmetry of repeating patterns, hyperbolic geometry, and designing and implementing algorithms to create artistically pleasing patterns.

Dr. Dunham enjoys teaching and working with students on research projects. He has had 30 undergraduate students work with him under the University of Minnesota's Undergraduate Research Opportunities Program. In addition, he has supervised more than 20 Master's projects in computer science. When not teaching or doing research, he occasionally enters running races and triathlons with much enthusiasm but little talent.

Response from Douglas Dunham

I am pleased and honored to receive the Trevor Evans Award. I would like to thank Steve Kennedy, Deanna Haunsperger, Tonya Hahn, and the other people at *Math Horizons* who edited and laid out my article in such an attractive way. I would also like to thank Doris Schattschneider and Joe Gallian for their input on early versions of "A Tale Both Shocking and Hyperbolic." Finally, I would like to thank Joe Gallian and our mutual research students, John Lindgren and David Witte in particular, for helping design and implement the first versions of the hyperbolic pattern programs.

There were two main ideas that I wanted to convey in my article. The first is the mathematical sophistication and artistic genius of M. C. Escher in creating his hyperbolic patterns. The second is that those mathematical "aha!" moments can come at unexpected times, as they did for both Escher and me, so when they happen to you, enjoy them!

Hugh McCague

"A Mathematical Look at a Medieval Cathedral," ***Math Horizons*****, April, 2003, page 11+.**

If you have been asked to teach a mathematics course for students of the humanities, this rich paper presents elementary mathematics used in a very significant way. McCague ties square roots, ratios, the compass, and the golden section to the building of churches in Medieval Europe, but makes it very clear that to the masons building the churches the mathematics was far more significant than just a measuring and building tool. This mathematics tied the building of the church to the whole intellectual tradition of Western Europe. A student of literature or history reading Dante, Chaucer, or Augustine will find many resonances in this paper.

This article is well written and illustrated. It is engaging and invites one to delve more deeply into the subject by offering suggestions for further reading.

Biographical Notes

Hugh McCague did a Bachelor of Mathematics (Honours Statistics) Degree at the University of Waterloo. After graduation, he worked as a statistician for seven years at McMaster University in Ontario. McCague then returned to academic studies at York University, Toronto, where he completed his M.A. and Ph.D. in interdisciplinary research on the application of mathematics in art and architecture. He works and teaches at York University in a program promoting and supporting computer literacy and critical skills for students in the Arts and Humanities. His research and publications concentrate on the mathematical and statistical analysis of the design and construction methods of the medieval master masons and Roman land surveyors.

Response from Hugh McCague

I am honored to accept the Trevor Evans Prize. I would like to acknowledge the thoughtful and dedicated editorial and production assistance of Prof. Stephen Kennedy, Jane D'Alelio, and Tonya Hahn. As alluded to in the Citation, I have stressed the philosophical and quantitative import of mathematics for artistic creation. In this manner, mathematics addresses the meaning and purpose of human life, and thereby enriches the contact of students from the sciences and humanities.

Lester R. Ford Awards

The Lester R. Ford Awards, established in 1964, are made to authors of expository articles published in *The American Mathematical Monthly*. The Awards are named for Lester R. Ford, Sr., a distinguished mathematician, editor of *The American Mathematical Monthly*, 1942-46, and President of the Mathematical Association of America, 1947-48.

Noam Elkies

"On the Sums $\sum_{k=-\infty}^{\infty}(4k+1)^{-n}$," *The American Mathematical Monthly,* August-September 2003, pp. 561-573.

The author notes that the sums $\sum_{k=1}^{\infty}\frac{1}{k^{2n}}$ and $\sum_{k=0}^{\infty}\frac{(-1)^k}{(2k+1)^{2n+1}}$, both of which were shown to be rational multiples of powers of π by Euler, can be combined to state that $S(n)=\sum_{k=-\infty}^{\infty}\frac{1}{(4k+1)^n}$ is a rational multiple of π^n for all integers $n \exists 2$. He notes that the rationality of $\pi^{-n}S(n)$ has been proved many times, but only recently (1993) has a proof been given (by Calabi) that involves only the change of variable formula in multiple integrals. Elkies explores this and the generalization by Calabi, Beukers, and Kolk involving an *n*-dimensional polytope $\prod_n$.

He also, alternatively, relates *S(n)* to $\prod_n$ by way of a compact self-adjoint operator on $L^2(0,\pi/2)$. This leads to a combinatorial interpretation of *S(n)* that can be derived directly involving "zig-zag" permutations.

