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OF TAU BETA PI | The Engineering Honor Society | Spring 2013

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the Bent of Tau Beta Pi
The Engineering Honor Society

Spring 2013
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founded at Lehigh University, South Bethlehem, Pennsylvania, June 15, 1885, by Edward H. Williams Jr., A.B., A.C., E.M., Sc.D., LL.D. (1849-1933). Key and name registered in U.S. Patent Office. Member, American Society for Engineering Education and (co-founder) Association of College Honor Societies. Affiliate, American Association for the Advancement of Science.

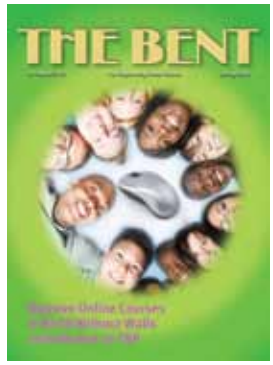
Features

ON THE COVER:

Alan S. Brown looks at the effects of education of free massive online open courses.

Joel L. Cuello reviews a decade of travels across an ever-changing planet.

Cover artist: Dali Polivka



Reports

Departments

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COUNCIL'S CORNER

The Tau Beta Pi Association was founded at Lehigh University in 1885 by Edward Higginson Williams Jr. to mark in a fitting manner those who have conferred honor upon their Alma Mater by distinguished scholarship and exemplary character as students in engineering, or by their attainments as alumni in the field of engineering, and to foster a spirit of liberal culture in engineering colleges. —Preamble to the Constitution

It's all about the Relationships!

Since its founding in 1885, our Association is fortunate to have initiated over 500,000 members. Like you, they represent some of the most talented and successful in their chosen careers—whether it is in engineering or in other fields. However, as is understandable with a group of this size, we have not been able to keep up with most of you since you were initiated. While we do have the *Who's Who*, *Alumni Notes* and *In the Colleges* features in The Bent, along with our listing of notable alumni on the Tau Beta Pi website, we know that these members just represent the proverbial tip of the iceberg. As with an iceberg, the larger mass of our members remains quietly hidden beneath the surface.

It is my pleasure to recount several initiatives that we have started to reconnect with the larger mass of our members. One initiative was President Larry Simonson's program to start inviting local alumni to our annual District Conferences held throughout the country. Another is the Young Engineer's Organization that our long serving Trust Advisory Committee Chair Rodger Smith has started in New York. Yet another is the effort to revive Alumnus Chapters and hosting alumni gatherings in different cities that Secretary-Treasurer and Executive Director Curt Gomulinski and his wife Tricia have spearheaded. The Bent has featured several articles on these events and we hope that you will consider joining us. Visit *www.tbp.org/memb/alumni.cfm* for a list of upcoming events.

Tau Beta Pi is excited to announce the addition of Sherry Jennings-King as a Major Gifts Officer. Sherry is a long time volunteer with TBΠ, starting as a District Director more than 18 years ago. Over the years and through numerous moves for work, she has continued to work with the Association. Sherry's professional experience started as a process engineer for a chemical company but, like many of our members, made a career switch. During the last 14 years, Sherry has worked in fundraising for non-profits.

You might ask what Sherry's work has to do with reconnecting with alumni. In fact, you might be leery about meeting with someone called "Major Gifts Officer!" Well, as I have learned by working with Sherry recently, her work is really all about building relationships. A great deal of her time is spent meeting and getting to know people. This is where you can help. In order to build these relationships, we need to hear from you. While Sherry's work includes meeting with current and prospective donors, her focus is also on locating and reconnecting with our members. Since December, Sherry has met with over 50 members to learn about their experiences with Tau Beta Pi and to update them on the work of the Association.

If TBΠ made a positive impact on your college experience or in your life after college, please tell us. We know that as students many of you were chapter officers, led

a chapter project, received a loan, scholarship or fellowship, attended the annual Convention or a District Conference, or learned valuable interpersonal skills through the Engineering Futures Program. We also know that many of you have volunteered countless hours as a Chapter Advisor, District Director, Engineering Futures Facilitator or by serving in other capacities. It is our hope that your story includes how Tau Beta Pi enriched your life and how you might want to support the work of this fantastic Association to help enrich the lives of current and future members.

Please contact HQ at *tbp@tbp.org* or Sherry Jennings-King at (763) 220-0955 or *sherry.jenningsking@tbp.org* directly if you would welcome a visit to share your story or if you are interested in becoming involved on any level with TBΠ. The great, untapped strength of our Association is *you*. We'd like to renew relationships with many, many, more of our members, and with your help, we can!

—Norman P. Pih,
Tennessee Alpha '82, Councillor

TBΠ *EXECUTIVE COUNCIL*

President Larry A. Simonson, Ph.D., P.E., *SD A '69,* SDSM&T Fnd., 306 E. St. Joseph St., Rapid City, SD 57701 *larry@tbp.org*

Vice President Solange C. Dao, P.E., *FL A '95,* 1110 E. Marks Street, Orlando, FL 32803 *solange@tbp.org*

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Councillor Norman Pih, *TN A '82,* 811 W. Cherry Ave., Flagstaff, AZ 86004 *norman@tbp.org*

EDITORIAL

Focus Group Follow Up

The Vision Development Group (VDG) posed a simple question: What do current students want from Tau Beta Pi? Focus groups were conducted at the 2011 Convention to answer this question. The results were used to formulate their strategic recommendations that were reported in the last issue of The Bent. At the same time, the groups provided numerous suggestions that could be tackled immediately. A summary of the focus group results is available on our website at *www.tbp.org/conv/2011/conv.cfm.*

I am pleased to share with you some of the initiatives that have been implemented as a result of recommendations made by the students at the Convention.

Chapter Communications

The students in the focus groups expressed an overwhelming desire to receive less paper mailings. Starting in January of last year, web-based eNotes along with email reminders replaced these mailings. Convention materials were also distributed electronically and made available to all attendees via our website.

To ensure that all student members are aware of the programs and benefits of membership, the content of The Bulletin includes information targeted for student members as well as chapter officers. It is distributed to all students through email, and a fourth issue will be added to the lineup this spring to keep students up-to-date on activities over the summer.

The students and alumni were near unanimous in their directive to "Update the website!" The new site launched last month, and we appreciate the help and support that the students from California Alpha provided in making this a reality. More work remains, including bringing over the remaining content from the old site and integrating our reporting system, but the feedback so far has been extremely positive.

Operations

I have highlighted some of the projects to enhance our operations in previous issues which included replacing paper catalog cards with electronic catalog cards. The first academic term using electronic cards went well, and we plan to take what we have learned and enhance the system for the next academic year. This past December, chapter financial statements started to be delivered via email and stored in the reporting system for future reference. Additional updates to streamline our reporting requirements should be completed in the coming months.

Engagement

A Student Advisory Board has been chartered to provide input to the Executive Director on a regular basis. While the direction of the Association still remains the work of the annual Convention, the Council and I believe it to be desirable to have a group of students to assist in some national initiatives and provide feedback on issues facing the members and chapters. As always, we welcome suggestions from all our members on ways to improve the organization.

Current students, recent graduates, and seasoned alumni have shown a renewed interest in staying involved or becoming active again. To meet that need, over 30 alumni gatherings have been held in the past year, and another 15 are planned in the next two months. In addition, we are proud to have over 25 *active* Alumnus Chapters on the books with interest in many other areas of the country. For more information about upcoming alumni events visit *www.tbp.org/memb/alumni.cfm.*

Photo by Chris Wooten

Convention

While one of the major responsibilities of the annual Convention will continue to be conducting the business of the Association, we are always looking for opportunities to enhance the experience for the members who attend. The 2012 Convention included a series of professional development sessions for students and alumni that we plan to continue in Ames this year.

The Executive Council and I will be meeting in the coming months to use the input from the VDG and focus groups to develop a comprehensive plan for the future of *your* Association. We want to have a roadmap in place for our programs and activities, while at the same time, being mindful that the leadership of the Society changes every four years. As we approach the election of the next Executive Council this November, we want to ensure ΤΒΠ has a plan that is robust, yet flexible, to meet the needs of our changing leadership, chapters, and members.

Until Later,

CHECK OUT THE NEW TBP.ORG!

Tau Beta Pi wishes to express its gratitude to the students of the California Alpha Chapter at the University of California, Berkeley, for their website design contributions and work.

PETITIONER'S SUPPORT FUND

In December 2012, Tau Beta Pi received a generous donation from the Faidley Family (Galen W., *IA A '00*; LeAnn E., *IA A'00*; LeVern W., *IA A '67*). The restricted gift will establish and support a Petitioner's Support Fund for collegiate schools interested in chartering a chapter of Tau Beta Pi. In making the contribution, the donors expressed the wish to encourage expansion of ΤΒΠ both within and outside the U.S. and that a portion of the gift be used to further diversity in ΤΒΠ membership through support to petitioning chapters at 1890 Land Grant Colleges and Universities and other institutions with large minority engineering student populations. Schools interested in obtaining funding are invited to apply by contacting the Executive Director. Alumni interested in financially supporting this initiative are also encouraged to contact the Executive Director.

ENGINEERING JOB BOARD

Over 5,000 jobs are currently available on Tau Beta Pi's job board! Our partnership with JobTarget allows members to post resumes, browse jobs, faculty positions, and internships, and employers may browse resumes.

New opportunities are posted each day and a full list of openings are available by visiting *tbp.org/memb/jobboard.cfm*.

POWERED BY JOBTARGET

The NAE has announced the 2013 recipients of its major annual awards. They include the following Tau Bates: **Richard H. Frenkiel,**

MA Δ '63, top, was one of five to receive the Charles Stark Draper Prize—given to engineers whose accomplishments have significantly benefited society—"for (their) pioneering contributions to the world's first cellular telephone networks, systems, and standards."

The other recipients were Martin Cooper, Joel S. Engel, Thomas Haug, and Yoshihisa Okumura. **Richard K. Miller,** Ph.D., *CA Δ '71*, center, **David V. Kerns Jr.,** Ph.D., P.E., *AL A '67*, and Sherra E. Kerns will receive the Bernard M. Gordon

Prize—that recognizes innovation in engineering and technology education — "for guiding the creation of Olin College and its student-centered approach to developing effective engineering leaders."

Ivan E. Sutherland, Ph.D., *Pennsylvania Gamma '59*, a pioneer in computer graphics now working at

Portland State University, has won the Kyoto Prize in Advanced Technology, an annual award that recognizes significant contributions to the "betterment of mankind." It comes with a gold medal and more than $600,000. Sutherland pioneered advances to the computer graphics technology used for information presentation, as well as interactive interfaces that allow people to use computers without the need for programming.

John J. Moskwa, Ph.D., *Michigan Gamma '80*, received the Edward N. Cole Award for automotive engi-

neering innovation from the Society of Automotive Engineers, International (SAE). Moskwa was the first university professor to receive the award and was recognized for the high-bandwidth transient test systems developed in his laboratory at the University of Wisconsin-Madison. The late **Edward N. Cole,** *Michigan Gamma '52*, was president of General Motors 1968-74.

Jill S. Tietjen, P.E., *Virginia Alpha, '76*, received the 2012 Daughters of the American Revolution History

Award Medal for her book, *Her Story: A Timeline of the Women Who Changed America.* The citation read: "In recognition of contributions that significantly advance the understanding of our nation's past through the study and promotion of an aspect of American History." Tietjen is president and CEO of Technically Speaking, Inc.

Otis A. Shelton, *Texas Epsilon '68*, has been elected by the American Institute of Chemical Engineers (AIChE) to serve as president-elect in 2013 and as president in 2014. He recently retired as director of corporate safety and environmental

services assessment program for Praxair, Inc., facilities worldwide. Shelton served 20 years on the national advisory board of the National Society of Black Engineers and for five years on the National Research Council's committee on chemical demilitarization.

Donald M. McEligot, Ph.D., *Connecticut Alpha '52*, has received the International Network for Engi-

neering Education and Research (iNEER) Leadership Award "for visionary leadership in innovative research, consistent scholarship through international collaborations and pioneering contributions to engineering." He is a thermal scientist at the Center for Advanced Energy Studies in Idaho Falls and a Nuclear Science and Technology Division fellow at the Idaho National Laboratory.

John C. Chen, Ph.D., *Pennsylvania Alpha '56*, has become the inaugural winner of the World Scientific

Award in Boiling and Condensing Heat Transfer. He is professor emeritus of chemical engineering at Lehigh University and served as Lehigh's engineering dean from 1999 to 2001. Chen is a past president of the American Institute of Chemical Engineers. He received the award at an international conference in Lausanne, Switzerland.

National Academy of Engineering

The National Academy of Engineering has elected 69 new members and 11 foreign associates, announced NAE President Dr. Charles M. Vest, WV A '63, in early February. Election to the academy is among the highest professional distinctions accorded an engineer. Membership honors those who have made outstanding contributions to "engineering research, practice, or education, including, where appropriate, significant contributions to the engineering literature" and to the "pioneering of new and developing fields of technology." New Tau Beta Pi/NAE members are listed below.

Peter L. Andresen, Ph.D., *NY Γ '72,* principal scientist, ceramics and metallurgy, corrosion and electrochemistry laboratory, GE Global Research Center, Schenectady, NY. For prediction and prevention of stress corrosion cracking in nuclear materials.

Joseph J. Beaman Jr., Sc.D., *TX A '72,* Earnest F. Gloyna Regents Chair in Engineering, mechanical engineering department, University of Texas, Austin. For innovation, development, and commercialization of solid freeform fabrication and selective laser sintering.

Lorenz T. Biegler, Ph.D., *IL B '78,* Bayer Professor of Chemical Engineering, Carnegie Mellon University, Pittsburgh. For contributions in large-scale nonlinear optimization theory and algorithms for application to process optimization, design, and control.

Craig T. Bowman, Ph.D., *PA Γ '61,* professor of mechanical engineering, Stanford University, CA. For contributions to understanding pollutant formation processes in combustion systems to reduce harmful emissions.

Weng Cho Chew, Ph.D., *MA B '76,* professor, department of electrical and computer engineering, University of Illinois, Urbana. For contributions to large-scale computational electromagnetics of complex structures.

Thomas F. Degnan Jr., *IN Γ '73,* manager, breakthrough and leads generation, ExxonMobil Research and Engineering Co., Annandale, NJ. For contributions to novel catalytic processes for improved lubricant, fuel, and petrochemical production.

Curtis W. Frank, Ph.D., *MN A '67,* William M. Keck Sr. Professor of Chemical Engineering, Stanford University, CA. For elucidation of molecular organization in polymers and other soft materials.

Helen Greiner, *MA B '89,* chief executive officer and founder, CyPhy Works Inc., Danvers, MA. For leadership in the design, development, and application of practical robots.

David H. Gustafson, Ph.D., *MI Γ '62,* professor of industrial and systems engineering and preventive medicine, University of Wisconsin, Madison. For industrial and systems engineering methods to improve the care of aging, lung cancer, severe asthma, and drug addiction patients.

Carl C. Koch, Ph.D., *OH A '59,* Kobe Steel Distinguished Professor of Materials Science and Engineering, North Carolina State University, Raleigh. For synthesis of amorphous and nanocrystalline alloys by mechanical attrition.

Enrique J. Lavernia, Ph.D., *CA Λ '84,* dean, College of Engineering, and Distinguished Professor of Chemical Engineering and Materials Science, University of California, Davis. For contributions to novel processing of metals and alloys, and for leadership in engineering education.

Raphael C. Lee, M.D., *PA Z '75,* Paul S. and Allene T. Russell Professor of Surgery, Medicine, Organismal Biology and Anatomy, University of Chicago. For contributions to understanding cell injury associated with trauma including electrical shock and thermal burns.

Richard M. Murray, Ph.D., *CA B '84,* Thomas E. and Doris Everhart Professor of Control and Dynamical Systems and Bioengineering, California Institute of Technology, Pasadena. For contributions in control theory and networked control systems with applications to aerospace engineering, robotics, and autonomy.

Robert E. Schafrik, Ph.D., P.E., *OH E '73,* general manager of materials and process engineering, GE Aviation, Cincinnati. For innovation in materials for gas turbine engines.

Eric S.G. Shaqfeh, Ph.D., *NJ Δ '81,* Lester Levi Carter Professor, professor and chair, department of chemical engineering, and professor of mechanical engineering, Stanford University, CA. For contributions to dynamics and rheology of complex fluids, including polymeric liquids, vesicles, and fiber suspensions.

John J. Tracy, Ph.D., *CA T '86,* chief technology officer and senior vice president of engineering, operations and technology, Boeing Co., Chicago. For leadership in advanced composites design and manufacturing technology for air and space vehicles.

Sharon L. Wood, Ph.D., *VA A '82,* Robert L. Parker Sr. Centennial Professor and Chair, department of civil, architectural, and environmental engineering, University of Texas, Austin. For design of reinforced concrete structures and associated seismic instrumentation for extreme loadings and environments.

Foreign Associate

Ji Zhou, Ph.D., *NY N '81,* president, Chinese Academy of Engineering, Beijing. For research contributions in numeric control, computer-aided design, and design optimization.

LETTERS

Chapter Eternal

• The Winter 2013 issue of The Bent notes the passing of dozens of my fellow Michigan Alpha confreres. Clearly the chapter files from 1938 were in disarray? I recognized several names (I matriculated in '42; graduated in '49. WWII was a digression.), but Harold F. Nuechterlein, *MI A '47*, was the most poignant. In the spring of 1948 I sat across a drafting table from another Nuechterlein, Melvin, who was the chapter president and a proud son of Frankenmuth, MI. One day he averred, "You get better grades on the exams than I do! How come you're not in Tau Beta Pi?" The rest is history, thanks to his gentle intercession.

Jack W. Osgood, P.E., MI A '49

[Editor's Note: We are in the midst of methodically reviewing our membership records and updating information as time permits. We've updated through California Epsilon and skipped ahead to Michigan Alpha as part of our project to scan and archive all of our catalog cards. As some of our astute readers have noticed, the Chapter Eternal section sometimes reflects where we are at in updating our older records.]

Probability

• A letter in the Winter 2013 issue appears to claim that a chance event with a probability as low as 1 in 10^{390} means that the event is impossible. This is a common error in quoting probabilities. The problem is that, if that claim were so, then all of the other 10^{390}-1 events, being equally improbable, are also impossible, so nothing would ever happen. Additionally, if one is to claim that the alternative to the occurrence of any one of those improbable events was an additional single event of creation (a 10^{390}+1), that one must be equally impossible. You can't have everything.

The study of statistics demonstrates that random events actually occur in pattern groups having structures that can be organized (by us) into non-random groupings of, for example, known relative size. The actual uncertainty lies in the time positions of the individual events (which might be intervals rather than points). What randomness means is that nothing relates the occurrence of any one "random" event to any point or interval in time. But some one of them had to occur first. It could have been one needed to result in life at an early date. Or, equally possibly, it was that magical-creation one.

Richard B. Innes, ME A '45

Asteroids

• I enjoyed your article in The Bent on asteroids. I particularly enjoyed how you answer questions that pop up in my mind. For example, the article mentioned that iridium is rare in the earth's surface. My mind immediately asked why. The next sentence told me! Great!

We need a Trudy Bell fan club which sends out emails on where to find your articles!

Walter S. Ciciora, Ph.D., IL B '64

• I read the article in the Winter 2013 Bent on asteroids and the one line that particularly caught my attention was the one about "... profound darkness blanketed the planet..."

It got me to thinking about a time when I was in high school in Jamestown, NY, back in 1950, and we had taken a short trip to Fredonia, NY, (about 30 miles away) to visit a mutual friend. It was around mid-day when the sky became very, very dark (like midnight) for a period of time. We were driving and it was so dark we had to use our headlights to see where we were going. We weren't sure what was happening at the time and were never given a satisfactory explanation of what had happened. The incident was more or less forgotten but never really explained. I always look forward to reading your articles in The Bent because they are so very interesting and informative.

Marion A. Darrow, AZ A '61

• I have gotten really good at screening my reading opportunities. Trudy's name on an article is all I need to make an immediate selection. "Target Earth!": more excellent reading enjoyment! A little scary though.

Benjamin L. Smith, TN Γ '68

• Got my BENT today and really enjoyed the article. Best one I've seen in the magazine in many years. Space has been an interest of mine, and this subject is very interesting, relevant, and informative.

Alan H. Hedegard, IN A '64

• I want to tell you how much I enjoyed Trudy's article on the killer asteroids that appeared in the Winter 2013 issue of The Bent. Indeed, whenever I get a science magazine with one of your contributions, your article is generally the first thing that I read (sometimes, the only thing that I read). Thanks again for your informative and entertaining journalistic work.

David W. Hughes, GA A '75

• Thank you for the excellent and informative Bent article on killer asteroids and the challenges humanity faces in detecting and then avoiding their collisions with the earth.

As I read the article, I found myself hungering for a more definitive risk assessment—and maybe we just don't know. However, I found an excerpt from a 2010 *Scientific American* article that presents their assessment of the frequency of impact for several sized asteroids, in terms of several diameter vs. impact frequency values scattered throughout the article. So, my first question is, "As we discover more NEOs, do these impact frequencies reflect our current thinking?"

However, the article did not put these values together. So, I plotted

the diameter vs. impact frequency values presented in the article and then drew a log-log fit through the 25 m to 140 m values which also fits the annual 4 m - 1 per year frequency presented in the article. However, the impact frequencies for 1 km asteroids (every 700,000 years) and the assumed every 65 myr frequency for the 10 km KT extinction asteroid are considerably more frequent than the projected values of the smaller asteroid frequency fit.

For your review, let me present the following observation. While the effect on human civilization of asteroids larger than 140 meter (i.e. PHAs) is vastly larger than the effects of ~40 meter "Tunguska" asteroids, the impact probability of a PHA (once every 30,000 years is quite low) and our existing space propulsion technology is likely incapable of deflecting such an asteroid unless discovered many years ahead. However, the impact probability of a 40 m diameter asteroid is once every 200 years, and as your article notes, there have been six known close (inside GEO) encounters (including the Feb. 15, 2013, encounter) since the 1970s. I also believe our present space technology has at least a chance of deflecting or destroying asteroids of that size. This leads me to the conclusion that our focus should be on finding as many of the 25-140 meter LHAs (Likely Hazardous Asteroids) as possible. This admittedly much more ambitious effort would likely find most of the PHAs as well as a by-product, but the emphasis should be on finding objects that more likely pose an imminent threat and ones that we could actually defend against.

John M. Humphrey, NY Δ '67

[Note from Paul Chodas, one of the sources for the article: Over the past decade, there have been several studies looking at the questions you have posed, and I believe Trudy's article correctly reflects the current thinking on these population/impact frequency issues. Log-log plots such as the one you constructed have shown clearly that there is a dip in the PHA population around the 100m size range, even when discovery biases are accounted for. In other words, there appears to be a deficit of asteroids in the 30m to 500m size ranges, and therefore a dip in the impact frequency, when compared against a simple exponential (straight-line) model.

The problem of discovering asteroids in 2 m to 140 m size range is formidable, as Trudy says. They are simply too faint to detect unless they approach extremely close to the earth. Only a small fraction of these asteroids pass close enough to the earth to be detected, and when they do pass, they move very quickly indeed, further complicating the detection problem. The LSST is predicted to bring the discoveries of the d>140m population to the 90 precent level within 10 years, but even LSST will have difficulty finding an appreciable portion of the much larger 25 m to 140 m population, and the LSST design is pushing the state of the art in wide-field deep sky imaging. While I agree with you that the smaller objects are much more likely to collide with the earth, and are also much easier to defend against, they are much, much harder to detect, and as Trudy says, even harder to detect with years of warning.]

SEEKING MAJOR GIFTS OFFICER

The Association is searching for a full-time major gifts officer who is familiar with the organization and has at least eight years of development experience. This individual will primarily identify potential major donors, meet with them, and assist with gift planning strategies. Individuals considering this paid position should possess excellent communication and social skills and be able to travel 1–2 weeks each month to meet with prospects. The position can be located at Tau Beta Pi Headquarters in Knoxville, but that is not required. This requisition will close on May 1, 2013. The position starts August 1, 2013. Please see *www.tbp.org* for the official job listing.

VOLUNTEERS WANTED

Director of Alumni Affairs

The position of Director of Alumni Affairs shall stimulate and maintain alumni interest and support for Tau Beta Pi, encourage the formation and support the operation of Alumnus Chapters, and represent the alumni at the Convention and before the Executive Council. This individual must be a member of Tau Beta Pi and be willing to travel 5-6 times per year. Past experience and knowledge of the organization and its operations is desired. The deadline to submit an application for this position is May 1, 2013.

Convention Chair & Parliamentarian

Long time Convention Chair Ron Hickling and Parliamentarian John Luchini are interested in identifying members who might wish to succeed them in these roles.

Per Article III, Section 2(d), "The Collegiate and Alumnus Chapters and Association Officers may submit nominations for permanent Convention Chair to the Executive Council by June 1 of the Convention year for which the Chair will be selected." This individual must be a member familiar with Robert's Rules and should have experience in conducting meetings with that philosophy.

At the same time a Convention Chair is selected, a Convention Parliamentarian will also be selected. This individual must be a member with experience in using Robert's Rules and have the resources to help the Chair during Convention.

These two volunteers must be able to attend Convention in Ames, Iowa, from October 31–November 2, 2013. Interested candidates should express their interest to the Executive Director no later than May 15.

• For any of these positions, please send your resume to *tbp@tbp.org* and indicate the volunteer position for which you wish to apply.

CHAPTERS HONOR JIM

Executive-Director Emeritus James D. Froula, P.E., (Ret.), left, is congratulated by Great Smoky Mountains Alumnus Chapter President Timothy D. Wheelock, *TN A '93,* at Headquarters in Knoxville, TN, during a reception honoring Jim on December 8. Tim unveiled a plaque placed by the GSMAC and Tennessee Alpha, Jim's Collegiate Chapter, to commemorate his 29 years of leadership. *Photo: Ray Thompson*

CENTENNIAL MARKED

Pennsylvania Beta President Kathryn L. Kirsch, '11, center, and Renata S. Engel, Ph.D., '82, left, Penn State engineering college associate dean for undergraduate studies and international programs, receive a centennial certificate from Vice President Solange Dao. The presentation took place at the Chapter's celebration banquet on December 2.

JENNINGS-KING JOINS THE HQ TEAM

Sherry D. Jennings-King, *Tennessee Alpha '93*, was hired by Tau Beta Pi as a contractor through the end of July, 2013.

Tau Beta Pi has been a major part of Sherry's life for almost two decades. As a junior at the University of Tennessee studying chemical engineering, she accepted an invitation to join ΤΒΠ. Over the past 18 years she has served as an Association Official, primarily as a district director.

In her professional life she made a career change 14 years ago into the field of development, and for the past 10 years served as a major gifts officer at a private college in Minnesota.

Much of her work with Tau Beta Pi will involve reaching out to our alumni to update them on the path set by our Vision Development Group. She will also let friends and family know how they can become more involved in and support the incredible work being undertaken by ΤΒΠ members. For example, the Association has taken steps to offer a more valuable experience to the students who attend our annual Convention.

While she will be traveling in the upcoming months to visit with our alumni across the nation, she will keep her home base in the Twin Cities of Minnesota.

Sherry is excited about the opportunity to take an active role to stimulate awareness and alumni involvement in this dynamic honor society. She looks forward to meeting many of you during her travels in the months ahead.

CALLING ALL ALUMNI IN TAMPA BAY

William L. Collins Jr., *Florida Gamma '75*, is looking to reactivate the Tampa Bay Alumnus Chapter. If you are interested in networking and socializing with other Tampa Bay area alumni, meeting the current members of the FL Gamma Chapter, and possibly attending the cshapter's spring initiation at USF, please contact:

Bill Collins
9805 Meadow Field Circle
Tampa, FL 33626

Phone: 813/728-0622
Email: wcollins@tampabay.rr.com

EXECUTIVE COUNCIL MEETINGS

The Executive Council met via teleconference on October 17 and November 14, 2012.

The Council reviewed a request from alumni in the Atlanta, GA, area and granted them a charter for the Atlanta Alumnus Chapter. Executive Director Curtis Gomulinski's 1st quarter financial report was accepted.

Director of Fellowships D. Steven Pierre, P.E., presented changes to the Fellowship and Scholarship Programs. The proposal to alter the deadline for scholarships to April 1 and to allow electees who will be initiated by June 1 to apply for scholarships was accepted. The Council agreed to changes in the submission method, review process, and plans for the Fellowship Board meetings. Executive Director Gomulinski indicated that the scholarship announcements could be moved to the fall issue of The Bent. The status of other Association programs were reviewed, and plans were made for further discussion at the December meeting in Knoxville.

The Council discussed the qualifications and duties for the new volunteer Director of Alumni Affairs. They requested that Executive Director Gomulinski prepare additional information for a future meeting. A proposal to establish a Major Gifts Officer position was discussed, and an eight-month contract position through July 31, 2013 was approved.

Executive Director Gomulinski presented a plan for a Student Advisory Board consisting of nine students or recent graduates that will provide input to him.

The Council appointed Vice President Solange C. Dao, P.E., as the Installing Deputy for the Pennsylvania Mu installation on January 26, Councillor Jonathan F.K. Earle, Ph.D., P.E., as the Installing Deputy for the New Jersey Zeta installation on March 2, and President Larry A. Simonson, Ph.D., P.E., as the Installing Deputy for the Missouri Epsilon installation on March 23.

The Executive Council met in Knoxville, TN, on December 8, 2012.

Director of Development Pat McDaniel reviewed the status of the 2012 Alumnus Giving Program. A plan to recognize new donors with a license plate frame was approved, and a trial contest among the chapters for the largest percent of recent graduates making a contribution to Tau Beta Pi was established.

The Council adjusted the budget for 2012-13 to support a Major Gifts Officer contract position. Program funding priorities for 2013-14 were discussed, and a proposal to raise the initiation fee was approved pending additional information from Executive Director Gomulinski. The report of the auditor and the auditor's management letter were reviewed.

The Council accepted a proposal from LeVern W. Faidley, *IA A '67*, to establish a Petitioner's Support Fund from an initial gift of $12,500 and established guidelines for use of the fund. The principal and earnings are to be used to offset the cost of representatives from schools interested in establishing a Tau Beta Pi Chapter to attend Convention and related activities.

The Council reviewed the status of the District Program and requested input from the District Program Planning Committee as to metrics for the program. The schedule of District Conferences was reviewed, and assignments were made for Association official representatives at all 16 events. A proposal to conduct alumni gatherings at each event was approved. Josuan Hilerio-Sanchez, *PR A '07*, was appointed as District 5 Director for a term ending June, 2015.

Director of Engineering Futures Russell W. Pierce reviewed the status of the Engineering Futures Program. The Council and Director Pierce agreed to investigate updates to the evaluation form and the type of questions to ask of participants.

The Council reviewed the preliminary petition for a new collegiate chapter from the local honor society at the University of Texas-Pan American, and President Simonson was named its representative on an inspection visit.

The 2012 Convention held in Lexington, KY, was reviewed and judged to have been successful. In compliance with the 1981 Convention procedure for site choices, the invitation from *MA A*, *Δ*, and *E* and *RI A* and *B* was reviewed, but final approval was tabled pending requested information from Assistant Secretary-Treasurer Hawks.

The Council established goals and objectives and finalized a formal contract for the Major Gifts Officer. Sherry D. Jennings-King, *TN A '93*, was offered the position through July 31, 2013.

MOOCs Make Their Move

Tens of thousands of students are signing up for free massive open online courses (MOOCs). Is this the future of education?

by Alan S. Brown

This fall, Allison Okamura, an associate professor of mechanical engineering at Stanford University, will begin teaching an unusual class on haptics.

Ordinarily, she brings a handful of students to her well-equipped lab to build electromechanical systems that provide tactile feedback for digital games, simulations, and robots.

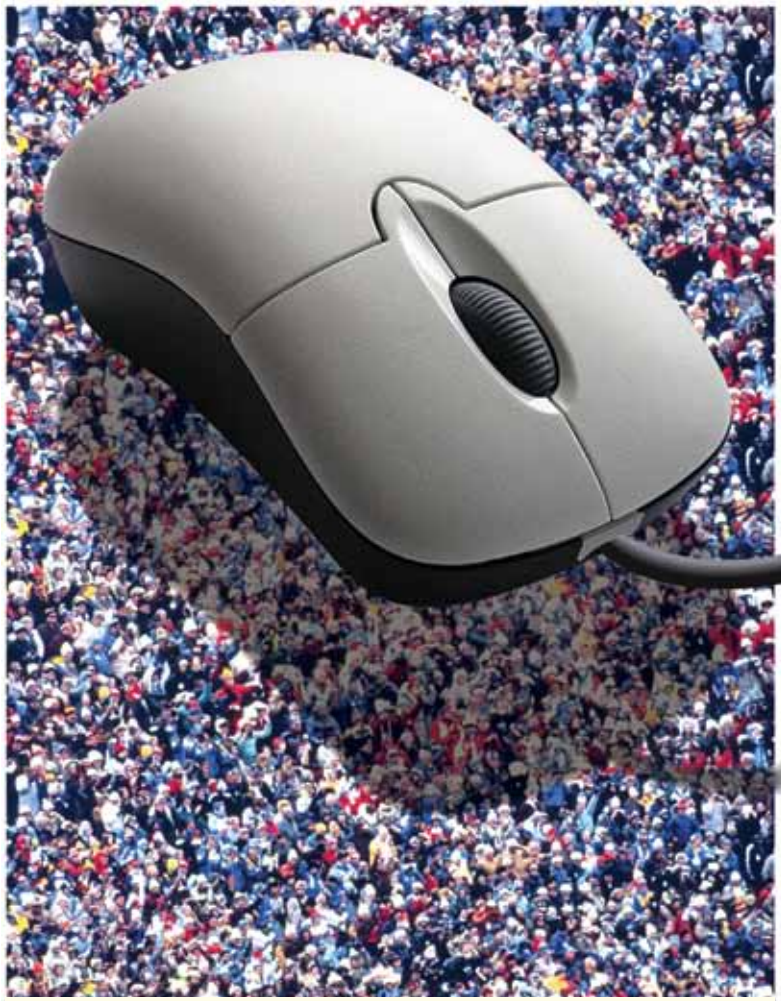
This fall, however, they will work with a $50 kit of haptics parts. Considering Stanford's $160,000 price tag for a four-year engineering degree, $50 is not much to spend on supplies. But Okamura is looking beyond her Stanford classroom. Instead, she plans to make her haptics class freely available to thousands of students around the world. Then anyone who can afford $50 worth of supplies could take her course over the Internet, build haptic devices, and receive a grade on their work.

"At first, I wasn't interested in online courses," Okamura explained. "As a teacher, I like interacting one-on-one with my students. But I'm also a real believer in this technology."

Yet she was keenly aware of how inexpensive robotics kits inspired thousands of people and led to innovative designs and applications. She believes that her online course and cheap supplies could produce a similar explosion in creativity in haptics.

"My idea is to distribute inexpensive kits to the maker community and people in other fields who are not trained like my graduate students and see how they use them. This might open new ways to build and use haptic devices," Okamura said.

Okamura's is one of several projects Stanford is funding to put some of its best courses online for free. It is part of a sudden explosion in massive open online courses, or MOOCs.



Massive open online courses, or MOOCs, are indeed massive. In March 2012, 155,000 people registered for MIT's introductory circuit design MOOC. This is more students than MIT has graduated since it opened in 1864.

MOOC Explosion

In some ways, MOOCs resemble online education, an increasingly common element of academic life. According to Babson College's *2012 Survey of Online Learning*, one-third of all higher education students have taken at least one course online. Many graduate and night students work during the day and squeeze online lessons into lunch breaks and evenings.

Yet MOOCs differ from conventional online learning in three critical ways. First, they are free and have no prerequisites. Anyone, any-

where, with any type of background, can sign up for a class.

Second, they attract an extraordinarily diverse audience. Students range from bartenders in San Francisco and bankers in Bombay to high school prodigies in Prague and retirees in Boca Raton. They often have very different perspectives and questions from students who usually attend class.

Third, they are indeed massive. In March 2012, 155,000 people registered for MIT's introductory circuit design MOOC. This is more students than MIT has graduated since it opened in 1864. So not only are they diverse, but they have the critical mass needed to generate self-sustaining and often very interesting online discussions.

The ease of taking a MOOC may contribute to their high dropout rates. Students may lack the necessary background, find the work too hard or too time-consuming, or simply lose interest.

Allison Okamura, an associate professor of mechanical engineering at Stanford University, will begin teaching an unusual class on haptics.

Only a small fraction of the students who signed up for MIT's circuits course completed it. According to Anant Agarwal, an electrical engineer who heads edX, the $60 million joint MIT-Harvard MOOC initiative, 23,000 students completed the first problem set; 9,000 passed the midterm; and nearly 7,200 passed the course.

That is two orders of magnitude less than the course's initial enrollment. Yet it is still 60% greater than MIT's total undergraduate population.

While classes with 100,000 or more students are not the rule, they are not rare either. Most classes attract tens of thousands of students. Those numbers are simply too big—and exciting—to ignore.

It is why the Gates Foundation is spending $3 million to study them, and why venture capitalists have pumped millions into MOOCs offering free courses.

Debate Rages

Many top schools now offer MOOCs as well. In addition to Harvard, MIT, and Stanford, they include Berkeley, Brown, Caltech, Columbia, Duke, Georgetown, Johns Hopkins, Illinois, Indian Institute of Technology Delhi, Michigan, Ohio State, Pennsylvania, Pittsburgh, Princeton, Texas, Virginia Tech, Vanderbilt, Washington, and even Wellesley.

Meanwhile, debate rages. Advocates believe MOOCs —or some form of online learning—will revolutionize education, improve course quality, and reduce costs.

Skeptics, meanwhile, argue that MOOC-driven cost cutting will result in students with standardized points of view and limit that type of teacher-student interactions that nurture critical thinking.

The arguments can get heated. Last summer, when University of Virginia's trustees fired their president, they said one of the reasons was because she was slow moving the university online. (They rescinded their decision after heated protests.)

The debate raises fundamental questions about the role of higher education. Why are colleges doing this? Can online learning replace classrooms? What do high MOOC dropout rates really mean? Should colleges give credits for MOOCs? How will universities stay in business if they give their best courses away for free?

Why?

The answers are far from straightforward, and they have important implications for engineering. So far, math, science, and technology courses are among the most popular MOOCs. Fewer engineering courses have gone online, in part because they are so hands-on. Yet, as Okamura's haptics class shows, this may be coming too.

Anant Agarwal is an electrical engineer who heads edX, the $60 million joint MIT-Harvard MOOC initiative.

Schools have many reasons for jumping into MOOCs. MIT's Agarwal, for example, wants to mine the "big data" that hundreds of thousands of students generate to understand how people learn best.

Joseph Burns, a physicist and Cornell University's dean of faculty, who is considering MOOCs, finds this argument compelling. MOOCs, he says, are the first courses large enough to run statistically valid tests.

"If we have 10,000 people doing this course and if a lot of them are asking questions about homework problem 12, we know we need to clarify something in how we teach that area," he said.

An example is an analysis of an introductory MOOC programming class by Coursera, one of several MOOC startups. It found that students' approach to solving their first assignments predicted course success better than their right or wrong answers.

Teaching Competence

Peter Macedo, director of distance learning at Virginia Tech, sees MOOCs as a recruitment tool. They can demonstrate his school's quality and distance teaching competence.