The paper is a model of clear exposition showing unexpected and interesting relations between different, seemingly unrelated areas of mathematics.

Biographical Note

Noam D. Elkies is a number theorist, most of whose work concerns Diophantine geometry, computational number theory, and connections with other fields such as sphere packing and error-correcting codes. He also publishes occasionally in enumerative combinatorics and combinatorial games. He twice represented the United States at the International Mathematical Olympiad, winning gold medals both times, and was a Putnam Fellow in each of the three years he took the Putnam examination. He has been at Harvard since coming there as a graduate student in 1985; after earning his Ph.D. there under Barry Mazur and Benedict Gross, he was a Junior Fellow, then Associate Professor, and was granted tenure in 1993 at age 26, the youngest in Harvard's history. His work has also been recognized by awards such as a Packard Fellowship and the Prix Peccot of the Collège de France.

Elkies' main interest outside mathematics is music, mainly classical piano and composition. Recently performed works include a full-length opera, *Yossele Solovey; Brandenburg Concerto #7*, commissioned and performed by the Metamorphosen Chamber Orchestra; and several other orchestral compositions, one of which had Elkies playing the solo piano part in Boston's Symphony Hall.
He still has some time for chess, where he specializes in composing and solving problems; he won the world championship for solving chess problems in 1996, and earned the Solving Grandmaster title in 2001.

Response from Noam Elkies

It is an unexpected honor and pleasure to have my first *Monthly* paper recognized by the Lester R. Ford Award. I am grateful to the MAA for this award. I also thank Don Zagier, for introducing me to Calabi's transformation; Frits Beukers and Johan Kolk, for alerting me to their part in the proof; and the referees, for their valuable corrections and suggestions. Finally, and particularly relevant to this award, I thank the *Monthly* editor Bruce Palka for the rare opportunity to publish in the *Monthly* a paper that combines mathematical research (the connection with the trace formula) and exposition, and for working with me to polish the exposition recognized by the Ford prize.

Charles Livingston

"Enhanced Linking Numbers," ***The American Mathematical Monthly,*** **May 2003, pp. 361-385.**

The ***enhanced linking number*** is a new invariant of links. Livingston's enticing introduction begins with a known invariant, the linking number. To justify the term "invariant" one must prove that equivalent links have the same linking number. Readers are coaxed into doing this for themselves by showing that Reidemeister moves do not change the linking number.

How do transformations other than Reidemeister moves affect the linking number? For example, in any link diagram, where two strands cross, if you switch the overstrand with the understrand, this is called a "crossing change." Crossing changes do *not* produce equivalent links; so one would not expect them to leave the linking number, or any other link invariant, unchanged in general. But perform enough crossing changes and one can untangle any link to the "unlink." Thus, by keeping track of the changes made to an invariant every time a crossing change is made, one can reduce the computation of an invariant to that of the unlink.

Livingston's article gives a development of the enhanced linking number based on crossing change formulas, and a number of related topics such as symmetry, Brunnian links, and periodicity are investigated. The article is decorated with many clear and informative illustrations of the crossing change formulas and other results. By the time readers finish the article, they will have encountered many interesting examples and properties, culminating with the uniqueness result that any "type 1 invariant of 2-component links" is obtained from the enhanced linking number by an affine transformation. Better than that, they will likely come away from reading the article with a strong desire to learn more about knots and links.

Biographical Note

When **Charles Livingston** was young, his mother Rosetta fascinated him with her instructions on the art of weaving lattice top piecrusts. Little did she know that would lead him to a career with knots and links. The path from pies to the mathematics of knots took him from the public schools of Burbank, California, to undergraduate studies at UCLA and MIT, and in 1975 to graduate work at Berkeley. After graduation he taught at Rice University and then came to Indiana University, Bloomington, where he has taught since 1981. It was at Berkeley that he met his wife, Lynn Greenfield, who finds his finest application of knot theory on the tops of pies.

Response from Charles Livingston

The *American Mathematical Monthly* inspired the mathematical spirit in me as a student. I am delighted that my article might have had done the same for others and it is an honor to receive the Lester R. Ford award. Colleagues, family and friends contributed to my work on this paper, and I am grateful to all of them. In particular, my colleague Paul Kirk collaborated with me on the mathematics that formed the basis of this article; his insight and determination was the foundation of our work. And my brother Eric's encouragement, as well as careful readings, have been a source of constant support. My thesis advisor and friend Rob Kirby introduced me to geometric topology. If my article shares just a small fraction of the pleasures of mathematics that he offered to me, it will have achieved a great deal.