"Many people would like to try a lecture or two and get

a feel for the instruction. It's a very valid approach. Lots of people who pursue their master's degrees are paying out of pocket and take some courses online, and they need to make an informed decision where they want to spend their money," Macedo said.

Both Agarwal and Burns also mention their schools' sense of mission. Cornell, Burns explained, is a land grant institution established to further practical knowledge as well as teach students.

"We could bring agricultural knowledge to Africa and Southeast Asia. What an incredible opportunity that is," he said.

"There is something really appealing about MOOCs," he added. "I feel that I'm blessed here at a place like Cornell, where I'm surrounded by bright people who are really excited by what they do. Now imagine somebody 40 or 50, trapped in a job that he or she no longer likes, or a high school student surrounded by people not as bright or curious. Now, suddenly, they have the world's smartest people to interact with. We want to bring this out to the world."

Joseph Burns is a physicist and Cornell University's dean of faculty who is considering MOOCs.

Then there is cost. Student loans have edged above $1 trillion, and educators are looking for ways to deliver classes for less money. MOOCs and other forms of online learning might help by educating thousands instead of dozens or handfuls of students at a time. Colleges could cut costs by eliminating classrooms, automating grading, and reducing (or perhaps, redeploying) faculty.

But first, educators have to determine whether students really learn from MOOCs and other online courses, and how they can grade the results.

Gamification

It is far too early to evaluate MOOCs, but online learning has been around for nearly two decades. Many studies have attempted to assess it. While the results are mixed, most educators believe online courses get results.

Of the academic leaders surveyed in Babson College's 2012 Survey of Online Learning, 77 percent believe online courses achieve the same learning outcomes as face-to-face classes. Seven out of 10 say online learning is a critical part of their long-term strategy.

Yet those same leaders identify high online dropout rates as a problem and note that only three out of 10 faculty members accept the value and legitimacy of online education.

Some faculty are clearly suspicious about pitting dry scholarship against the showmanship of some of the most effective MOOC teachers.

Others are suspicious. Online education has developed a set of best practices that include robust presentations with illustrations, photos, videos, and animations. They break lectures down into 10-15 minute segments, often with a quiz at the end. Not every teacher likes the format, since it does not support the back-and-forth of traditional classes.

Most Extreme

At its most extreme, this type of immersive experience, with ongoing rewards (like quiz points and grades) to capture student attention, is called gamificiation. By making classes more like video games, educators hope to motivate students who may not have the discipline to complete an online course.

Peter Macedo, director of distance learning at Virginia Tech, sees MOOCs as a recruitment tool.

Sebastian Thrun likes this approach. Thrun, a computer scientist, led the development of the self-driving Google Car. He then taught a breakthrough MOOC on artificial intelligence that drew 165,000 people in 2011. He later co-founded Udacity to develop MOOCs.

"It's not my lecturing that changes the student, but it's the student exercise," he explained in an online interview. "So our courses feel very much like video games, where you're being bombarded with exercise after exercise after exercise. That's very different from the way I teach at Stanford, where I'm much more in a lecturing mode."

Macedo argues that gamified MOOCs are not that different from a textbook. "A textbook is prepared by an authority in the field, it has examples and problems you can solve within the book itself, and it is a self-paced exercise."

Online learning, with its videos and animations, is more immersive than a textbook. Instead of discussing the lesson in class, students can share the experience in online discussion groups, Macedo said.

Discourse

Yet the quality of online discussions varies wildly. This is due to course structure, says George Siemens, who taught the first-ever MOOC in 2008. He is a strategist at the Technology Enhanced Knowledge Research Institute at Athabasca University, which offers a robust range of online courses from Alberta, Canada.

There are really two types of MOOCs, Siemens explains. The first are top-down MOOCs based on conventional online education.

"They have solid course designs, use existing online learning technology, and put the faculty member at the center of the experience. They are more about knowledge duplication than knowledge creation," Siemens explained.

Most experienced MOOC teachers find ways to encourage richer interactions. Tucker Balch of Lucena Research recently taught a course on computational investing to 53,000 students through Georgia Tech. At first, he logged onto class forums to answer questions and keep enthusiasm high. When his workload increased, he tried a well-honed technique: He asked students to post questions and "vote up" the ones they most wanted answered. He then made a video where he answered the most popular questions.

"These were my most popular videos," he explained.

Sebastian Thrun, a computer scientist, taught a breakthrough MOOC on artificial intelligence that drew 165,000 people in 2011.

Then there are the discussions generated by the type of MOOCs Siemens teaches. His MOOCs rely on size to create self-sustaining networks where participants create and learn on their own.

"The faculty member is important, but still just one node within a larger network. In some areas, he or she is dominant. But other people know different things and they contribute in different ways," he said.

Siemens calls this approach connectivism. He saw it in the first MOOC, which included 25 students in class and 2,300 students online. The vast number of students enabled the class to create new types of connections.

"There was more global participation. We had people from Africa, China, India, and Latin America. In addition to learning course content, students also learned about other cultures and their educational technologies," Siemens said.

New Dynamics

It also created new dynamics. Students broke into online subgroups that met regularly to discuss topics that caught their interest. Some met face-to-face in coffee shops, others on Facebook or other online environments. Students translated the curriculum into five different languages, so they could share it with educators in their own country. Each group developed its own style of interaction, raised its own questions, and proposed its own solutions.

"They not only read what I posted, but generated their own materials as well. There was a lot of creativity. When you teach in an open format and don't put too many claims on the intellectual property, people will write themselves into the course. It becomes a platform for others to build on," Siemens said.

Siemens believes this type of back and forth creates the highest form of critical thinking, since students share, challenge, and synthesize new ideas. It is also the most difficult form of MOOC to grade.

Before MOOCs truly enter the mainstream, educators must wrestle with several issues. Schools cannot keep giving their best classes away for free. To be self-sustaining, MOOCs must somehow earn a profit. Schools must also come to grips with how students earn credits and credentials from free online classes.

It is relatively easy to grade introductory MOOC courses that teach new skills by using video game-like quizzes, though preventing cheating is more difficult.

Advanced courses, however, demand more than right/wrong answers. This is especially true of engineering classes, where problems may have many possible solutions. Even the most sophisticated software would have trouble determining a design's creativity and elegance.

George Siemens taught the first-ever MOOC in 2008. He is a strategist at the Technology Enhanced Knowledge Research Institute at Athabasca University.

Some MOOC providers suggest students grade each other's projects. Research done by Coursera, for example, found good correlations between the grades faculty and peer groups assign to test answers.

Cornell's Burns finds this encouraging, and admits that students who read and grade peer papers develop a better understanding of the material. Still, he and others remain far from convinced.

Universities and MOOC providers are already seeking to resolve this issue. In January, the American Council on Education announced that it would evaluate four courses offered by Udacity, another MOOC startup, for college credit. Yet the courses—pre-algebra, college algebra, elementary statistics, and introduction to computer science—are all relatively simple to grade.

Students pay schools not just for their classes, but for validating what they have learned. One day, students who want college or professional credit for their MOOCs may pay to take proctored exams or have professors or teaching assistants grade a project or essay.

These fees might make MOOCs, which can cost tens of thousands of dollars to create, financially sustainable.

In addition, the best MOOCs might become the equivalent of today's textbooks: Resources that could be sold to schools around the world. After all, what community college student studying electrical engineering would not want to take an introductory circuits class from a top professor at MIT?

And that is the time bomb, or at least one of them. Schools that rely on MOOCs and other online education might need fewer professors to teach courses.

Engineering the Future

That might satisfy some educators, especially in financially strapped state schools. Others argue that MOOCs will never replace the give and take of a classroom full of students debating the best approach to a problem.

Besides, many courses do more than teach new methodologies. Engineering projects, for example, do more than teach students to apply concepts and use laboratory equipment. They also help students learn how to work together on complex undertakings.

"I don't think you can replace the lab," Burns said. "Maybe I'm old. I don't know how things are going to change. But the most important part of those projects is learning to work with people, to interact, to lead, and to benefit from the expertise of others."

Instead of replacing classrooms, MOOCs and online learning are more likely to complement them.

"If we step back and look, the real thing we got out of our college education came from interacting with smart, engaged people and creating a social network driven by our peers. Maybe we can do that same thing without as much faculty time spent standing in front of a classroom lecturing," Burns said.

He gives a sophomore dynamics class as an example. Some students who took the class at Cornell got a lower grade on the final than if they had picked multiple choice answers at random.

Hardcore Materials

"Can we do better? Maybe the way we do better is to take the lectures online, then come into the classroom having already done the rote work and work with your professor to make use of those principles. We get great lecturers from the university and others to provide the hardcore materials, and people with other types of skills to provide the interaction," Burns explained.

Combining online with classroom education is called a "flipped classroom." Rebecca Griffiths, a program director at Ithaka, a firm that researches digital education, has spent two years studying how 600 students at six institutions learned statistics in conventional and flipped classrooms.

"Basically, there was no difference between students who went to class and those who spent two-thirds of their time with an online learning platform. That result held true across all different student demographics and backgrounds," she said.

Griffiths was not surprised. In fact, some of her colleagues believed the flipped students would have outperformed classroom students if their professors had previous experience teaching flipped classes.

In fact, Okamura plans to use a flipped model for next fall's haptics class. She plans to limit it to 100 Stanford students. They will watch lectures on their computers, then come to the lab to work with her as they program their devices. She may record her lab sessions, so online students can see how she and her students solve common programming and mechanical problems.

If the online material appears to work, Okamura could launch her MOOC within two weeks after her class starts. She has even figured out a way to grade student projects remotely.

Backup Plan

"Students will have to write a program to create virtual walls, dampers, and springs. If they just submitted their code, we could test it but we wouldn't know what they were feeling.

"So we want to attach low-cost force sensors to their devices. Then we could acquire data through the haptic device itself. That way, we would get some sense of what they are feeling, and judge whether they had done the assignment correctly," Okamura said.

That's the plan. She also has a backup plan. If her online lessons need more work, she may put off her MOOC until the second semester.

Okamura's class, like MOOCs themselves, is a work in progress. Yet her vision—flipped classroom, devices that automate grading—suggests that MOOCs could find a role in tomorrow's universities.

After all, MOOCs are not likely to replace classrooms or instructors or staying up late with your team to complete a project in the lab.

Instead, they are a delivery system, like mechanical models, slide projectors, and computers. They are certainly a powerful way of transmitting information, but they are not an end unto themselves. They are just another way for students to learn, one more part of the toolkit.

Alan S. Brown has been an editor and freelance writer for more than 30 years and lives in Dayton, NJ (**insight01@verizon.net**). A member of the National Association of Science Writers and former co-chair of the Science Writers in New York, he graduated magna cum laude from New College at Hofstra University in 1974. He is an associate editor of Mechanical Engineering and contributes to a wide range of engineering and scientific publications.

Notes from a Decade of Travels in a World Without Walls

by Joel L. Cuello, Ph.D., Pennsylvania Beta '89, professor in the department of agricultural and biosystems engineering at The University of Arizona. cuelloj@email.arizona.edu

Academic and research activities between 2000 and 2010 frequently drew me from the confines of the university campus and outside of the United States, sending me into orbit over a good part of our planet. I covered six continents, 22 countries, and 59 cities, with at least one return trip made to two-thirds of those countries within the same time period.

I traveled alone, which made meeting colleagues and new friends on the other side of my long journeys all the more welcome. Traveling solo also heightened the sense of adventure at times, such as my first trip to the West Bank in 2006. I was met at Tel Aviv airport by an elderly Palestinian who could not speak English, but who had been entrusted with meeting me and whisking me away to the Palestinian territories in the middle of the night. Or that time in 2007 when I spent the night sleeping on the floor at London's Heathrow waiting for my flight to India to be rescheduled as a result of the liquid terrorist plot which had been thwarted a day earlier. Most of the time though, traveling alone allowed me to make unhurried personal observations and to engage in honest reflections while on the move—as an engineer, as a professor, and as a fellow citizen of the planet.

China Without Walls: China's opening itself to global trade about 30 years ago led to its rise to the world's second largest economy by the close of the last decade, helping usher in an unprecedented economic emergence of nations at the beginning of a globalized 21st century.

With the last decade book-ended by two worldwide economic recessions, and by events like the 9/11 terrorist attacks, as well as China's accession in 2010 as the world's second largest economy, our planet has been realigned during the first 10 years of the 21st Century. From a decade of travels crisscrossing our world, here are eight of my notes on trends that will reshape our interconnected world.

Hello World: Riding a taxicab in Mumbai (population 20.1 million), visiting the bustling bazaars of Cairo (12.5 million), or walking through the pulsating streets of Manila (11.7 million) or Shanghai (15.8 million), one could not escape that sense of being surrounded, not just by people, but by huge numbers of people.

Global population in 2011 marked a new milestone by reaching 7 billion. While it took 150 years to rise from 1 billion to 3 billion in 1960, it has taken merely 5 decades for the number of people in the world to more than double. In the last 50 years, Europe grew by 21%, the U.S. by 72%, and China by 111%, while India added the largest single contribution to world population by gaining 782 million people (more than twice the current U.S. population).

The main impact of the world's population, however, lies less in its absolute number—which the United Nations Population Division is projecting to stabilize to about 9.2 billion by 2050—than in how it is distributed. It has been reported in *Foreign Affairs* magazine that in 1913, Europe had more people than China and the proportion of the global population living in Europe, Canada, and the U.S. was over 33%. By 2003, the combined population of Europe, Canada and the U.S. accounted for just 17% of world population. In 2050, this figure is expected to decline further to 12%, far less than it was in 1700.

Today roughly 9 out of 10 children under the age of 15 live in developing countries. Indeed, over 70 percent of the population growth between now and 2050 will occur in 24 countries, all in the developing world. Further, the six most populous Muslim-majority countries of Bangladesh, Egypt, Indonesia, Nigeria, Pakistan, and Turkey had a combined population of 886 million in 2009, which is expected to increase by another 475 million in the next four decades. By comparison, the six most populous developed countries are projected to gain only 44 million people during the same time. The increasingly skewed shift in the center of gravity of world population from the developed world

to the developing, and in general from West to East, has been reshaping the global economic, scientific, political, and military landscapes and will only persist in coming decades.

Ascent of Cities: The ancient city of Hebron in the Judean hills (population 170,000) is home to the biblical patriarchs Abraham, Isaac and Jacob, and site to Palestine Polytechnic University, my host university in the West Bank. It never fails to evoke within me that heightened feeling of visiting a place that is simpler, more serene, and of another time. The Israeli occupation has virtually isolated Hebron in many respects from the rest of the world and has unwittingly helped preserve many of the ancient city's traditions and rhythms of life. Visiting certain parts of Hebron provides a glimpse of how people came to live together in cities. They gained efficiencies in their lives and wove their ideas into a shared civilization.

Archetype of Sustainability: The author visits the Philippines' Ifugao rice terraces, used continuously for at least the last 2000 years.

In 2010, the proportion of the world's population living in cities exceeded 50%, despite the cities occupying only 3 to 4% of the planet's land area. Indeed, the number of countries with multiple cities with more than 1 million residents each continues to grow. Pakistan has eight, Mexico 12, and China more than 100. By 2030, India will have 68 such cities, while China will have 221. By 2030, China will add 400 million city dwellers (more than the U.S. population) while India will add 215 million. India, which is less than 30% urbanized today, is expected to be 55% urbanized by 2050. China, which is about 40% urbanized, is expected to be 73% urbanized by 2050. The world's urban population is projected to go up to 4.7 billion by 2030. At that time, Asia will be home to 55% of the world's city residents. China and India alone will account for 30% of the world's urban dwellers.

A heavily urbanizing century demands city-centered engineered systems for basic needs—sustainable dwelling, food production and distribution, water reuse and delivery, as well as energy generation and conservation.

A Common Rise: On my visits to the United Kingdom, I keep returning to the British Museum which, through its vast collection of objects and artifacts, provides a kaleidoscopic survey of history through the ebb and flow of civilizations—the Assyrians, the Babylonians, the Egyptians, the Greeks, and the Romans. Even in the ensuing Dark Ages when Europe descended into turmoil and backwardness until the Italian Renaissance, the civilizations of China's Tang Dynasty, the Islamic Empire, and the Maya in Mesoamerica took their turn to rise. Indeed, the waxing and waning of civilizations has become the plot line of our history.

But traveling the world in the first decade of the 21st Century, one finds that we are making a new kind of history. Globalization of trade, information, labor, investment, and capital means that we no longer follow the rise and fall of empires. We now see the simultaneous rise of states and civilizations, a development unprecedented in human history.

The economic numbers attest to the trend. It has been reported, for instance, in *Foreign Affairs* that the proportion of global GDP by Europe, the U.S., and Canada fell from 68% in 1950 to 47% in 2003 and, by 2050, will decline further to only 30%—smaller than it was in 1820. Conversely, an overwhelming proportion of the GDP growth between 2003 and 2050, about 70%, will occur outside of Europe, the U.S., and Canada.

The World Bank has predicted that by 2030 the number of middle-class people in the developing world—those capable to purchasing durable consumer products, such as cars, appliances, and electronics—will be 1.2 billion (greater than the combined population of Europe, the U.S., and Canada), a rise of 200% since 2005. Thus, there is consensus that the main driver of global economic expansion from now on will be the economic growth of newly industrialized countries, such as China, India, Brazil, and Indonesia. The rise of these countries does not mean that Europe, the U.S., and Canada are declining. It just means that other countries are rising gradually toward parity with already developed countries.

A Hungry Planet: I get to enjoy my predilection for authentic Chinese cuisine when I actually visit China. With my host Prof. Yong He and his colleagues, and graduate students at Zhejiang University taking me to dine at restaurants in Hangzhou, and mostly on my own in Shanghai and Beijing, the infinite variety of Chinese gastronomy never ceases to amaze me. But what really makes me think is the simple fact that China has to feed its 1.3 billion citizens three times a day. To put this in perspective, McDonald's has reportedly been selling 4.2 million hamburgers a day in the U.S. Assuming that each burger went to a unique

individual, that would be equivalent to feeding 1.4 percent of the U.S. population once a day. Applied to China, that would be equivalent to feeding a miniscule 0.32 percent of its population just once a day.

The question is how do we make our planet feed its 7 billion inhabitants three times a day? Last year the U.K. charity Oxfam reported that demand for food in 2050 will be 70% more than it is now, and that 925 million people already go hungry every day. Oxfam further forecasts that food prices are expected to increase by 70 to 90% by 2030, which would roughly double price increases again, before taking into account the effects of climate change. Between 2000 and 2011, the price of soy per ton increased 260%, while the price of corn, wheat, and rice per ton each rose roughly 300%.

On my visit to Oslo in 2010, my host Dr. Roald Flo took me to the Norwegian Nobel Institute where we were shown the stately conference room where a five-member committee gathers every year to select the recipient of the Nobel Peace Prize. On the walls of the room hang the pictures of all individual Peace Prize laureates. The picture that really caught my eye, however, was that of American Norman Borlaug who received the prize in 1970 for "his leadership of the Green Revolution in developing countries and helping to reduce world hunger." We certainly need more Norman Borlaugs today.

Climate Bellwether: A guanaco surveys a region of Patagonia at the extreme south of Chile.

A Thirsty World: I would see them every morning as I was driven from my hotel to the Biofuels Research Center in Coimbatore in Southern India: scores of women walking beside the road, quiet and stoic in their brightly-colored saris, balancing on their heads jugs containing water they had collected at a considerable distance from where they lived.

Women in developing countries walk an average of 3.7 miles to collect water, and one out of eight people in the world today lacks access to clean water. With current urbanization trends, some 993 million city dwellers by 2050 will each live with less than 26 gallons a day, considered the daily minimum. Today around 150 million people fall below the 26-gallon threshold for daily use (the average American uses 98 gallons each day). India's six biggest cities, including Mumbai and Delhi, are among those most affected by water shortages. And as many as 119 million people in the Ganges River Delta alone are projected to face shortages by 2050. Agriculture accounts for 32% of all water use in Europe, 39% in North America, 71% in Latin America, 72% in Australia and Oceania, 81% in Asia, and 86% in Africa. Driving from Israel's border to Jordan's capital Amman, I would see numerous fruit and vegetable stands by the roadside where local farmers sold their fresh harvests, belying Jordan's serious problem, not just with food security, but more so with water security. According to official figures, Jordan every year uses 600 million cubic meters of water more than it can replace, and the Kingdom still uses less per capita than any other country in the Middle East. What is more, the majority of Jordan's water is used for agriculture, though agriculture does not contribute even 4 percent to the country's GDP.

It both surprises and perplexes that we have arrived in the 21st Century while someone has yet to design a low-cost and water-efficient irrigation system for farmers in the developing world, especially in semi-arid regions.

Climate Insecurity: I visited Punta Arenas located in the extreme south of Chile as a Fulbright Senior Specialist in 2010 on the invitation of the Antarctic Research Program at the University of Magellan. As the southernmost city in the continental land mass of South America, Punta Arenas is also part of the Patagonian region, a vast cathedral of nature in all of its epic grandeur. Over a weekend, my host Prof. Pedro Cid took me on a hiking trip, providing me with my first encounter with the region's immense landscapes, mountains, lakes, icebergs, glaciers, and ice fields. Even as its tranquil splendor reassures how ravishingly beautiful our planet is, Patagonia has also become a quiet testament to our planet's growing climate insecurity—with 270 of the largest glaciers in the region between Chile and Argentina losing volume 10 to 100 times faster in the last 30 years than over a span of 300 years. At the top of the world, as much as 40 percent of the Arctic ice cap's area during summer has disappeared, also in the last 30 years.

Meanwhile, the past decade happened to be the hottest ever measured, with 2005 and 2010 tied as the hottest years recorded since systematic measurements began in the 1880s. Indeed, 9 of the 10 hottest years in history occurred in the last 13 years. While diversity is generally good, it is not so when it comes to diversity in weather disasters, which is precisely what today's warmer, moister atmosphere is primed to offer

across the globe—from catastrophic flooding to blizzards, heat waves, droughts, wildfires and windstorms. In the United States alone, a significant rise has been observed in the occurrence of billion-dollar incidents, the upper tier of natural disasters. Adjusted for inflation, the 1980s had an average of one billion-dollar event a year, the 1990s with four annually, and the first decade of the new millennium with four to five per year. The average for 2010 and 2011 is a staggering 7.5 a year. Over the last 30 years, 99 billion-dollar disasters have struck the United States, with Hurricane Katrina setting the record in 2005 at $134 billion in damages.

In the Philippines, five of the wettest tropical cyclones in history occurred in the past decade, with recorded precipitation ranging from 26.97 inches to 42.45 inches.

Human vulnerability to extreme weather disasters is expected to increase. Rising global population, rapid urbanization, and the growth of megacities will mean highly vulnerable urban communites especially in the developing world and along coastal areas. There are currently about 25 million people who are environmental refugees. Climate refugees, for instance, account for more than a third of recent migrants to the city of Dhaka in Bangladesh, a low-lying country that has been seeing more frequent flooding as glacial melt in the Himalayas accelerated. By 2050, the number of environmental refugees globally is projected to rise to 150 million.

War in Peace: The author visited the Peace Prize conference room at the Norwegian Nobel Institute in Oslo, which awarded the prize to Norman Borlaug in 1970 for his leadership of the Green Revolution. This calls to mind a similar need for engineered solutions to sustainability to ease escalating global competition for resources.

Resource Wars: I still find it wondrous to leave one world in a winged tube and just 10 to 15 hours later arrive in an altogether different world. This was how it felt for me when I left Los Angeles and arrived for the first time in Beijing, China, in 2000. Beijing then felt to me like another world in many ways, but it was the people who looked most foreign to me. The majority still dressed in drab-colored Mao jackets, and the faces I saw in the streets appeared mostly grave, unsmiling, and even pensive. But fast forward 10 years and the contrast cannot be clearer. The city itself, of course, underwent physical transformations many times over in the last decade, and the people of Beijing themselves look transformed—many fashionably dressed mostly in the Western style, and the majority radiating a mix of optimism, confidence, and ambition. Arriving in Beijing today feels just like arriving in Tokyo, Seoul, Singapore, Manila, Sydney, Mumbai, Tel-Aviv, Riyadh, Paris, London, or Sao Paolo—that is, arriving in a city that is a vital part of the globalized economy.

Some in academic and policy circles are still debating whether the world of the 21st Century is one where all nation states would democratize or one where people would align themselves along civilizational lines and subsequently engage in a "clash of civilizations". What is clear is that the world has already decided to live by another system that is neither ideological nor cultural. In the world of the 21st century, capitalism serves, not only as an economic system, but a new shared "global civilization," with its language, principles, and practices embraced universally.

In addition to lifting millions of people out of poverty into the middle class across the world and enabling global corporations to post record profits, global capitalism has also made the world a more stable and peaceful place. Indeed, despite the wars in Afghanistan and Iraq in the last decade, the number of countries experiencing some form of major political violence—which increased continuously through the Cold War period—declined progressively, dropping from a peak of about 30% of all countries in 1992 to only 13% in 2010. An integrated global economy makes nation states more disinclined to wage war against one another. In an era of greater peace, however, a new brand of conflict is emerging. This is competition between nation states for the acquisition of all types of resource from across the planet—from oil fields to natural gas reserves, mines, and even biomass. Time was when only Western firms gained control of foreign energy and other resource assets. Today, Brazil, Russia, India, and especially China have been scouring the planet to lock down supplies to sustain their burgeoning economies. China overtook the U.S. as the world's largest energy user in 2010, and is projected to be the world's top oil consumer by 2027. It has aggresively been securing foreign resource reserves in Central Asia, Africa, the Middle East, and Latin America. In 2009 and 2010, two state-controlled banks, the China Development Bank and the China Export Import Bank, provided loans totaling at least $110 billion to governments

and firms in developing countries to facilitate the supply of raw materials or land—an amount that exceeded total loans issued by the World Bank to developing countries in the same time period. Meanwhile, Saudi Arabia recently announced that it had sold more oil to China in 2011 than to the United States, previously its largest customer.

But perhaps nowhere is the competition for resources more emblematic of the current globalized economy than at the top of the world. As a result of a warmer atmosphere, the polar ice cap is shrinking and the permafrost layer is receding, providing opportunity for access and exploitation of the region's abundant resources. These include up to 90 billion barrels of undiscovered but recoverable oil, up to about one-third of the world's natural gas, and a wide array of minerals. Not surprisingly, the Arctic countries of the United States, Russia, Canada, Norway, Denmark, Iceland, Sweden, and Finland are fiercely contesting which countries have the right to which territories to access their riches. In 2007, a Russian expedition planted a flag at the floor of the polar sea, 14,000 feet below the surface, staking its claim on a contested portion of the Arctic. Subsequently, the United States and other nations have begun rebuilding their military presence in the region.

Collectively, we humans currently use about 50 billion tonnes of resources per year which, without restrictions, could jump up to 140 billion tonnes per year by 2050. This would be equivalent to collectively consuming resources by 2050 of a total weight roughly equal to that of Mount Everest! How we produce or manage and use our resources—food, water, energy, fuels, minerals—is the globalized world's biggest challenge. It also happens to be the biggest engineering challenge of the 21st century.

Universities Without Walls: Especially in a global economy that consumes an alarming amount of natural resources, knowledge remains the most precious resource. And while the economic ascent of nations has historically been founded on the creation of knowledge and the subsequent translation of knowledge into value, this fact has never been more clear and more urgently desired than in today's interconnected global economy. As the walls between countries fall, so do the walls of the world's universities.

While universities in Medieval times were cloistered ivory towers whose main purpose was the preservation of knowledge from antiquity, today's universities are without walls and create the knowledge to fuel our economic dynamos through public and private partnerships.

Each time I visit universities in other parts of the world, I am grateful to have a front seat for seeing our shared and diverse planetary challenges—food security; water, energy and environmental sustainability; public health; poverty eradication; cross-cultural and religious understanding; diplomacy, etc. I can see for myself an entire panoply of knowledge being creatively put together to solve such challenges.

Universities which have a global reach not only have the privilege of engaging in the joint search for solutions for shared global challenges, but also have the best hope of solving local and national problems.

The Places We Go: Travel takes us to other geographical locations and also to different types of understanding. Albert Einstein once wrote that the human mind "always has tried to form for itself a... synoptic (or broad-view) image of the surrounding world." Since ancient times people have sought to reach a place where the natural, the philosophical, the artistic, and even the religious all merge.

During my travels in the past decade, I harbored the hope of visiting such a place of broad understanding, though my hope admittedly was fairly modest. My only goal was to understand on a personal level the developments that significantly impact our world.

To travel during the first decade of the 21st century was to see the common rise of nations across the globe. Problems like political and military threats between nations would be easy enough to identify and—through global cooperation and diplomatic hard work—could be surmounted through agreements and compromises. A disquieting obstacle that is posing a clear and present danger to all nations today, however, is the increasing and unsustainable consumption of resources. With the rest of the world emulating Western ways of living and consumption, one estimate shows that if everyone on the planet today lived like the typical American, we would need the equivalent of 5.4 earths to meet our needs. Rephrasing the biggest engineering challenge of the 21st century, how do we create economic growth and development without relying on the increased exploitation of the earth's resources?

During the first wave of globalization in the 16th century, when people were circling the globe for the first time conquering other peoples and plundering their resources, a small group of native tribes in North America were quietly sowing the seeds of resource sustainability. The Iroquois, architects of the Seven Generation Sustainability enshrined in The Great Law of the Iroquois, practiced an ecological concept that required thinking ahead to ensure that the decisions they made would benefit their descendants.

During this second and present wave of globalization in the 21st century, there is a world imperative to redesign the very foundation of globalization if our shared economic civilization is to last—demanding a complete disavowal of the principle of resource plunder and accelerating the universal embrace of sustainability.

Mark Twain, with insights he had gained through his travels, offered that "travel is fatal to prejudice, bigotry and narrow-mindedness." Through my travels in the past decade, it has become my ardent hope that, by the middle of the century and certainly by the end of this millennium, we in the engineering professions can offer, not only that engineering is fatal to resource depletion and reckless misuse, but more so that, indeed engineering is fatal to hunger, poverty and unsustainable development.

Portions of this expanded and edited article are reprinted from *Resource* magazine (May/June 2012) with permission of the publisher, the American Society of Agricultural and Biological Engineers. Background is the world map published in 1569 by Gerardus Mercator.

Additional Contributors to 2012 Alumnus Giving Program

The names of an additional 2,337 Tau Beta Pi alumni who made donations to the Association in the 2012 Alumnus Giving Program between November 16, 2012, and January 31, 2013, appear in two separate listings on the following pages. Added to the 8,434 members whose contributions were acknowledged in the Winter 2013 BENT, *the complete group of donors totaled 10,771, who made 11,064 contributions. These loyal and generous members gave a total of $934,327 with a record average gift of $84.45 vs. $80.29 last year! Gifts received after February 1* **and other gifts designated for the 2013 campaign** *do not appear but will be published in the Summer 2013 issue.*

The generous assistance of each member is deeply appreciated by the Executive Council and other officers of the Association. The financial resources have permitted strengthening our programs in several areas that emphasize the importance of Tau Beta Pi's basic objectives and that help all collegiate chapters and student members.

Donors' names are arranged alphabetically within their chapters. Names of members who have qualified for the Tau Beta Pi Donor Recognition Clubs are listed only in the first section below.

Names marked with a † symbol are of deceased members in whose memory donations were made either by relatives and friends or through bequests. In addition to the gifts acknowledged here, several were made anonymously through the Combined Federal Campaign, Network for Good, or JustGive and are also deeply appreciated. Matching entities are listed on page 29.

Donor Recognition Clubs

The names of 1,761 Tau Bates appear in this first section. They made donations to the 2012 Alumnus Giving Program between November 16, 2012, and January 31, 2013, AND they have also made CUMULATIVE contributions and bequests to Tau Beta Pi through the years totaling from $250 to more than $1,000,000. These, plus the 6,236 names listed in the previous issue, bring the total number of 2012 recognition club donors to 7,997.

The Donor Recognition Clubs are part of our effort to recognize a donor's total lifetime cumulative giving to Tau Beta Pi. Such continuous support significantly contributes to the overall strength of the Association and allows our Society, with confidence in our financial resources, to plan for modest growth in our services to the engineering profession. These clubs were chartered by the Executive Council in 1986 and have been set at the following levels:

Matthews Club	*500,000*	*Alpha Club*	*25,000*	*Chi Club*	*1,000*
Nagel Club	*250,000*	*Beta Club*	*10,000*	*Second Century Club*	*500*
Williams Club	*100,000*	*Delta Club*	*5,000*	*Founder's Club*	*250*
Heikes Club	*50,000*	*Zeta Club*	*2,500*		

MATTHEWS CLUB
CA Γ † Forge, Charles O. '56

NAGEL CLUB
IL B † Sickafoose, Robert D. '50

WILLIAMS CLUB
IA A Campbell, P.E., Cleveland '47

HEIKES CLUB
NY E Lynnworth, Lawrence C. '58
RI A Anonymous '72

ALPHA CLUB
IN Δ Koller, David C. '62

BETA CLUB
AZ B Myers, Gerald E. '70
CA B Schlinger, Warren G. '44
CA Δ Mleczko, Eugene L. '47
CA E Pappone, Daniel C. '77
CO B Anonymous '78
IN A Ford, Steven R. '80
Sarkisian, Nancy L. '77
IA A Faidley, Ph.D., LeVern W. '67
Moyer, James H. '51
LA Γ Kitchens, Philip H. '67
NJ Δ Bezos, Jeffrey P. '86
NY K Knox, Keith T. '70
NC A Johnson Jr., James W. '77
OK A Bork, Walter A. '51
SD A Gomulinski, Tricia E. '98
TN Γ Hall, Kristofer Brian '98
TX A Yates Jr., Saint Clair P. '65
TX B Relyea, James R. '53
TX Δ Mitchell, George P. '40
TX H Trich, John A. '70
WI Γ Cronce, Richard G. '77

DELTA CLUB
CA B Sartelle, John E. '79
CA Δ Davis, John L. '60
CA E Tozaki, Ronald Y. '74
CA Z Grigsby, David A. '84
CA I Pickett, Stephen E. '75
CA N Caddock Jr., Richard E. '72
CA Ξ Hickey, Robert W. '88
CA O Turhollow, Charles B. '81
CO Δ Laughlin II, George T. '75
FL A Bolton, Charles H. '62
Kalter, Howard L. '66
FL B Crews, Renard C. '70
IN A Griffin, Abbie J. '74
IN B Freers, Howard P. '48
KS A Kleist, Robert A. '51
MA A Keogh, Brian J. '84
MA Δ Dranetz, Abraham '44
Fenton, Harvey A. '58
Lee, Richard G. '51
MI Γ Fay, John E. '56
Simmons, Charles D. '50
MI E Frye, James H. '51
NH A Sherman, John L. '54
NJ Γ Kenney, Thomas E. '70
NJ Δ Mendelsohn, Andrew J. '77
NY I Judd, Robert P. '78
NC Γ Buehler, Martin G. '61
OH Γ Kolbas, John M. '47
OK A Hall, Ralph R. '64
PA Γ Barrow, Bruce B. '50
TX A Plank, Michael J. '83
VA A Pitzer, William G. '75
WV A Landes II, Junior H. '64
WI A Smith, Rodger F. '64

ZETA CLUB
AL B Acree, Elaine S. '76
AZ A McIntosh, Duncan M. '65
Milan, John M. '67
AZ B Story, Franklyn H. '81
Stout, P.E., Roger P. '77
AR A Biggadike, Robert H. '58
CA A Meyer, Jack A. '54
CA B Lippey, Gerald Z. '55
Shombert, Lee A. '79
CA Γ Davis Jr., Joseph S. '59
Trane, Frank H. '53
CA Δ Sekimura, Gerald T. '73
CA E Smernoff, Kenneth B. '67
CA Θ Koblitz, Gordon F. '66
CA M Heitkamp, Ross S. '85
CO A Knight, William J. '79
CO B Harris, James R. '68
Harris, Karen L.W. '74
CT B Chatfield, Larry A. '71
Killingbeck, David R. '77
DE A Morrow Jr., John L. '73
FL B Tilles, Arno William '84
IL A Fue, Harold '57
Pfefer, Bernard L. '47
Robertson, John A. '65
IL Γ Cook, Stanton R. '49
Lee, James A. '88
IN A Barker, Kenneth D. '64
Reese, Francis E. '41
Sedlacek, Warren R. '45
IN B Badger, Jerry D. '62
IN Γ Buran Jr., Joseph E. '75
Jones, Walter T. '64
Poore, Michael F. '71
IN Δ Stechholz, Jonathan M. '72
IA A Feisel, P.E., Lyle D. '61
Krambeck, Scott D. '82
KS A Mitchell, James E. '85
KY B Lambert, Linda M. '88
Lambert, Michael T. '88
LA A Comeaux, Ph.D., Keith A. '89
Williams, Colleen D. '82
ME A Brigham, Ernest B. '53
MD B Crane, Thomas C. '62
Hawkins, Albin L. '80
MA A Duris, Robert A. '74
MA B Gilkes, Alan M. '68
Ladd III, P.E., Charles C. '55
MA Δ Carter Jr., Arthur A. '51
MA E Dipietro, William O. '42
Stevens, Janet M. '72
MA Z Cetti, Richard P. '70
MI A Colbry, Ph.D., Kathleen '99
Colbry, Dirk J. '06
MI B Funk Jr., Clarence G. '63
Jenekhe, Samson A. '77
MI Γ Battel, Steven J. '79
Liepa, Mark A. '81
Padzieski, Robert J. '70
MI E Gomulinski, Curtis D. '01
Thompson, George W. '55
Timmins, William D. '62
MI Z Volpe, David R. '74
MO Γ Rossetti, David J. '74
NJ A Forslund, Donald C. '60
NJ B Mudie, Samuel H. '62
NY B D'Avignon, Edward J. '88
NY Γ Luckett, Larry W. '83
NY Z Present, Henry '67
NY I Dujmich, Louis C. '78
NY A Abrardo, Joseph M. '72
NY Ξ Runowich, Carl J. '84
NY Π Stalzer, Jeffrey '74
NC A Vercaemert, Carol S. '76
NC Γ Anapol, Edward '76
Linker, Edward M. '47
NC E Linney, Ronald J. '86
OH Γ Albery, James O. '59
Howland, Smith E. '69
OH Z Zelms, Charles M. '73
OH M Bowers, Keith Allen '91
OK A Edwards, Paul A. '87
Markland, Ralph John '88
Morris, Jay K. '81
OR A Eden, James D. '79
PA A Wagner, Theodore W. '71
PA B Stockburger, Richard '73
PA Δ Honath, Mark F. '80
PR A Negron, Jenaro R. '60
RI A Pritchard, Robert L. '46
SC A Harman, J. Patrick '65
SC B Bashore, Allen S. '51
SC Γ Davis, Emmett I. '50
TN A Cook, James M. '72
Froula, P.E.,Ret., James D. '67
Massimini, Michael I. '76
Peishel, Frank L. '61
Pih, Norman P. '82
TN B Layne, Margaret E. '80
Marianelli, Walter D. '75
Parrish Jr., Thomas F. '75
TN Δ Stewart, John D. '78
TX A Klump, D. Craig '77
TX B Tye III, John M. '67
TX H Lin, Kuo-Chiang '80
Schmidt, Robert W. '84
TX Θ Barrett, Gerald G. '70
UT A Morrison, Michael George '88
VA A Brown, Lee Merry '88
VA B Harras, Edgar D. '67
VA Γ Glass, Christopher E. '83
WA A Okita, Richard Y. '56
WA B Cass, Robert D. '83
Grossman, Robert J. '59
WI A Delucca, Gregory J. '59
WI Γ Werner, Jeffrey A. '79