R. Michael Range

"Complex Analysis: A Brief Tour into Higher Dimensions," ***The American Mathematical Monthly*****, February 2003, pp. 361-385.**

The article delivers just what its title promises: a guided excursion into areas of surprising---and surprisingly little-known---beauty and applicability. The author, like any good guide, chooses his examples knowledgeably and well from among the available highlights. On a day trip, not a technical trek, we view the peaks from a little distance, but our author-guide points toward some of the paths that lead upward, but may cross slippery or broken terrain.

Singularities, pseudoconvexity, and the passage from local to global results via sheaf cohomology and integral kernels are all pointed out, but not belabored. The prerequisites (the basics of complex analysis in one variable) are modest but crucial: the main thread concerns similarities and, especially, differences between the one- and higher-dimensional theories. Hartogs' extension theorem is an early and striking instance: A special case asserts that, for $n \geq 2$, every function that is holomorphic in a connected neighborhood of the boundary of a ball in C^n can be extended holomorphically to the ball's interior. Nothing of the sort holds in single-variable complex analysis, of course, where a rich theory of isolated singularities applies. Having glimpsed several peaks and strolled on one or two, many tourists can be expected to return.

Biographical Note

R. Michael Range was born in Germany and raised in Milano, Italy; he earned his Diplom in Mathematik in Göttingen. A Fulbright Exchange Fellowship brought him to the USA, where he received a Ph.D. at UCLA in 1971. He has held academic positions at Yale University and at the University of Washington, as well as research positions at institutes in Bonn, Stockholm, Barcelona, and Berkeley.

He is Professor of Mathematics at SUNY at Albany, where he served as chair in the early 1990s. Range has published numerous research articles in multidimensional complex analysis. He is the author of *Holomorphic Functions and Integral Representations in Several Complex Variables* (Springer-Verlag, 1986), recently reprinted, and also reproduced in the People's Republic of China. A frequent visitor abroad, Range is fluent in five languages, a skill that he has often used in lectures in North America and Europe. He and his wife Sandrina have 3 grown children.

Response from R. Michael Range

I am delighted that the MAA has chosen my article for a Lester R. Ford Award. I have been fascinated with multidimensional complex analysis since my student days in Göttingen, when I was introduced to the subject by H. Grauert, one of the outstanding masters of the field. I have long felt that more mathematicians, rather than being deterred by the differences when compared to the familiar classical one variable case, should be able to recognize the unity of complex analysis, understand some of its principal results, and appreciate the surprising features that remain hidden as long as one limits oneself to the complex plane. Perhaps this brief tour into higher dimensions will make a small contribution towards that goal. I must confess that the project began as a multi day excursion, not technical, but definitely more strenuous than the present tour. Thanks are due to the referees and to Bruce Palka, editor of the *Monthly*, for their encouragement and suggestions to turn this into a more manageable hike.

Rüdiger Thiele

"Hilbert's Twenty-Fourth Problem," ***The American Mathematical Monthly*****, January 2003, pp. 217-234.**

In David Hilbert's Notebooks (part of his *Nachlass*) appears a putative "24th problem" that addresses the question of determining the simplicity of a proof.

While Hilbert vacillated on the topic to present for his invited address in Paris, he ended by adopting Minkowski's suggestion of mathematical problems, but, at the suggestion of both Minkowski and Hurwitz, lectured on only ten problems, though all twenty-three appeared in the published version. But the prospective twenty-fourth did not! Probably this was, as Professor Thiele remarks, because proof theory did not yet exist (although Hilbert had some nascent ideas about it). The problem of simplicity, as Hilbert later expressed it, was intimately connected with the issues of consistency proofs, say for logic.

In this paper Rüdiger Thiele thoroughly explores the mathematical, historical, logical, and philosophical context of Hilbert's twenty-fourth problem in a lucid way that makes clear all the many threads and ramifications of what might be viewed as an "impossible" problem, and in the context of its first English publication.

The thoroughness that informs his paper and makes it accessible is reflected in the 116 items in the bibliography.