CHI CLUB
AL A Talbot, Thomas F. '52

CHI CLUB, CONTINUED

Uptagrafft, Dewitt '72
AL B Delorenzo, Joseph D. '57
AL Δ Koelbl, Terry G. '84
AK A Braun, David R. '74
Cline, John R. '81
AZ A Bailey, Harold E. '71
Da Silva, Eduardo G. '58
Erickson, Kenneth L. '68
Redfern, Julie Jacks '83
AZ B Lanzinger, Donald J. '72
AR A Kimmel, Dennis E. '88
CA A Baker, C. Vincent '62
Gottwald, Carl H. '48
Johnson, Albert W. '50
McCune Jr., Earl W. '79
Ravenscroft, Dewey S. '63
Wilhoite, W. Clinton '85
CA B Creutz, Michael J. '66
Jessen, Howard E. '46
CA Γ Hardison, R. Logan '57
Hetzel, Geoffrey O. '82
Inouye, Lance M. '68
Marks, Stuart W. '84
Rodriguez, David A. '58
Sansbury, James D. '66
Ullman, Marc A. '83
CA Δ Barr, Juliana '80
Fong, Franklin M. '69
CA E Gaunt, Arnold J. '86
Gliksman, Jerome A. '62
Karagozian, Ann R. '78
Masumura, Robert A. '62
Spencer, Gordon F. '74
Woo, Raymond '72
CA Z Downey, James B. '62
Javete, Donald F. '51
CA H Broadston, Robert D. '94
Burrows, Stanford '63
Trebaol, George O. '75
CA K Bethune, Edwin M. '84
CA Λ Hall, Victoria Lee '86
Horn, Jeffrey B. '79
Pickles, William R. '80
Veerkamp, Gary R. '74
Yamamoto, Ko '84
CA M Mitsuoka, Jeffrey M. '79
Rodgers, Patrick J. '80
CA N Bohannan, James G. '70
Emery, Linda R. '82
Lamoureux, Mark S. '81
Ruud, John E. '73
CA O Fitzsimons, Michael J. '79
Mulvihill, Michael E. '60
Treinen, James P. '85
CO A Kranzler, Irvin '54
Peters, Richard D. '80
CO B Aerstin, Franklyn G. P. '64
Bartlett, Paul E. '51
Colonell, P.E., Joseph M. '58
Eason, Ernest D. '71
Guss, William C. '68
Keller, Jack '51
Wilson, Paul L. '59
Wood, John E. '71
CO Γ Hough, H. Vernon '52
CO E Hepworth, Richard C. '63
CT A Fischer, Edward Michael '89
McLeod, Christopher K. '77
Saubestre, Paul A. '79
CT B Klopfenstein, Rex C. '59
Layman, Timothy P. '79
Melander, Donald R. '81
DE A Folsom, Steven A. '77
Kimpel III, Paul H. '70
Levie, Stefan Gerhard '91
Winer, Harley S. '81
DC A Belcher, Wade D. '70
Gathungu, Peter Maina '93
Griffin, Earl H. '57
DC B King, David A. '68
Lee, Wah H. '73
Maggio, John J. '81
Maslen, Carrie Y. '82
Youssef Mir, Paul '78
DC Γ Ashie, Ibrahim A. '70
FL A Hayden, James G. '69
Traverse, P.E., Richard S. '71
FL B Ault, Richard H. '64
Jennings IV, Tipton D. '54
FL Γ Collins Jr., William L. '75
Jones, William D. '74
FL E Stierlen, Lorelei Beth '97
GA A Backhaus, George P. '83
Barber, Brian R. '81
Coons, Louis W. '81
Cooper Jr., Basil P. '65
Fawcett, Clinton Douglas '92
Hilton, Joanne L. '80
Negro, James E. '68
Rogers, Don E. '63
Snare, Daniel M. '80
ID A Marks Jr., John R. '77
IL A Jones, Douglas W. '80
Krupka, John F. '52
Mueller, Thomas R. '85
Ostrodka, David L. '70
Schoenberg, Kurt F. '72
Snyder, Dan W. '50
Vogel, Frederick M. '80
Zielinski, Edward L. '74
IL B Gurney Jr., P.E., Donald P. '59
Hughes, Joseph L. A. '79
Kinast, John A. '79
IL Γ Aagaard, James S. '53
Dompke, Richard K. '56
Guest, H. Brandon '81
Timmerman, Nancy S. '72
IL Δ Hachtel, Dale A. '68
IL Z Wislek, Michael A. '89
Woyna, Mark A. '87
IN A Beal, Dick H. '49
Boelter, Frederick W. '73
Carlson, Richard A. '70
Egilsrud, Richard L. '81
Ehlers, Steven M. '77
Hanover, Marilyn K. '78
Heirman, Donald N. '62
Hooks, Collis C. '64
McGraw, Earle P. '50
Nemier, Stanley E. '63
Rathbone, Donald E. '51
Schlosser, Samuel C. '71
Sublette, Ivan H. '49
† Toombs, H. Dean '59
Yoder, Norman E. '71
IN B Marsh, Gene W. '85
Martin, Jeffrey V. '78
Rose, Willis E. '44
Ruddick, Everett L. '64
Waterman, Robert C. '70
Yee, Stuart '89
IN Γ Heidrich, Steven J. '82
Kukla, James A. '72
Lombard, Michael G. '76
Mason, James A. '56
IN Δ Brems, Robert R. '63
Lorenz, Mark J. '80
Schmalz, Peter B. '69
Spring, Bradford H. '59
IA A Berkholtz, P.E., Nicholas E. '56
Bookin, Marvin L. '57
Bosshart, David J. '80
Coffey, Leo F. '64
Derr, Curtis R. '85
Drumm, Alfred W. '64
† Johnson Jr., Aldie E. '47
KS A Black, Arthur G. '70
Knapp, Roy M. '63
Leamon, Richard G. '67
Shankles, Larry E. '69
Smith, Ricky D. '83
KS Γ Benton, Kirk '78
Bucher, William A. '76
KY A Dunning, William E. '61
Howe, P.E., Richard S. '59
LA A Compton, Ronald R. '72
Franklin Jr., Duard D. '74
LA B Buesinger, Robert F. '78
Mullins, Peter L. '57
Perrin III, Shepard F. '83
LA Γ Sigmund, John A. '75
ME A Atkinson III, Leland G. '78
Grover, David Joseph '94
MD A Becker, William H. '65
Linaweaver, F. Pierce '55
Scheinin, Warren M. '74
Wiseman Jr., William J. '64
MD B Bromley, Ralph W. '44
Chase, Ronald J. '71
Kirschbaum, Alan I. '71
Lambrechts, James R. '73
Roberts, William M. '76
Rowland, R. Wilson '51
Toense, Robert E. '76
MA A Bernacki, Stephen E. '70
Bujaucius, Gerald A. '79
Royea, James Edward '92
Snively, Fred S. '60
MA B Balazs, Phillip T. '69
Brandes, Richard D. '57
Clauss Jr., John S. '54
Dickey, Robert L. '74
Freeman, Reed H. '61
Heatwole, Antony J. '64
McKim, Thomas F. '75
Smoot, William N. '56
Strauss, Richard A. '60
MA Δ Colen, Esq., Frederick H. '69
Harty Jr., Frederick R. '61
MA E Glatfelter, William '87
Herzberg, Ernst '51
MA Z Cain, John F. '61
Fontana, Mario H. '55
Grzeslak, Kazimierz T. '88
Gusciora, Kenneth H. '69
Harrison, C. Brett '64
Smith, Richard G. '78
MA H Penafiel, M.D., Jay Buhay '90
Whitley, Norman L. '75
MI A Bonner, Robert C. '60
Houthoofd, Janet M. '76
MI B Sandretto Jr., Peter P. '64
Saul, William E. '55
MI Γ Albrecht, Terry E. '67
Coates, Larry L. '78
Connable, Tenho S. '42
Greene, Edward B. '51
Grimes, Harvey J. '49
Hammond, Donal D. '52
Hansen, Charles '46
Holderness, James H. '67
Isackson, Robert M. '78
Itami, Robert M. '73
Pepper, Julia L. '84
Prescott, Thomas J. '69
Reines, Jose '59
Seidel, David A. '81
Sheets, Alan '81
Stewart, Stephen R. '66
Toliver, Christopher M. '74
Trankle, Thomas L. '71
Warner, Caleb '44
Zuk, David M. '70
MI Δ Conti, Mark '76
MI E King, James B. '65
Lewizky, Jury '56
MI Z Lachele, Roger E. '75
MN A Hanson, Henry A. '66
Loughlin, James P. '85
McLeod, Gary W. '70
Rosene, Robert W. '45
Thompson, Richard A. '77
MS A Jerome, Dennis C. '67
MO A Crabbe, Emmanuel F. '81
Currie, Wayne L. '59
Donaldson, Albert L. '75
Myles, M.D., Thomas D. '82
MO B Ash Jr., Richard L. '70
Bondi, James O. '71
Ernest, Terry L. '82
Peat, Robert J. '79
MO Γ Byrne, Clare M. '78
MT A Collins, Douglas M. '71
Osgard, Dennis M. '62
NE A Criswell, Marvin E. '65
NJ A Murphy, Kevin J. '78
Schmidt, Arthur J. '68
NJ B Cohen, Robert B. '77
Fletcher, Leroy S. '58
NJ Γ Fenster, Saul K. '53
Knight, Ralph M. '39
Kunyz Jr., Joseph J. '73
Sharon, Anthony P. '74
NJ Δ Lisle Jr., Thomas K. '69
Prutzman, Robert A. '72
NM B Sevier Jr., James M. '96
NY A Cohen, Adam B. '85
NY Γ Borkowski, Norman P. '52
Bornhorst, Bernard R. '60
Bruch, Charles G. '59
Lequar, James Kay '87
Mohr, Wendell C. '53
Schultz, Stephen P. '70
Spengler, Stewart R. '52
Stallman, Thomas F. '59
Thal Jr., Herbert L. '53
Werner, Stuart L. '54
NY Δ Dougherty, John W. '59
McCloskey, Charles C. '71
Teng, William L. '74
NY E Febesh, Melvin '47
Hellman, Martin E. '66
Kammenzind, Henry A. '50
McCaffrey, Ronald W. '52
NY H Bergh, Gerald K. '58
Schattner, Bernard L. '56
Valcourt, Jean-Mary K. '85
NY Θ Broutman, Charles A. '53
Kelley, F. Douglas '78
NY I Berman, Jay I. '78
Calkin, Edwin T. '61
NY K Brown, George A. '48
Hinshaw, David J. '86
Moore, Duncan T. '69
NY Λ Dasczynski, Warren M. '75
Schmitt, Robert E. '71
Silverman, Joel S. '74
NY N Marso, Rudolf '59
NY Ξ Mathews, Joseph R. '81
Rorke, George L. '71
NY Π DeVoe, Charles G. '76
Lewis, Frederick R. '77
NY P Curran, Paul J. '83
Roldan, Mark J. '85
Solaski, Thomas P. '85
NC A Baer, Richard T. '63
Redano, Richard T. '78
NC Γ Franks, Marla J. '79
ND A Unzelman, Louis R. '69
ND B Dehen Jr., James J. '80
OH A Gschwind, Leon D. '55
Oravec, Joan M. '71
Thro, Stuart W. '64
OH B Fazzoni, Gregory F. '76
Hagedorn, Donald E. '54
Hamilton, Edward L. '73
OH Γ Becher, Charles D. '72
Dietz, James F. '69
Fawcett, Sherwood L. '41
Fling, Russell S. '49
Guins, Thomas S. '69
Hohman, Charles M. '67
Hollenbaugh, Roger E. '71
Kovach, Karl D. '85
Kroencke, Edward A. '48
Monter, George C. '60
Orkins, James E. '66
OH Δ Moore, Mathew F. '62
Robe, P.E., T. Richard '55
OH E Basta, Edward D. '82
Cull, Ronald C. '70
OH Z Frederick, Wm G. D. '58
OH H Cole, Neil R. '75
Hager, Douglas S. '85
Kohlhaas, Richard L. '62
Reid, James H. '73
OH I Schaffner, Charles R. '74
OH K Maki, Luke R. '78
OK A Lovering, Eugene H. '43
OK B Royce, Robert M. '73
Steffanelli, Loretta M. '86
OK Γ Basore, Paul A. '78
Freese, William E. '50
OR A Beard, James L. '61
Ewing, Robert C. '43
Hansen, Steven W. '69
Laos, Oscar J. '51
Lynch, Stanley C. '73
Milton, Stuart W. '84
Niedermeyer, Rex '77
Pengelly, David D. '78
PA A Barndt, Ronald L. '58
Fowler Jr., W. Beall '59
Saal, Frederick A. '54
Sherman, William J. '60
PA B Aughenbaugh, Gregg W. '67
Ciuca, James A. '72
Magnus, John C. '48
Slocum, Helene Zuber '85
PA Γ Helfer Jr., Arleigh P. '67
Licht, Robert B. '55
PA Δ Sokal, Allen M. '68
PA E Huke, John A. '43
Mansfield, Brian David '91
PA Z Ebner, Alan M. '61
Hunt, Steven D. '80
PA H Gilman, Thomas C. '66
Hills, Frederick J. '61
Reetz, Helen A. '78
Swartz, William E. '54
PA Θ Daniels Jr., Harold E. '66
Gigliotti, Michael P. '73
Walsh, Daniel J. '69
PA K Beseler, Jan W. '88
RI A Saharian, Alexander '56
Vigar, Judith W. '83
RI B Binns, George '59
Luz, James J. '80
SC A Speed, Penelope H. '87
Ward, Robert M. '86
SC B Bradey, Jeffery E. '85
Thomas Jr., Cunningham P. '58
SC Γ Gustafson, Richard A. '63
SD B Bocklund, Lori S. '83
TN A Allen, Mark L. '82
Goodwin, William A. '49
Layman, Ronald T. '77
Shoemaker Jr., John E. '67
St Clair, Edward G. '70
Stickle, Gene P. '53
Trundle, Max Don '72
Vandenbulck, Charles F. '56
TN B Convery, Thomas Patrick '02
Green Jr., Thomas B. '75
Heflinger, Richard S. '72
TN Δ Bromenshenkel, Wendy K. '89
TX A Baker, William E. '52
Grimes, William O. '43
Haschke, Chester G. '50
Hickox, Robert E. '69
Massey, James F. '50
Moorman, Charles T. '59
Porcher, Calvin E. '48
Sweet, Paul A. '70
Wilson, Randy Wayne '97
TX B Rossler, Steven W. '73
TX Γ Hunter, David G. '79
Johnson, Terry R. '55
TX Δ Knowles, David W. '80
Linn, William R. '81
Pollock, Stephen T. '70
Smith, Manning D. '64
TX E Taylor, Mark E. '83
TX H Guinn, Douglas E. '78
TX Λ Herzig, Marie Pauline '04
UT A Davidson, Stuart W. '83
Eide, Eric Norman '89
Hull, Wade Alan '97
VT A Butterfield, William F. '67
Cimonetti, William J. '59
Ketcham, Kenneth J. '68
VT B Berkman, Richard L. '69
VA A Anderson, Willie C. '75
Evans, Gary K. '77
Garner, Patrick L. '72
Iachetta, F. Anthony '50
VA B Carpenter, Joseph A. '63
Doughty, Gary S. '77
Fetter, Robert B. '47
Hatfield, Bennett K. '79
Long, David A. '91
McConnell, Fred L. '64
Snidow III, Lyle C. '74
VA Γ Campbell, Dale A. '72
WA A Confer, Peggy J. '81
Eastman, James S. '53
Follett, Mark S. '74
Matthews, Nancy N. '81
Reichel, Jerel D. '66
WA B Anderson, Warren L. '66
Hardan, David L. '65
Langley, Duane D. '55
Yates, David A. '53
WV A Blackshaw, George L. '58
Campbell, Donald F. '78
Fleischer, Charles J. '70
Gould, Marvin B. '63
Ramsey, Walter J. '74
WV B Johnson, Newton E. '75
Thornton, James R. '81
Torre, Linda R. '83
WI A Lutz, Leroy A. '60
Voelz, Richard T. '50
Wulff, Kurt H. '63
Yuen, David P-K '73
WI B Hutton, Teresa Jean '91
WI Γ Simon, Karen A. '83
WY A Cook, Norman L. '79
Fassett, P.E., Gordon W. '74
Gallensky, Neil E. '82

SECOND CENTURY CLUB

AL A Farlow, James C. '49
Scarborough, Cullen D. '65
Steele, Jacqueline G. '78
Trapane, Karen L. '82
AL B Dodson, Gene A. '57
Gachet, Thomas H. '60
Gray, David A. '80
Shields, Clark R. '71
Wallace, Ronald S. '75
AL Γ Sahawneh, Mary C. '76
AZ A Atkinson, Dale R. '86
Berg, Jeffrey R. '93
Leonardi, Suryanto F. '86
McLaughlin, Dennis P. '80
Steinwachs, Donald M. '68
AZ B Sirkis, Murray D. '51
AZ Γ Bruening, Brenda I. '82
Bruening, Gregory W. '80
AR A Brown, William D. '69
Jenkins, Lynn P. '61
CA A Cocotis, Paul Alexander '90
Feldsher, Theodore B. '85
Hassur, Karl R. '82
† Kaplan, William S. '50
Karn, Richard W. '50
Ong, Allen '70
CA B Dryden, Eugene H. '55
Hill, Roger C. '63
CA Γ Burtis, Betty Legarra '48
Dunham, James G. '73
Geary, Richard '56
Landers, Carl F. '88
Likins, Peter W. '57
Love Jr., Ralph E. '57
McClendon, Scott '60
Mitchell, Donald B. '59
Roodhouse, James G. '59
Vincenti, Walter G. '38
CA Δ Hughes, Patrick J. '80
Shiells, David J. '78
CA E Goodkin, Mitchell A. '68
Miyatake, Yukio '61
Stein, Eugene P. '68
CA Z Cancilla, Charles E. '59
Benson, Chris A. '84
CA H Puig, Carlos Manuel '94
CA Θ Gilman, Larry '73
Reis, Thomas A. '77
Smith, John M. '70
Tullock, Willard '76
CA I Wrigley, Chris J. '96
Yoshida, Gerald T. '68
CA K Ramirez, Marvin J. '82
Taylor, Robert D. '82
CA Λ Johnston, Brian David '95
Smith, Robert P. '75
Stanley, Richard L. '79
CA M Keiser, Randy J. '73

The Heritage Society

The Heritage Society was established in 2001 to recognize and honor those who continue the tradition of outstanding support by remembering ΤΒΠ in their plans. Heritage Society members, listed below, have included a provision in their estate plans to benefit the Association and have informed ΤΒΠ of this commitment. Their support is gratefully acknowledged, and their names will appear each spring.