Biographical Note

Rüdiger Thiele is a historian of mathematics who studied both mathematics and physics, receiving his Ph.D. in mathematics from Martin-Luther University of Halle-Wittenberg and his habilitation in the history of physical sciences from University of Hamburg. In 1996 he was awarded the Foerder Prize of the German Academy of Natural Sciences, Leopoldina. He has been a visiting professor and research scholar at the Universities of Bonn, Mainz, Muenster, and Toronto; he is vice president of the Euler Society in the USA. Since 1986 he has held a position at the University of Leipzig, where he now is a Privatdozent in the Department of Mathematics, and a member of the Sudhoff Institute for History of Medicine and Science. His main field of research is the history of the calculus of variations; his publications include a biography of Leonhard Euler and a booklet on mathematical proofs. Living almost next door - within the shot of an arrow – of Georg Cantor's detached family house in Halle and working in an office in Leipzig on which the famous concert hall Gewandhaus casts shadows, his interests include foundations of mathematics, philosophy, and music.

Response from Rüdiger Thiele

As a historian of mathematics I am deeply honored to receive the Lester R. Ford Award of the Mathematical Association of America. I am bound in duty to thank all people who encouraged and supported me, most particularly my colleague and friend David Zitarelli who invited me to lecture on the topic at the New Orleans Meeting in 2000 and Bruce Palka, the *Monthly*'s Editor. The Editor's comments and hints brought my submitted report on a new source to the extended essay, which was finally printed. Bruce Palka patiently suffered the endurance test of a work in progress (let alone the linguistic improvement of my German English).

George Pólya Awards

The George Pólya Awards, established in 1976, are made to authors of expository articles published in the *College Mathematics Journal*. The Awards are named for George Pólya, a distinguished mathematician, well-known author, and professor at Stanford University.

Greg N. Frederickson

"A New Wrinkle on an Old Folding Problem," ***College Mathematics Journal,*** **September, 2003, vol. 34(4), pp. 258-263.**

Optimize the volume of a box, subject to the following constraint. Imagine the millions upon millions of calculus students who have spent hours doing just that (not to mention the number of tears shed when the answer did not match the back of the book). As far as these types of examples are concerned, we've done them all, haven't we? Wrong! In this lovely article, Professor Frederickson shows that even such a basic example can lead almost immediately to tantalizing new questions and insight.

Frederickson considered the 100-year-old box problem, introduced by Henry Dudeney in *The Weekly Dispatch*, where a cistern of maximum volume is to be made from a rectangular sheet of tin by cutting equal squares out of each corner and folding up the sides.

Over the ensuing one hundred years, others have identified variations on this puzzle; Frederickson's generalization asks for a cistern of any shape, open on the top, formed from a rectangular sheet using tin snips and solder, which maximizes the volume. The shape Frederickson offers, which looks like an ornate thickened capital I improves Dudeney's maximum value by 5% (more if the original rectangle is closer to square). Moreover, it shows that beauty can be found in and ingenuity inspired by a problem even after 100 years of calculus students have seemingly milked it dry.

Biographical Notes

Greg N. Frederickson was born in Baltimore, Maryland. After graduating from Harvard University with an A.B. in economics, he taught mathematics in the Baltimore City public schools for three years before entering graduate school. He received a Ph.D. in computer science from the University of Maryland in 1977. He then joined the faculty in the computer science department at the Pennsylvania State University, from which he moved to Purdue University in 1982.

Professor Frederickson has done research in the area of the design and analysis of algorithms, with major contributions to approximation algorithms for NP-hard problems, graph and network algorithms, and data structures. He has published two books, *Dissections: Plane* & *Fancy* and *Hinged Dissections: Swinging & Twisting*.

Reflecting his experience as a (strictly) amateur squash player, he enjoys thinking inside the box. Recently he has tried hard not to fold under pressure.

Response from Greg N. Frederickson

I must admit that I was never really concerned about the "millions upon millions of calculus students" who had spent countless hours optimizing the volume of a box. Having never noticed the box problem before I heard Woody Dudley lament its automatic inclusion into innumerable textbooks, I found it a rather interesting problem about folding.

How intriguing to imagine crazy schemes for cutting and then flapping panels around in three dimensions! And math aside, how fascinating that the master puzzlist Henry Dudeney had framed this problem a century ago in terms of "cistern-makers, ironmongers, plumbers, cardboard-box makers", and how curious that he had attracted his readership with the weekly award of a half guinea prize! How lovely to be able to track down that picturesque illustration from *Cassell's Magazine*, and how exciting to trace the problem back fifty years earlier! How nifty to identify the many variations since the time of Dudeney, and what fun to construct a shiny physical model!

And best of all, it's been great to see the MAA provide the proof that it is never too late to collect that half guinea.

Chauvenet Prize

The Chauvenet Prize for expository writing, first awarded in 1925 to Gilbert Bliss of the University of Chicago, is given for an outstanding expository article on a mathematical topic by a member of the Association. The prize is named for William Chauvenet, a professor of mathematics at the United States Naval Academy. It was established through a gift in 1925 from J.L. Coolidge, then MAA President.

Edward B. Burger

"Diophantine Olympics and World Champions: Polynomials and Primes Down Under," ***American Mathematics Monthly,*** **November, 2000, pp. 822-829.**

This delightful and imaginative article uses an extended metaphor between a question in Diophantine number theory and an Olympic event. The world champion, for a given irrational number *a*, is the sequence of denominators in the continued fraction expansion (the "down under" referring both to Australia, the site of the 2000 Olympics, and to the denominator). Among other things Burger shows that a "champion sequence" can be composed entirely of primes or entirely of powers.

This article is distinguished by its clarity and the originality of its presentation. It elucidates material on continued fractions that should be in every young mathematician's gym bag and includes some new surprises as well. Continued fractions are both mysterious and central. They encode almost everything one might wish to know about the arithmetic nature of *a* and, as such, should be familiar to all mathematicians.

Edward Burger has given us a lovely, fresh perspective on some classical and new mathematics all arrayed in modern guise. He richly deserves the Chauvenet "gold medal".

Biographical Notes

Edward B. Burger pursued his undergraduate studies at Connecticut College and earned his Ph.D. at The University of Texas at Austin. In 1991, after a Postdoctoral Fellowship at the University of Waterloo, he arrived at Williams College where he is now Professor of Mathematics and Chair.

Burger's research interests are in diophantine analysis and he is the author of over forty articles, books, CD-ROM texts, and DVD courses. His latest book, *Making Transcendence Transparent: An intuitive approach to classical transcendental number theory*, was published last month. He has given several AMS and MAA invited addresses and currently serves as an Associate Editor of the *American Mathematical Monthly*.

Burger was awarded the 2001 MAA Deborah and Franklin Tepper Haimo Award for Distinguished Teaching of Mathematics, the 2001 Robert W. Hamilton Book Award, and was named the 2001-2003 Pólya Lecturer. In 2003 he received a Residence Life Teaching Award at the University of Colorado at Boulder.

Response from Edward B. Burger

I wish to thank the Mathematical Association of America for this award. I believe that the vitality of mathematics depends not only on our efforts to move the frontiers of mathematics forward, but also on our efforts to share those discoveries so as to inspire further explorations. Our lectures and our writings, at all levels, are wonderful opportunities to entice our audiences to search for new mathematical vistas. My hope for the "Diophantine Olympics" article was to offer some recent results from number theory in a novel and ideally entertaining fashion. Therefore to have my efforts recognized by the Mathematical Association of America through this honor is especially meaningful and enormously rewarding.

Henry L. Alder Award for Distinguished Teaching by a Beginning College or University Mathematics Faculty Member

The award was established in January 2003 to honor beginning college or university faculty whose teaching has been extraordinarily successful and whose effectiveness in teaching undergraduate mathematics is shown to have influence beyond their own classrooms. An awardee must have taught full time in a mathematical science in the United States or Canada for at least two, but not more than seven, years since receiving the Ph.D.

Francis Edward Su

Francis Edward Su of Harvey Mudd College gets rave reviews for his teaching from students across the College while teaching a wide variety of courses and trying new teaching strategies. He has co-coached the College's Putnam Team for which the weekly evening problem solving seminar has had participation grow from 20 students to about 70 students (in a college of 680 students!). He has one or two undergraduate research students each year with whom he co-authors papers (nine of eleven past such students have gone on to graduate study at top institutions). Faculty across the USA have used his web site "Mudd Math Fun Facts" which provides material intended to arouse curiosity in students at the start of a calculus class. His dedication and example are viewed as a model for faculty in his department and college inspiring them to be better at their own teaching. He has designed conferences and programs for Project NExT. His strong writing talent has been recognized by the MAA Hasse Prize, his service as mathematics editor for the 6th edition of the book *For All Practical Purposes*, and his appointment as an Associate Editor of *Math Horizons*.