Aagaard, Ph.D., James S., *IL Γ '53*
† Alford, Henry M., *MS A '27 (Dec'd.)*
† Althouse, Ernest E., *PA A '26 (Dec'd.)*
† Anderson, Marshall, *MI Γ '32 (Dec'd.)*
Anonymous Alumnus, *MA B*
† Arm, David L., *PA E '30 (Dec'd.)*
† Banner, Charles E., *OH Γ '47 (Dec'd.)*
Barnes, Raymond H., *MI Γ '40*
Basta, Edward D., *OH E '82*
Bateman, Terry S., *CA Γ '58*
Beans, Ph.D., E. William, *OH Γ '53*
Burg, Stoddard S., *PA B '51*
Burns, Carlisle V., *NY A '50*
Budd Jr., Col. Roger, *IL A '62*
Campbell, P.E., Cleveland L., *IA A '47*
Cancilla, Charles E., *CA Z '59*
Colbry, Ph.D., Dirk J., *MI A '06*
Colbry, Ph.D., Kathleen Luchini, *MI A '99*
† Curtis, Ph.D., Richard A., *OH A '64 (Dec'd.)*
D'Avignon, Edward J., *NY B '88*
† Donoghue, Leonard W., *MA Δ '37 (Dec'd.)*
Dooley, George H., *NH A '53*
† Duenweg, Col. Louis, *IN B '36 (Dec'd.)*
† Dulles, John W.F., *AZ A '43 (Dec'd.)*
Fisher, James E., *CO Δ '78*
Fleming, John R., *IA B '50*
† Forge, Charles O., *CA Γ '56 (Dec'd.)*
Forslund, Donald C., *NJ A '60*
Froula, P.E., James D., *TN A '67*
Fue, Harold, *IL A '57*
Gendron, Roger J., *IL B '55*
Gomulinski, Curtis D., *MI E '01*
Gomulinski, Tricia E., *SD A '98*
† Hanley, Edward P., *IL B '42 (Dec'd.)*
† Hart, Jack B. & Arline I. *(Dec'd.) (ΣΤ)*
Herke Jr., Frederick P., *OH A '54*
† Heymann Sr., Andrew P., *FL A '39 (Dec'd.)*
Jackel Jr., Henry E., *IN B '57*
Jennings-King, Sherry D., *TN A '93*
Johnsen, Roy L., *MI B '57*
Johnson Jr., James W., *NC A '77*
† Jones, David S., *KS A '49 (Dec'd.)*
Kern, Jack C., *CA K '71*
Kitchens, Philip H., *LA Γ '67*
† Kolff Van Oosterwijk, H.L.J., *CA A '50 (Dec'd.)*
† Liggett, John A., *MI A '43 (Dec'd.)*
Luce, John W., *FL Γ '50*
Luchini, Ph.D., P.E., John R., *MI Γ '71*
† Lucken, Ernest G., *NY I '42 (Dec'd.)*
McDonald, Capers W., *NC Γ '74*
† Nelson, Thomas A., *CA Δ '49 (Dec'd.)*
Orkins, James E., *OH Γ '66*
Pierce, Russell W., *WA A '70*
Ray, Frederick *H.*, *OH E '49*
† Reed, Ph.D., Charles E., *OH A '34 (Dec'd.)*
Regula, Ph.D., Donald W., *MI E '63*
Reinhardt Jr., William H., *IA A '48*
Sax, Franklin S., *MO Γ '55*
Scheffler, P.E., Paul H., *PA Z '48*
Schmoller, Ralph H., *OH Δ '61*
† Scribner, A. Clayton, *NY Γ '29 (Dec'd.)*
† Sickafoose, Robert D., *IL B '50 (Dec'd.)*
Siller Jr., Ph.D., Curtis A., *TN A '66*
Slafer, Loren I., *CA Δ '68*
Smith, Andrew L., *MS A '48*
Smith, Richard N., *OR A '57*
Smith, Rodger F., *WI A '64*
† Stechmeyer, John P., *OH E '48 (Dec'd.)*
Stella, P.E., Damien F., *AK A '82*
† Strom Jr., George J., *CA Γ '56 (Dec'd.)*
Swanson, P.E., Hilmer S., *WA A '76*
Swanson, Ph.D., John A., *NY Δ '62*
Taber, Norma J., *MO Γ '80*
Tarwater, James P., *MO B '51*
† Taylor, Paul D., *KS A '58 (Dec'd.)*
Teti Jr., John J., *WV B '71*
Tydeman, Frederick J., *CA Δ '73*
Tyson, Samuel E. *PA B '48*
Weissman, Martin J., *NY E '58*
White, Robert C., *IL Γ '56*
Widmann, Bradley H., *NY Λ '69*
Williams, David C., *TX B '47*
† Winkler, Albert H., *AZ B '75 (Dec'd.)*
Wisner, Benjamin G., *CA Δ '49*
† Zimmerman Jr., Marlin U., *MD A '44 (Dec'd.)*

Please contact Patricia McDaniel at *pat@tbp.org* if you wish to be included as a member of the Heritage Society.

SECOND CENTURY CLUB, CONTINUED

CA N Bishop, Douglas S. '73
Reukauf, Paul J. '70
Worlitz, Timothy L. '84
CA Ξ Hart, Laura J. '82
Schroeder, Steven A. '78
CA O Maulhardt, Alan L. '81
Page, John A. '61
Ringel, David J. '71
CA Π Nieraeth, Donald G. '77
CA P Markarian, Thomas F. '95
CA Σ Burke, Robert W. '82
Frankel, Craig A. '86
CA Y Intagliata, John David '95
CO B Aronson, Haskell Harold '52
Ashwood, Edward R. '75
Clark, Donald R. '72
Drexel, Charles F. '43
Horrell, Robin S. '85
Kayse, Kevin S. '78
Knapp, Barry G. '81
Ramsey Jr., Robert B. '42
CO Γ Lee, Don E. '59
CO Δ Ferentchak, James A. '77
Fisher, James E. '78
Mehring, James W. '72
CT A Bugel, Robert H. '45
Lehman, Philip L. '76
White Jr., Erskine N. '45
CT B Mastracchio, Robert '64
DC A Karydas, Apostolos E. '62
DC B Gaffney, Joseph M. '83
DC Γ Mayo, Henry C. '60
FL A Evans Jr., Andrew J. '75
Hunt, James D. '78
Milam, William E. '78
Townsend, Frank C. '62
Vande Vusse Jr., Gerald '65
FL B Elnaggar, Suzanne '93
Gonzalez, Cristina M. '79
FL Γ Barnes, Kathryn G. '84
Copeland Jr., Charles E. '73
FL Δ Bradshaw, Robert H. '77
Hewlett, Troy Stanley '97
GA A Bowersox, Sara Parrish '89
Brown Jr., Harry J. '65
Layden III, Joseph C. '87
Leathers, James C. '81
LeCroy Jr., Edwin P. '67
ID A Erickson, Leif '80
IL A Boehm, Ronald J. '81
Davison, Brian C. '87
Dowden, Douglas C. '73
Fernandez-Sein, Rafael '63
Flitman, Jeffrey E. '82
Hanus, Daniel J. '86
Kasik, Phillip M. '68
Lattner, Paul D. '55
Mast, Robert F. '57
Peithman Jr., Harlan W. '53
Pubentz, Lawrence J. '81
Reichard, Grant W. '61
Stein, Roger H. '80
Tennery, Victor J. '54
Thompson, Marshall R. '60
Wilhelm, Dale R. '80
Williams, Allan R. '71
IL B Knorovsky, Gerald A. '70
Thomas Jr., Stanley R. '72
IL Γ Bryan, Jon J. '61
Gosnell, John R. '61
Zimmerman, Jerald R. '76
IL Δ Klasing, Wayne G. '65
Zeller, Sean Michael '92
IL E Hopkins, Mark A. '82
Straka, James J. '84
IL Z Villasenor, Jaime S. '87
IN A Belter, Terry R. '77
Bicknell, Bruce A. '68
Bullions III, Robert J. '64
Carter, Eric L. '72
Cheesman, Mark W. '81
Cundiff Jr., Bruce T. '65
Danner, David L. '70
Davies, John R. '79
Forster, Allen V. '72
Fusillo, Pasquale '50
Goette, William E. '56
Golding, Brage '41
Good, Larry D. '67
Herendeen, Robert O. '65
Jicha, Albert J. '52
La Duc, John T. '65
Muehlbauer, James H. '63
Noah, Max W. '58
Peiguss, James A. '79
Roth, Robert H. '72
Schwiesow, Ronald L. '62
Shulaker, Edward R. '72
Smith, H. Irvin '56
Sosnay, Richard G. '66
Stilger, Donald L. '81
Welch, Alan J. '71
White, P.E., Stanley A. '57
Wolff, Jay R. '48
Ziemer, Donald A. '51
Zimmer, Clarence L. '57
IN B Hovda, Keith D. '81
Johnson, William B. '60
Jones, Philip S. '56
Klaus, R. Alan '53
Osburn, Richard K. '67
IN Γ Fitzgerald, Edward J. '86
Foley, Dan J. '70
Hawes, William M. '78
Kast, Steven J. '69
Pastega, Christopher B. '91
Quadrini, Mark L. '74
Schuster, Gregory M. '77
IN Δ Eisenbart, Thomas R. '78
Hessler, Glenn B. '61
Valenti, Paul M. '01
IN E Elder, James S. '80
Lund, Stephen R. '80
IA A Carosella, Sandra L. '88
Cosgrove, John D. '56
Crawford, Brian Matthew '04
Cronk, P.E., John O. '60
Nelson, David L. '52
Persinger Jr., Ardell L. '71
Radkins, Andrew P. '47
Rustwick, John D. '71
Zwiebel, Jeffrey L. '82
IA B Coe, Roger N. '57
Hunstad, Norman A. '49
Rathjen, Keith R. '56
West, Allison K. '81
KS A Calhoun, Myron A. '63
Johnson, George L. '43
Lovitch, Dinah '88
Massoth, William H. '82
Schuler, Charles J. '48
Suelter, Leonard G. '58
KS Γ McKinnis, Steve R. '74
KY A Letton Jr., George C. '57
McIntosh, Rickey D. '75
Taylor, Ronald Lee '89
KY B Hundley, John S. '87
Hundley, Theresa H. '87
Raderer, Thomas K. '73
Yantz, Robert C. '52
LA A Angelo Jr., Ernest '56
LA B Hosey, Ronald R. '79
Twiford Jr., Thomas W. '71
LA Γ Bertsch, Paul J. '79
Clary, Dennis M. '73
Sewell, P.E., Curtis R. '69
LA Δ Garber, James D. '66
LA E Champagne Jr., Leo P. '76
MEA Blackstone, Bradford Earl '91
Blackstone, Jill E. '92
Degon, Robert J. '66
Jones Sr., Jeffrey A. '75
Larson, Reginald E. '55
McBurnie, Jeffrey C. '82
McKusick, James E. '82
Musk, Ph.D., Jeffrey H. '86
Soini, F. Richard '72
MDA Capecci, Dennis W. '79
Chan, Louis A. '84
Frisco, Louis J. '49
Harris, Matthew S. '98
Rochkind, Allen '65
MDB Eberly, Steven C. '87
Jochum, Thomas A. '77
Law Jr., Preston E. '60
Mendoza, Donald C. '48
Perkins, Michael Joseph '95
Schaefer Jr., William J. '70
Seeley, Timothy D. '86
Tracey, John S. '74
Tregoning, Robert L. '87
Whitehead, Edward R. '62
MAA Eggimann, Wilhelm H. '54
MAB Charpie, David W. '82
Cox, Russell N. '49
Ditmeyer, Steven R. '63
Goldman, Barry '76
Hanpeter, Robert W. '48
Schaffer, Michael J. '63
Shinko, Martin S. '72
MAΔ Kurkowski, James F. '84
Shaer, Norman R. '58
Surtees, Robert E. '55
MAE Jurczyk, Thomas W. '71
Lichtig, John F. '83
Madden, Val F. '78
Presume, Hantz Antony '89
Travers, Harvey C. '48
Williams, Charles R. '53
MAZ Bak, Dennis C. '79
Burstein, Ph.D., Michael C. '64
Kopec, Thomas E. '80
Mathews, Archie '53
Rainville, Robert F. '68
MAΘ Schultz, Steven A. '82
Smith, Gerard P. '83
MI A Golden Jr., August '66
Nastas III, George '66
Ruhl, Scott Alan '88
Tscharner, Christopher G. '83
Woodruff, Paul H. '59
MI B Groeneveld, Gerald A. '63
Hutula, David N. '66
Leven, Peter Johannes '93
Mansfield, Michael G. '76
Whitman, Brian Edward '92
MI Γ Anderson, Richard W. '66
Berno, Jeffrey W. '63
Bloomer, Craig D. '80
Bloomer, Kristine K. '81
Caminer, Morris H. '50
Earl, George C. '66
Fertel, Howard K. '79
Friess, John G. '57
Gibbons, Harold M. '50
Grants, Valdis '64
Linnell, J. Scott '78
Lugten, John B. '76
Lust, Robert V. '78
Maier Jr., P.E., Edward L. '77
Maker, Pamela A. '81
Miller, Richard N. '67
Nicols, George '85
Pearl, John C. '61
Sherman, Larry G. '66

SECOND CENTURY CLUB, CONTINUED

Siewiorek, Daniel P. '68
Sivier, Kenneth R. '51
Smith, T. Murray '72
Stoddard, Frank J. '60
Ye, Eric T. '84
Young, John G. '39

MI Δ Di Cicco, Dominic A. '61
Marino, Joseph A. '72

MI E Mertz Jr., Harold J. '61
Siepierski, Michael A. '80
Zickafoose, Michael W. '97

MI Z Gomez, Lloyd E. '55
Nicosia, Peter J. '77
Scarlatelli, Michael G. '76
Zellner, Edward J. '75

MI H Harder, Shawn J. '80
Obudzinski, Gary T. '76

MN A Ball, William L. '70
Braaten, David L. '75
Chapin Jr., George G. '47
Olson, Daniel J. '85

MS A George, P.E., James F. '71
Mills, Marvin L. '65
Wilson, Robert R. '77

MS B Miles Jr., John H. '71

MO A Caruthers, James R. '69
Farrell, Adam John '99
Henderson, Betsy A. '84
Stiefermann, Michael C. '86

MO B Benson, William A. '77
Cawns, Albert E. '59
Edgington, Antony N. '51
Jenkins, G. Willard '59
Meyer, Gene R. '84
Schmidt, Thomas E. '70
Wilreker, Victor F. '72
Zimnick Jr., Harold E. '64

MO Γ Briner, Charles D. '52
Kilert, Albert H. '63
Mills, Robert A. '57
Wildermuth, Amy J. '94

MT A Moody, Thomas W. '49

MT B McDonnell, Kathleen G. '83

NV A Reynolds, Roger S. '65
Van Horn, Michael D. '76

NH A Charron, Ronald H. '64
† Herrin, Ned E. '50
Jarvis, John E. '79
Kieffer, Roger A. '61
Scharfe, Alan C. '78
Zecchini, Charles R. '50

NJ A Appuliese, Michael F. '72
Ciccolella, Sergio A. '72
Ehrhardt, William C. '68
Helfrich, John H. '50
Lipton, Sydney '50
Reinhardt, Gregory C. '65
Sussmann, Kenneth P. '72

NJ B Andre, Gerald R. '75
Palko, John R. '69
Plant, Stephen I. '65
Wolf, David '65

NJ Γ Branco, Maria D. '74
Gagliardo, Reginald S. '70
Goodrich Jr., Robert R. '70
Minardi, Vincent C. '66
Reitano Jr., Anthony J. '72
Rij, Jerry J. '72
Sulzberger, Carl L. '62
Sulzberger, Virginia C. '62

NJ Δ Wolff, Richard J. '72

NM A Havens Jr., Kenneth H. '78

NM B Busch, Robert D. '72
Welter, David D. '78

NY A Feuerstein, Stewart F. '80
Philipson, William C. '69
Silbert, Glenn R. '75
Zimmerman, Robert W. '77

NY B Demyanovich, Sara E. '85
Gorey, Anthony G. '84
Lee, Chung M. '85
Stanton, James W. '61

NY Γ Brown, A. Windsor '66
Buck, Frederick A. '76
Covello, Joseph '63
Curtis, Justin A. '60
Fredericks, Robert J. '48
Jordan, William E. '64
Law, E. Harry '62
Merdinger, Charles J. '45
Pennisi, Joseph Michael '89
Walczak, Dennis J. '76
Walter, Ret., John A. '60
Williams IV, Carter N. '66

NY Δ Alasti, Ali '84
Gordon, James P. '83
Reynolds, David A. '71
Scott, Russell C. '46
Sinclair, Leroy W. '66
Waring, Michael D. '65

NY E Pinnes, Edward L. '71
Rosen, Fredric K. '62

NY H Dicker, Daniel '51
Filipek, Stephan J. '82

NY Θ Donovan, Kenneth B. '78
Lester, John W. '52
Schwind, Daniel R. '76
Stone, Robert E. '76
Taylor, William L. '64

NY I Grant, Richard J. '88
Hauge, Kenneth '61
Jovanovic, Adrian Burton '89
Telesco, John C. '69
Warren, P.E., Willard L. '50

NY K Alcaro, Domenic J. '87
Isaacson, Morton S. '66
Levy, Cynthia A. '80

NY A Fillo, John P. '74
Ganetis, George L. '78
Monroe, Charles W. '53

NY N Darroch, Michael E. '84
Gluszak, Timothy J. '88
Havas, Donald W. '67
Lee, George C. '55
Weber, Thomas W. '53

NY Ξ Haller, Marc F. '85
Mercando, M.D., Anthony '76
Steinle, Kathleen S. '77
Storch, Florian J. '61

NY O Hofmann, Linda '79
Jahelka, Joseph R. '76

NY Π Drexel, Peter G. '69

NY P Faaland, Robert W. '77
Ward, Gary J. '90

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Daniels, P.E., Eric A. '85
Fitch Jr., Johnny E. '76
Minday, Richard M. '66
Skinner, James O. '73
White, Samuel E. '69

NC Γ Block, Norman G. '54
Board Jr., John A. '82
Chambers, William F. '60
Farst, Douglas E. '79
Flowers III, George H. '65
Moulton, Paul R. '80

NC Δ Decamillis, Clayton R. '79
Hollar, Donna A. '88

ND A Vastag, Harold J. '69

OH A Bondor, Paul L. '63
Brichford, Thomas K. '55
Fernbacher, John M. '62
Honious, Robert Todd '89
Zeis, John F. '62

OH B Allspach, Eugene R. '70
Best, Robert A. '55
Greene, Samuel J. '75
Hatch, Jeffrey A. '74
Lenz, Richard R. '66

OH Γ Au, Ralph D. '71
Hoover, Thomas E. '56
Joehlin, Stanley W. '60
Kirner-Pribe, Susan M. '85
Latimer, Trent W. '57
Magee, John V. '81
Nodes, P.E., Scott E. '84
Riedel, Kimberly S. '90
Steiner, William S. '63
Zeller, Hugh J. '66

OH E Bathen, Robert E. '57

OH Z Deblase, Michael L. '78

OH H Lauritsen, Terry N. '62
Nygaard, George M. '67
Shine, Andrew J. '46

OH Θ Crispino, David J. '80
Kelly, P.E., John B. '67

OH I Davis, J. Paul '76
Schilling Jr., Walter William '97

OH K Morrison, Donald Paul '89

OH Λ Murphy, Charles J. '77

OK A Lampl, Maurice B. '89
Spangler, Jon A. '90
Wolf, Jerald M. '88

OK Γ Sneed Jr., Elbert L. '79

OR A Robinson, Alan H. '56

OR B Buchanan, Marlowe J. '92

PA A Bradley Jr., Charles W. '51
Doumaux, Arthur R. '61
Hernjak, James Gregory '96
Hjorth, Beverly E. '79
Horger, Theodore V. '61
Leach, Jeffrey D. '77
Parsons Jr., Donald F. '70
Savage, Philip K. '72

PA B Cohen, Bruce A. '72
Hertneky, John A. '79
Ross, David S. '69
Thompson, A. Frederick '63

PA Γ Chan, Allen H. '82
Cooley, Wils L. '64
Husak, Alan D. '65

PA E Hartsel, James E. '62

PA Z Boron, John F. '53
De Maio, Joseph A. '75
Duda, George E. '77
Hill Jr., Albert M. '67
Hodson, William R. '67
Howe, Howard J. '63
Jastrzembski, Joseph S. '64
Kasoff, David '55
Sarraf, Steven S. '84
Silvasi, John J. '70

PA H Howes, Michael L. '75
McDonnell, Robert W. '48
Stiger, David L. '83

PA Θ Desmond, Thomas P. '68
McElhenny, James E. '70

PA Λ Andes, John A. '83
Brant, Arthur M. '78

RI A Campbell, Neal S. '68
Chorney, Paul '56
Olding, Duncan R. '55

RI B Fletcher, Gilbert A. '68
James, Charles F. '58
Mitnick, Margaret H. '85

SC A Davenport, Charles F. '79
Gachago, Njeri Muriithi '09
Scherer, John H. '65

SC B Feldmann, Andrew Russell '89
Prunty Jr., Robert W. '71
Skvoretz, Jonathan M. '95

SC Γ Burton, Kevin Lane '90
Edwards, Helen T. '57
Fralix Jr., James T. '59
Lindsay, Craig T. '86
Sullivan, Jack L. '79

TN A Cavender, James M. '66
Chambers, George P. '58
Henson, Joe M. '58
Jenkins, Ronald W. '72
Jennings-King, Sherry D. '93
King, Gregory T. '93
Peugeot, Richard S. '60
Plunkett, L. Alan '79
Snyder, Kevin Lloyd '93
Welch, David O. '60
Williamson, James M. '79

TN B Drago, Joseph A. '65
Macchio, Gregory J. '84
Petersen, Eric S. '84
Petersen, Stephanie O. '84

TN Γ Atchison Jr., Paul C. '66
Britton, Thomas C. '88

TN E Sanders, Darren John '96

TX A Badgwell, Thomas Alan '92
Bain Jr., P.E., Henry C. '80
Caudle, Brian H. '77
Glasow, Brian Scott '99
Hight III, Terry H. '70
Hugger, P.E., Bodin A. '56
Le Bleu, Robin B. '65
Marshall, James L. '72
Parma, George F. '85

TX B Landwermeyer, Thomas '50

TX Γ David, Anne W. '87
O'Dell, Stewart C. '78
Watts, Thomas L. '75

TX Δ Crosser, Robert E. '50
Deisler, Paul F. '46
Dokos, Nick G. '57
Dyson, Norman K. '60
Gray, Foster L. '53
Hillin, Thomas A. '69
Kunze, Glenn R. '77
Nuccio, Robert P. '51
Rueter, Curtis O. '86
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Nooyi, Raj K. '78

TX Θ Foster, Ottis C. '82

TX I Lopez, Norma J. '78

TX K Rogers, Decatur B. '67

TX Λ Perez, Romeo R. '82

UT A Dewey, William A. '67
Hayes, Robert D. '47
Spong, Robert N. '58

UT B Enke, Glen G. '62

VA A Colonna, James L. '65
Fox, William R. '71
MacKay-Smith Jr., A. '59
Price, Michael G. '74
Ring, Jessee B. '69
Stickle, Robert L. '54
Wyant III, Thomas R. '71

VA B Barnes, Edgar E. '68
Dalton Jr., Eddie G. '86
Dollard, Joseph S. '51
Gresham, James A. '83
Nay Jr., Marshall W. '63
Sloan, Forrest E. '83
Taylor Jr., John F. '83
Wayne, Jennifer S. '83

VA Γ Swats, Charles F. '74

WA A Cahill, Robert S. '72
McHenry, John P. '62
Oren, Kjell '79
Rosen, Donald G. '58
Searing, John E. '68
Simpson, David P. '76
Smith, Jeffrey F. '82

WA B Hudspeth, James Charles '88
Myers, Richard M. '80

WA Γ McCauley, Edward W. '53

WV A Bibbee, Dennis E. '75
Pellegrin, John D. '73
Rowe Jr., Eldridge E. '68

WV B Dehart II, P.E., Robert E. '72

WI A Diedrich, Donald L. '69
Martinson, Lloyd W. '57
Page, Christopher Scott '90
Pristelski, James S. '66
Sieker, Frederick A. '70
Tausche, Paul E. '48

WI B Bella, Robert A. '65
Graef, P.E., Luther W. '52
Hughes, Philip J. '66
Jilek, Carol B. '84
Lenz, Marsha J. '86
Mooney, Thomas J. '79
Panning, Martin H. '49
Wick, Paula B. '81
Wilhelmi, James J. '69

WI Γ Boehmer, Carolyn M. '82
Bomba, Steven J. '59

WY A Hill, Janet L. '95
Lester, Roger N. '87

FOUNDERS CLUB

AL A Fitzsimmons, Timothy E. '80
Rosser, Gregory K. '78

AL B Doughty, Ralph O. '61
Pearson, Marcus L. '63

AL Γ Fingar, Leigh '74
Purcell, George K. '74

AL Δ Fortune, Ph.D.,P.E., Juliana '01

AK A Miller, John M. '60

AZ A La Roche, David F. '86
Shaver, Frederick W. '55

AZ B Hislop, James S. '69

AR A Clark, Terence B. '56

CA A Chew, Richard S. '85
Griswold Jr., Thomas F. '72
Hong, Wilbur E. '80
Peschiera, Pablo J. '81

CA B Jensen, Pauline H. '77
Manatt, Stanley L. '55

CA Γ Bateman, Terry S. '58
Madden, Christopher J. '85
Nagel, John Frederick '91
Rassieur, Robert T. '79
Shocker, Allan D. '60

CA Δ Bates, John S. '65

CA E Hollar, Ray R. '78
Stone, Allan J. '58
Tamanaha, Howard S. '77

CA Z Bauerle, Richard D. '59
Breen Jr., Robert H. '71
Masnada, Dante A. '75
Sabbatini, Julian '68

CA H Bahr, Alfred J. '58

CA Θ Fuentes, Jorge S. '84
Hoekstra, Gerben N. '66

CA I Au, James T. '61
Kwong, Ray S. '65

CA K Kern, Jack C. '71

CA Λ Khalaf, Marwan Adel '92
Sanicky, Susan R. '72

CA M Clark, David James '99

CA N Pitzer, Allan G. '66

CA Ξ Steckel, David Edward '89

CA Π Crampton, Glen H. '71

CA Σ Black, Stephen H. '85
Booth, Andrew Joseph '08

CA Y Lindauer, John Arthur '90

CO A Benton, John H. '78
Stevenson, Thomas E. '80

CO B Brenner Jr., William O. '59
Davis, Gregg R. '77
Greene, Christopher S. '73
Hora, Keith Y. '87
Morgan, James I. '55
Olson, David R. '79
Walker, John Sherwood '53
Weber, Douglas C. '70

CO E O'Fallon, Sean Emmett '95

CT A Dranoff, Joshua S. '54
Feinman, David M. '49
Ljung, Michael Allen '92
Ronalds, Hugh C. '58

CT B Altschuler, Stephen '54
Berg, P.E., Kenneth P. '73
Rose, Glenda M. '81

DE A Pittenger, Michael T. '73
Tybout, Richard A. '43

DC B Kosnik, Cristine Josephine '95
O'Brien, Amy J. '87

DC Γ Evins, James B. '85
Greenwood, Sarah C. '06

FL A Cooper Jr., Wayne W. '81
Huggins, P.E., Jason A. '96
O'Steen, James K. '67

FL B Gatica, Rafael E. '80
Zhao, Weizhao '91

FL Γ Bowman, Harold J. '77
Mason Jr., Robert S. '77

FL Z Mazurek, David F. '82

GA A Ackert, Robert C. '69
Brush, Gary S. '80
Lee, George H. '70
Pipkins, Daniel Scott '88
Schreiber, Don C. '91
Shurbutt, James S. '75
Sullivan, Francis J. '86
Taylor Jr., George B. '75
Tyler, Stephen M. '84

ID A Beaudoin, Brian F. '81
Harris, Walter J. '82

IL A Allen, Charles H. '66
Allison, Herman D. '69
Drolen, Bruce L. '78
Drozt, Jennifer L. '92
Freeburg, James R. '70
Hang, Kenneth W. '66
Harvey, Thomas N. '55
Herning, Joel G. '69
Jones, Barclay G. '54
Kareken, Ronald S. '57
Kipp, Lyle D. '86
Michlovich, Michael S. '81
Pikna, Raymond J. '49
Ross Jr., William C. '86

IL B Kufta, Richard W. '77
Stocker, Danny L. '86

IL Γ Derlacki, Walter R. '45
Harley, Edward T. '49
Henze, Edward D. '50
Ho, Benjamin '87
Wright, Susan L. '74

IL Z Murray, Daniel A. '93

IN A Behr, Susan R. '88
Carbon, Max W. '43
Croop, Harold C. '70
Edelsohn, Charles R. '48
Harrod, Byron N. '71
Henley, Robert A. '49
Krochta, John M. '65
Mills, Michael S. '69
Pearson, James A. '55
Riley, Daniel W. '71
Russell, James Long '93
Rutz, Mark William '93
Schmertzler, Alvin L. '45
Schmidt Jr., John W. '73
Schott, Elizabeth Anne '66
Seefeldt, Waldemar B. '47
Southam, Robert E. '78
Stude, C. Ted '66
Vanderbilt, Vern C. '42

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FOUNDERS CLUB, CONTINUED

Wark Jr., Kenneth '50
Yokomoto, Charles F. '64
IN B Pauls, Jeffrey D. '79
Raff, Barry E. '67
IN Γ Crowley Jr., Richard D. '56
Makarewicz, Peter J. '73
Naimoli, Vincent J. '59
Silio Jr., Charles B. '65
Turek, Joseph A. '79
Turek, Mary Beth D. '79
Walsh, John S. '80
IN E Nagielski, Lawrence S. '81
IA A Anctil, Michael Joseph '08
Bartlett, Roger J. '64
Brackett, Robert C. '48
Chadly, Marcia R. '85
Hayes, John O. '66
Mehrdad, Mojgan '82
Neumayer, Robert '59
Rowe, Alvin G. '63
Sorensen, John A. '62
Stammer, Russell D. '79
Veenstra Jr., Henry R. '71
IA B Priester, Henry W. '83
KS A Obrien, Harry G. '59
Pack, Garrett E. '60
Rock, Brian A. '85
Vijgen, Paul '87
KS B Golobay, Gary L. '72
KY B Gray, John H. '75
LA A Bouvier Jr., Maurice J. '59
Robert, Stephen Douglas '03
LA Γ Sutton, Jerry K. '67
LA Δ Horton, Kenneth J. '79
ME A Fradette, Marc Y. '71
Priest, Peter H. '77
MD Δ Catlin Jr., John C. '69
Leith, Robert S. '51
Moran, Martin J. '96
Petersen, Randolph A. '77
Sniegowski, Gary H. '78
MD B Bohse, Michael E. '85
Cuesta, Ernesto '71
Gray, Donald L. '55
Heuckeroth, Deborah M. '88
Kulstad, M.D., Erik B. '92
Lawrence III, Joseph P. '68
Mitchell, Reginald H. '72
Ornett, William S. '59
Paulhus, Norman G. '70
Roberts, Victor D. '64
Rosen, Robert H. '65
Sennewald, Perry F. '53
Van Eepoel, John Michael '00
MA A Franke, Gene L. '73
Kerr, William A. '60
MA B Adcock, USA Ret., Thomas '63
Arnn, Edward L. '64
Bangser Jr., William '48
Baxter, Gail D. '74
Evans, Lary L. '67
Goren, Leora Michelle '91
Hoover, Lloyd N. '46
Johnson, Timothy L. '68
Margulis, John R. '54
Peak, John C. '62
Post, Allen E. '66
Schreiber, P.E., Robert P. '75
Seagle, John P. '55
Shedd, Walter M. '66
Strause, Philip E. '65
Tou, Frederich N. '81
Weston, Theresa A. '80
Zukowski, Charles A. '81
MA Δ Anderson, Thomas T. '57
Hunt, Robert F. '59
Levin, Neil '80
Maltbie, Catherine Vadala '86
Orenstein, Mark A. '66
Stanfield, Robert B. '53
Young, Wendell S. '45
MA E Field, Leslie A. '83
Keys Jr., Lloyd S. '70
Lockhart, Newton F. '54
Schoenfeld, Richard Alan '71
MA Z Beerman, Maxim V. '86
MI A Burdette, William A. '66
Hole, Kevin Michael '90
Mates, Robert E. '86
Meckler, Carrie Lynn '98
Salisz, Albert A. '75
Su, William Perry '90
MI B Barnhart, Kent T. '83
McNeil, Michael T. '86
Meiseiman, Herbert J. '62
Zollinger, Howard A. '51
MI Γ Ash, Russell A. '51
Boettner, Donald W. '62
Byce Jr., Richard C. '51
Dalby Jr., John C. '68
Foulke, James A. '59
Fox, Michael T. '73
Frantz, John A. '75
Gross, Paul H. '83
Jacobi, James G. '75
Kisak, Robert P. '82
Kroll, Charles E. '56
Mahowald, John E. '77
Malloch, Charles D. '57
Myers, John W. '87
Ori, Luigi '71
Passman, Richard A. '44
Samborn, James A. '70
Santini Jr., John Thomas '94
Upham, Donald L. '58
MI Δ Renauer, Joseph G. '74
Trama, Louis A. '73
Youkstetter, Frederick H. '57
MI E Bolgiani, Giovanni '70
Cleary, Gary K. '71
Gaunt, Frederick W. '67
Grant, Robert M. '75
Opiela, Kenneth S. '78
MI Z Tyckoski, Paul J. '76
MI H Johnston, Richard '78
Kipp, P.E., Eric Michael '98
Longenecker, James R. '94
Noggle, Francis E. '70
Wilkinson, James D. '71
MI Θ Dittrich, Gerald S. '86
Merrick, Nelson J. '71
MI K West, Michael David '90
MN A Betterman, Lanny Ray '92
Bratt, Robert W. '41
Cavanagh, Stephen P. '89
Larson, Michael L. '59
Martin, Bruce Douglas '97
Prickett, Gordon O. '58
MS A Corley, Katrina O. '89
Dawsey III, P.E., Joseph '72
Miller, Elton R. '70
MO A Sandridge, Jack R. '65
Taylor, James S. '77
MO B Bach Jr., Wilbert E. '50
Kopsky Jr., P.E., Raymond '84
Kyser, Dale A. '83
Oberschelp, William F. '53
Ratkey, Craig M. '80
Riley, Kenneth G. '56
Sedovic, Pete S. '81
MO Γ Ladewig, Scott James '90
Mitzel, Kevin R. '95
Patterson, James Glen '99
MT A Egeland, Monte D. '81
MT B Jackson, Darron B. '86
NE A Hofer, Diane J. '82
Sneed, Kathryn K. '80
NH A Bean, Stanley O. '57
NH B Cloyd, Joseph R. '02
NJ A Boardman, Thaddeus J. '52
Haid, David A. '57
Jones, E. Paul '77
Neill Jr., William J. '47
Rhyner, Frederick C. '75
Wolosky, Irwin S. '68
NJ B Hershkowitz, Benjamin '90
Nelson, Bruce V. '49
NJ Γ Groenenboom, Bastiaan '69
Gupta, M.D., Punit K. '96
Kobylarz, Thaddeus J. '58
Lerner, Marshall A. '62
Meany Jr., Thomas J. '66
NJ Δ Aughenbaugh, Jason M. '01
NY A Moody, J. Roger '58
Richter, Stephen L. '63
NY B Leight, David M. '75
Rubinstein, Ian Z. '69
NY Γ Beesley, Arthur H. '75
Foust Jr., Tilman H. '68
Gordon, Benjamin Bruce '97
Hruda, Prokop V. '83
Ives, Jon R. '61
Kotzalas, Nick '60
Lenney, Robert V. '62
Lyden, Michael J. '78
Smith, Charles A. '81
Smith Jr., Martin G. '59
Walter, Robert W. '64
White, Andrew H. '71
NY Δ Batson, Philip E. '70
Beaubien, Robert Patrick '90
Jureller, Steven F. '87
Lazar, Dale S. '74
Price, Richard H. '65
Wiley, David R. '82
NY E Dubey, Michael B. '47
NY Z Cha Fong, Maurice W. '62
Pollack, Martin L. '72
NY H Davidoff, Donald A. '72
Rubin, David K. '59
Stecher, Leonard S. '44
NY Θ Beckeman, William J. '79
Carley, William J. '46
Free, Albert P. '78
Hunt II, William E. '59
Mayotte, P.E., Mary F. '78
Wiggin, Robert N. '79
NY I Ahlman, Lars T. '71
Ispass, P.E., Alan B. '74
NY K Hackett, Emily '94
Krosse, John W. '46
NY Λ Conn, Robert W. '64
Coyle, John G. '70
Passut, Charles A. '67
NY M Mercer, Barton P. '76
NY Ξ Glynn, Sean Francis '97
Green, Gary P. '71
Stabile, Paul J. '79
NY Π Conzola, Vincent C. '88
Shakshober, Douglas J. '85
NY P Rossin, Alan R. '79
NC A Bennett Jr., C. Leonard '63
Keith, Alan R. '82
NC Γ Davidson, P.E., Lindell A. '49
Schubert, Derek Kingsley '96
NC Δ Nixon, Robert D. '82
NC E Craft, William J. '63
ND A Cofell, Jay W. '78
McCormack, Fred E. '76
Schmidt, Wayne J. '50
OH A Bacevice Jr., Anthony E. '70
Berman, Barry L. '64
Hartsell, Debra Lynn '90
James, Michael D. '91
Litzler, Thomas C. '53
Lund, Jeffrey W. '69
Ricart, D. Glenn '71
Whitney, Gina M. '80
OH B Cook, Kenneth F. '74
Harris, Neil H. '79
OH Γ Harris, William E. '58
Johnson, Jeffrey C. '77
O'Neal, Joe E. '55
OH Δ Hupp, William M. '69
Kizlik, Lawrence James '90
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OH E Bennett, William R. '80
Susinskas, Kestutis P. '72
OH Z Jones, Barbara J. '82
Spicer, Alvin L. '67
Woeller, Arthur C. '70
OH H Manter, Joseph M. '74
Merkle, Laurence D. '92
OH I Hurtig, Juliet H. '91
Hurtig, Michael L. '91
OK A Cramer, Karen F. '80
OK B Kouba, Gene E. '86
Petruska, Gregory J. '80
OR A Allen, Scotty R. '82
Chapman, James A. '58
Gibbs, Bruce F. '79
Jenks, Steven G. '73
PA A Albright, Carl H. '55
Busch, Kenneth J. '51
Frey, P. Wayne '51
Johnson, Robert S. '80
Swartwout, John B. '73
PA B Burley, Brendon Joseph '05
Godlesky, Mark A. '87
† Graber, Ralph Carl '40
Martignetti, Joseph F. '78
Trocchio, James T. '82
PA Γ Bloom, Jeremy A. '73
Halli, Robert W. '36
PA Δ Berger, Bruce S. '54
Cavallaro, Joseph R. '81
Fishstein, Bruce L. '83
PA Z Boyle, Elmer H. '59
Collins, Harley L. '48
Georges, George C. '63
Piecukonis, Bruce A. '81
Shaton, George '68
PA H Clarke, Charles W. '86
Coulter, David J. '74
Pedersen, Neil J. '74
PA K Potthoff, Robert E. '56
Siddiqui, Faruq M. '76
PA Λ Leiss, Wayne G. '76
MacCarone, David John '95
PR A Sanchez, Hector L. '76
RI A Salmon, Edward D. '66
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Equistar Chemicals, LP
Ericsson Inc.
Erie Manufacturing Company
Esterline Technologies
Exelon
Expedia Inc.
Fair, Isaac and Company Inc.
Fannie Mae Foundation
FleetBoston Financial Corporation
Fluke Networks Inc.
FM Global Foundation
Freeport McMoRan Foundation
The Gap Inc.
Gartner Group
GE Foundation
Genentech
General Reinsurance Corp.
General Signal
GenRad Foundation
Goodrich Foundation
Google
Guidant Foundation
Harcourt General Inc.
Hewlett Packard
Household International
Illinois Tool Works Foundation
IMCERA Group Inc.
IMO Industries Inc.
ING Foundation
Ingersoll-Rand Company
Ingredion, Inc.
Instron Corporation
Integrity Applications Incorporated
The J.P. Morgan Chase Foundation
The James River Corp. Foundation
Jim Beam Brands Co.
Johnson Controls Foundation
Juran Institute Inc.
Kellogg Brown & Root
Kellwood Company
Kimberly-Clark Foundation Inc.
Kraft Foods
Lennox International Inc.
Leo Burnett Company Inc.
Loiederman Soltesz Associates Inc.
The Lubrizol Foundation
LyondellBasell
M.W. Kellogg Company
M/A Com Inc.
Macy's Foundation
Mallinckrodt Speciality Chemicals Co.
Markman Inc.
Massachusetts Financial Services Co.
Massachusetts Mutual Life Insurance Co.
May Department Stores
McDonald's Corporation
McGraw-Edison Company
Meadwestvaco Foundation
Metso Automation
Microsoft Corporation
MidAmerican Energy Company
The Millipore Foundation
Mobil (Retirees)
Motorola Foundation
Motorola Mobility
National Instruments
NEPERA Inc.
Network Associates
Newmont Mining Corporation
Nissan North America Inc.
Nokia Inc.
Northrup Grumman Foundation
NOVARTIS
NRG Energy Inc.
Nuevo Energy Company
Occidental Petroleum Corp.
Owens-Illinois
Pacific Enterprises
Pathfinder Global Group Inc.
Pella Rolscreen Foundation
The PepsiCo Foundation
Petrotech Inc.
The Pew Charitable Trusts
Pfizer Inc.
Pitney Bowes
Polaroid Foundation Inc.
Potash
Power & Telephone Supply Co.
Progress Energy Inc.
QUALCOMM
Quantum Chemical Corporation
R.J. Reynolds Tobacco Co. Foundation
Ralston Purina Company
RELTEC Corporation
Rexnord Foundation
Roche Colorado Corp.
Rockefeller Family & Associates
Rockefeller Financial Services Inc.
Rogers Corporation
Rolm Corporation
SPX Foundation
Saint-Gobain Corporation Foundation
Schneider Electric/Square D Foundation
Sempra Energy
Shaklee U.S. Inc.
Shell Oil Company *
Siemens
Silicon Laboratories Inc.
Southern California Gas Company
St. Jude Medical
Stanley Black & Decker
The Sun Microsystems Found. Inc.
TCF Foundation
Teledyne Technologies Inc.
Tellabs Operations Inc.
Texas Instruments Foundation
Toyota Technical Center, USA Inc.
Transamerica Corporation
TransCanada PipeLines
Tribune Company
Turner Industries, Ltd.
Tyco
TyCom (U.S.) Inc.
UFE Inc.
Unilever U.S. Foundation Inc.
Union Pacific Corporation
United Technologies
The UPS Foundation
Verizon Foundation
Virginia Power/North Carolina Power
W.K. Kellogg Foundation
Wachovia Foundation
Washington Mutual
Waste Management Inc.
Wheelabrator Air Pollution Control Inc.
Williams
Wisconsin Energy Corp. Found. Inc.
WRC Inc.
Xcel Energy Foundation
XE Corporation
Xerox Foundation
Xilinx
Yarway Corporation
Zeon Chemicals L.P.