Biographical Notes

Francis Su received his B.S. at the University of Texas at Austin and his Ph.D. in Mathematics at Harvard, where he studied probability under Persi Diaconis. His current research interests are in geometric combinatorics and applications to mathematical economics. Since 1996 when he joined the faculty of Harvey Mudd College, seven of his twenty papers have been co-authored with Harvey Mudd undergraduates. He has held visiting positions at MSRI, Cornell

ORIE, and ZiF (in Bielefeld, Germany). In his spare time he enjoys writing music, photography, outdoor sports, and deep theological discussions.

Response from Francis Edward Su

I am grateful for this honor, and I acknowledge my debt to many people who have influenced my teaching, either by mentorship or by example. Among them are Jeff Vaaler, Mike Starbird, Persi Diaconis, Danny Goroff, Deb Hughes-Hallett, Michael Moody, and especially my colleagues at Harvey Mudd College, from whom and with whom I am continually learning and growing. I could not have a finer set of friends to work with. I have also had the pleasure of teaching (and learning from) many wonderful students; I thank them for the fun times. Finally, I thank my late parents and my sister for their nurture and support. Soli Deo Gloria for the beauty of mathematics that makes it worthy of being taught.

Zvezdelina Stankova

Zvezdelina Stankova of Mills College in Oakland, CA is highly praised by students (majors and nonmajors alike) for all aspects of her undergraduate teaching. She designed and has taught a popular nontraditional course for non-math majors, and through that course has changed the negative attitudes towards mathematics of some students to positive ones. She has convinced her colleagues of the effectiveness of her approach to teaching mathematics and converted students to becoming mathematics majors. In fact, the department chair credits her with doubling the number of mathematics majors at Mills College and tripling the number who have participated in summer research programs. In addition, she is credited with supplying the "energy, imagination, charisma, and drive" necessary to run two highly successful outreach mathematics programs for Bay area talented youth--the Berkeley Math Circle and the Bay Area Mathematical Olympiad. She also has repeatedly coached the USA Math Team for the International Mathematical Olympiad.

Biographical Notes

Zvezdelina Stankova is a native of Bulgaria. Her mathematics career started unexpectedly in 5th grade when, three months after joining her middle school Math Circle, she won the Regional Math Olympiad. Since then she has participated and won many contests, including the International Mathematical Olympiads (IMO) in 1987-88, as well as Bulgarian Olympiads in Chemistry, Literature, Poetry and Social Science. In 1989 she received a national scholarship to study in the USA and completed her undergraduate degree at Bryn Mawr College. Her first research papers, in combinatorics, were written in the summers of 1991-92 at the REU in Duluth, Minnesota. Zvezda received her Ph.D. in the area of Algebraic Geometry at Harvard University in 1997. She was then a postdoc at MSRI and the University of California Berkeley, and in 1999 she joined the Mills College faculty, where she is currently an Associate Professor.

Zvezda is one of the founders of the Bay Area Mathematical Olympiad for middle and high school students and has led the Berkeley Math Circle since its creation in 1998. She coached the US national team in preparation for the IMOs in 1998-2004. She currently lives in the lovely hills of Berkeley and works at Mills in Oakland and UC Berkeley.

Response from Zvezdelina Stankova

The Henry L. Alder Award is a national recognition of one's teaching contribution, which I am so honored to receive and which I hope I will continue to justify for many more years to come. My deep thanks go to Joe Gallian (UM Duluth) and Joe Harris (Harvard) for inspiring me to do mathematical research and giving me my first lessons on how to teach Mathematics, and to Steve Givant and my colleagues at Mills College for their constant support through hard moments and their belief that I can succeed in new educational ventures. Without the vision of David Eisenbud (MSRI) and Cal Moore (UCB) and the collaboration of Paul Zeitz (USF), Hugo Rossi and Joe Buhler (MSRI), the Bay Area Mathematical Olympiad and Circles would not have been possible. Deb Hughes-Hallett (U

Arizona) and Vito Perrone (Harvard School of Education) were instrumental while working on my Certificate of Education. Rhonda Hughes and Paul Melvin (Bryn Mawr) get the credit for taking a tough Eastern European girl, smoothing her edges and steering her on the path of Mathematics in the USA.

Finally, my many students, to mention a few: Gabriel Carroll, Maxim Maydanskiy, Tiankai Liu, and Melanie Wood, have gone beyond any expectations that a teacher would have and have brought me the best reward in my working career.

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