Profiles in Leadership #2

Norman R. Augustine: Doing the Right Thing

From accidental early experience to later study of great leaders, Norman R. Augustine, M.S.E., New Jersey Delta '57, has focused both on doing the right thing, and doing the thing right.

by **Trudy E. Bell**

"Most of what I learned about leadership came from team sports or the Boy Scouts," stated Norman R. Augustine, whose career has included being Under Secretary of the Army, Chairman and CEO of Lockheed Martin Corp., Chairman of the American Red Cross, National President of the Boy Scouts of America, and Chairman of the National Academy of Engineering. Augustine has also led several major commissions, the most prominent resulting in 2007 in the monumental analysis of U.S. education and technological competitiveness *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future*.

What does it mean to be a leader? In this series "Profiles in Leadership," Tau Beta Pi is exploring that essential question through the lives of eminent engineers who have attained leadership positions in their respective fields. The first profile—of Maria Klawe, President of Harvey Mudd College—appeared in the Fall 2012 issue of The Bent.

"I was not an extraordinary athlete but I loved sports and always had a ball in my hand," Augustine explained. "In sports, you can learn key life lessons—about losing and recovering, about winning but not getting carried away, about the importance of teamwork, morale, and sportsmanship. And you can make mistakes in an environment where failure doesn't have disastrous consequences. People don't die, as they might from a decision you make in the army."

Augustine meets with President Bill Clinton at the White House during Augustine's 1991-2001 tenure as chairman of the American Red Cross. *Photo: White House*

Born in Denver in 1935, Augustine loved the mountains of Colorado. He started camping and hiking with the Boy Scouts at age nine and, by his teens, was working summers at a Boy Scout camp leading nature hikes. By age 16, he had performed all the work required to become an Eagle Scout—the highest rank, attained by fewer than one in 20 Scouts. "It's amazing how many leaders in corporations, government, and nonprofits are also Eagle Scouts," Augustine remarked.

An Accidental Leader

Augustine attended East High School in Denver, a very good, large public school with nearly 800 students in each grade. He did well in math, loved taking clocks apart, enjoyed woodworking and building things with his hands, and excelled at all academic subjects. One day when he was a junior, a teacher he did not know called him to his office. "Justin W. Brierly was a lifelong bachelor who got a kick out of seeing how many East High School students he could get admitted to Ivy League colleges," Augustine recalled. Brierly handed him applications to Williams College and to Princeton University. When young Norm protested his family could not afford either, Brierly replied that if he got in, the college would

Augustine, chair of the Human Space Flight Review Committee in 2009, makes a point during a public meeting in Washington. He has chaired many such blue-ribbon panels. *Photo: NASA*

pay his way. Someone asked his intended major. Because of his love for the outdoors, Augustine thought of becoming a forest ranger, but neither school offered forestry. "I asked: 'What would be like forestry?' The person suggested geological engineering. I had never even met an engineer, let alone a geological engineer, but that's what I wrote on the application."

Accepted by both institutions with full tuition paid, Augustine chose Princeton. A year later, when returning to Princeton on a midnight train from a date in New York City, an older classmate—also from East High—on the same train asserted that aeronautical engineering was the big up-and-coming field. "He was so compelling that on Monday I switched my major," Augustine said, "although I was scared to death I was not up to it because it was considered by many to be the toughest course in Princeton." Despite his fears, he received his BSE magna cum laude in 1957, and his MSE from Princeton in 1959 and was elected to both Phi Beta Kappa and Tau Beta Pi.

Augustine said: "Princeton didn't have a chapter of ΤΒΠ when I graduated so it was several years after graduation that I officially became a member."

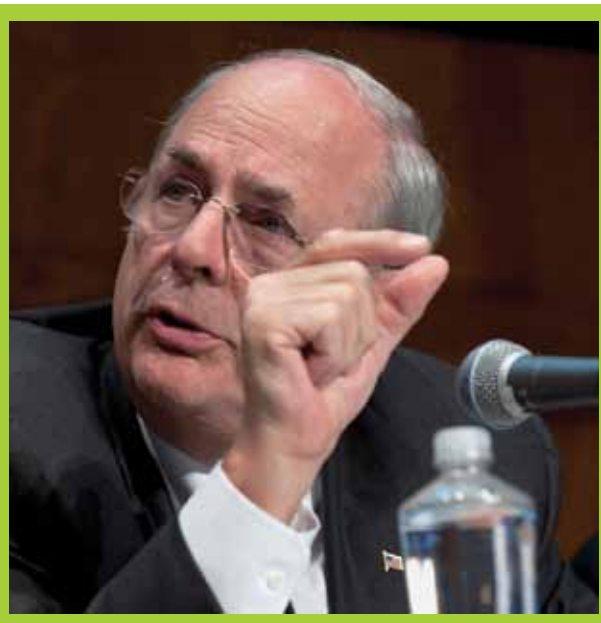
Talk about lucky timing. The National Aeronautics and Space Administration (NASA) had been formed eight months earlier, a year after the USSR had launched Sputnik I. Engineers were in high demand. When Augustine applied to the aircraft division of Douglas Aircraft in Santa Monica, he was assigned to work in research in the missiles and space division. "I loved research," he recounted. "Everyone working in missiles and space technology was young. People would come to me with questions, and I would do my best to help. Soon I was put in charge of a design group. Before I knew it, I was made a section head, then program manager, then chief engineer, and so it went. Quite by accident, I found myself leading others."

Indeed, looking back, Augustine reflected, "My life was one huge accident! I never realized until recently that I never had a grand plan. I simply had a lot of interests. I also focused on what I was doing, not on how to advance." He is convinced that "the best way to get ahead in a career is NOT to try to get ahead. Instead, do what you are doing the best you know how, and opportunities will follow. You'll be best at something you like, so choose something you love."

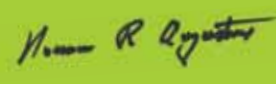
'That's How It's Done Here'

Once finding himself at the helm, however, and being an avid reader of biographies and history, Augustine began studying notable leaders to learn what made them great. He observed certain commonalities: "They were people of great character and high ethical standards. They worked hard. They were selfless—they did not think about themselves and their careers, but of the mission to be accomplished. They looked out for others, and treated everybody alike. Most importantly, as actions speak louder than words, they set a personal example."

In Augustine's view, establishing an organizational culture of character and integrity is paramount. After all, he asked, are employees "going to follow somebody they don't trust? In a dictatorship, you can force people to do what you



This Leader In Brief
Full professional name: Norman Ralph Augustine
Current position: Volunteer
Birthplace: Denver, CO
Highest degree: M.S.E., Princeton University, 1959, Aeronautical Engineering
Major career highlights: Douglas Aircraft 1958–1965 reaching Chief Engineer; Assistant Director, Defense Research and Engineering, Office of the Secretary of Defense, 1965–1970; Vice President, LTV Aerospace, 1970–1973; Assistant Secretary of the Army (R&D), 1973–1975; Under Secretary of the Army, 1975–1977; with Martin Marietta Corp., which in 1995 became Lockheed Martin Corp., 1977-1997, became President, then Chairman and CEO; Chairman, American Red Cross, 1991–2001; National President, Boy Scouts of America (1994–1996).
Board memberships: Black and Decker (1997-2010), Lockheed-Martin (1986-2005), Conoco-Phillips (1989-2006), and Proctor and Gamble (1989-2007).
Honors: Twenty-nine honorary doctorates; awards, including the National Medal of Technology by President Clinton (1997); Distinguished Public Service Award of the Joint Chiefs of Staff (2000); Distinguished Civilian Service Medal (the Department of Defense's highest civilian decoration) five times; the NASA Distinguished Public Service Medal (1997); elected to Eagle Scout Hall of Fame, 1998.
Greatest accomplishments: "Helping raise a wonderful family, traveling in 111 nations, and standing on both the North and South Poles."
Books published: *Augustine's Laws,* 1986; *The Defense Revolution* (with Kenneth L. Adelman), 1990; *Augustine's Travels,* 1997; *Shakespeare in Charge* (with Adelman), 1999.
Family: Wife Margareta Engman of Sweden (married 51 years); son Gregory E. (deceased) and daughter René I.
Hobbies: Hiking, tennis, photography, woodworking, writing, reading, stamp collecting, "building fancy dollhouses from scratch," and spending time with grandchildren.
Favorite books: "I love biography and history, but I hate science fiction." Favorites include *The Count of Monte Cristo* by Alexandre Dumas; *The Rise and Fall of the Third Reich* by William L. Shirer; Winston Churchill's books on history; Scot Turow's legal thrillers; *The Code Breakers* by David Kahn.
Personal motto: "Motivation will beat mere talent almost every time."
If you could do one thing over: "I'd be less cautious. You can do a lot more than you think you can. You've got to be willing to fail, and I was too often afraid to fail."



Papua New Guinea tribesman impresses Augustine with his phenomenally accurate archery technique.

Augustine and wife Meg celebrate their 50th wedding anniversary on the Great Wall of China, with daughter René, son-in-law Mark Alarie, granddaughter Isabella and grandsons Christian and Alexander.

Augustine at work on a 1:24 scale model of the White House, complete with electricity and working dumbwaiters, his current leisure-time project. "I'm sure I worry the Secret Service," he laughs. "Whenever I visit the White House, I spend time staring at window frames or stairs to make sure I get details right!" *Photo: Meg Augustine*

want done, but that's not leadership." In his experience, a leader sets a tone from the top. "Smart people come into an organization, look around, see that those in authority don't cut corners or behave unethically, and think 'that's how you do it around here.'"

As an example, he cited an economically difficult time around 1984, just after he was made President of Martin Marietta Denver Aerospace. It was imperative for the company to reduce expenses. Obvious savings could be realized if managers stopped flying first class and started taking coach. "But people were working long hours and company philosophy was we hire first class people and treat them first class, so I hated to lay this on them," Augustine recounted. So without any fanfare or announcement, he personally began flying coach. Observing this, soon other managers followed suit. To everyone's amazement, more than savings resulted from flying coach: "It put our company's leaders back with our customers, giving them hours on flights to get better acquainted and discuss issues," Augustine recounted, "while all our competitors were isolated up front in first class!"

Augustine on ΤΒΠ:
"I have found that membership in Tau Beta Pi is sort of a 'Good Housekeeping' seal for engineers. When I run across a member I am pretty sure they are a good engineer. Over the years I have particularly enjoyed the publications and interactions made possible with other members. I am particularly proud that my son was also a member."

Later, as CEO of Lockheed Martin, whenever he talked to a group of employees, he emphasized three points: Act ethically, take care of customers, treat everyone with respect. "I never mentioned profit—to the chagrin of our Wall Street bankers," he remarked. "I believe if you get those three main things right, profit will take care of itself."

The Power of Convincing

How different is leading corporations versus military organizations versus nonprofits? "The fundamentals of leadership across all three are surprisingly similar," Augustine observed. The key difference is tactics. "In the uniformed military, people respect orders. In nonprofits, you can only lead by convincing. In a corporation, you do something in between."

From his own experience, however, he feels that convincing is the most powerful. "In all three, you want to convince people why it's important to reach a goal, and then let them figure out how to do it. You want to create an environment where everyone can excel and contribute. For one thing, everyone knows how to do their own job better than you know how to do their job. Plus, you want them to internalize your values, so they can persevere without you."

As an example, he cited a time when Lockheed Martin was preparing a bid for a major fixed-price contract for manufacturing a tactical missile, in which competitors were to submit sealed bids to the Federal government; the low-

est bidder would win the job. Their cost estimate was just completed when an envelope arrived from an anonymous, presumably disgruntled employee at a competing company, disclosing the competitor's bid. Lockheed Martin employees realized that if they shaved a little off, they could underbid the competitor and win the contract. But they didn't. Lockheed Martin submitted its original bid to the Federal government.

And it lost the job. "But the employees did the legally and ethically right thing!" Augustine exclaimed. "More importantly, they did it without consulting me! That reveals the power of setting organizational culture. I hate losing. But I'd rather lose than cheat."

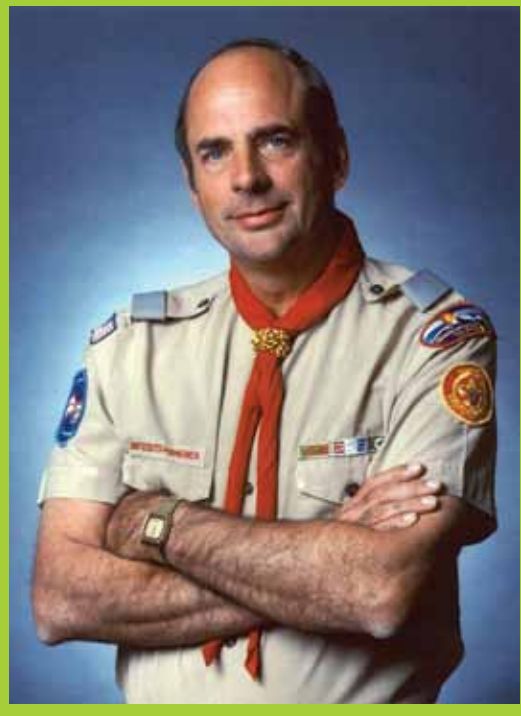
Engineering as Preparation

Engineering is "the best undergraduate education you can take to prepare for virtually any career," declared Augustine. "It is also an enormous help in any leadership position, because as a rule, engineers work hard, think analytically, are organized and disciplined, and don't cut corners—after all, you can't cheat Mother Nature!"

However, the biggest failing of many undergraduate programs in engineering, he feels, is their lack of liberal arts. "Engineers today need courses in economics and history nearly as much as they need thermodynamics. I was fortunate to study engineering in a liberal arts university, so I was required to take classes in literature, philosophy, and art—which lend different and valuable perspectives. There I also learned to write. Those things are essential to good leadership."

Today, six years after the 2007 publication of the *Gathering Storm* report, Augustine is even more concerned about the quality of U.S. K-12 education. Worse, he sees an additional cloud darkening the horizon.

"Today our universities are greatly challenged," he pointed out. "Throughout the 20th century, our universities were our competitive advantage. When writing our original report, it never occurred to us they could be endangered. But with the collapse of the economy in 2008, states have slashed their support to our great public universities, faculty salaries have declined, and faculty are being attracted abroad in a big international competition for talent. Our nation must reverse this if we are to continue to lead."



From top: Wife Meg holds the Bible as Augustine is sworn in as Under Secretary of the Army in 1975 by then Secretary of the Army Martin R. Hoffman. *Photo: U.S. Army.* Augustine was president of the Boy Scouts of America, 1994-96. *Photo: BSA.* Augustine arrives on King George's Island as part of a mission to the South Pole and elsewhere last year when he chaired a 12-member panel for the White House and National Science Foundation to examine U.S. logistical capabilities in Antarctica.

Trudy E. Bell, M.A., *(t.e.bell@ieee.org, www.trudyebell.com*, and she now Tweets *@trudyebell*), is senior writer for the University of California High-Performance AstroComputing Center *(http://hipacc.ucsc.edu/)* and a contributing editor for *Sky & Telescope* magazine. A former editor for *Scientific American* and *IEEE Spectrum* magazines, she has written a dozen books and nearly 500 articles. During 2013, she is running a centennial weekly research weblog 'Our National Calamity': The Great Easter 1913 Flood at *http://nationalcalamityeaster1913flood.blogspot.com/*. This profile is her 19th feature for The Bent.

SPOTLIGHT

Billion Dollar Verdicts
A federal court has awarded $1.17 billion to Carnegie Mellon University after a jury's unanimous verdict found that Marvell Technology Group sold, without a license, billions of semiconductors using technology developed at the university. The award is one of the largest in a patent infringement case and came soon after a $1 billion verdict awarded to Apple over its smartphone design.

The jury found that Marvell infringed on patents built on the work of CMU engineers that increased the accuracy with which hard-disk drive circuits read high-speed magnetic disks. Marvell argued that the method was subject to an earlier patent, acquired about 1995.

Hiring Foreign Scientists
The U.S. military should consider revising rules that exclude hiring foreign-born scientists and engineers, and make its work more attractive to potential employees, said a new study on future workforce needs.

There is broad agreement that first-rate scientists and engineers helped make the U.S. military one of the world's most potent, notes the report from the U.S. National Academies' National Research Council and the National Academy of Engineering that was requested by the Department of Defense.

But that edge has become harder to maintain. The pace of technological innovation has quickened, security threats have shifted, and competition for workers has globalized. At the same time, an aging U.S. population means that many Cold War era DOD researchers are nearing retirement, and fewer potential replacements—students who have the U.S. citizenship that would qualify them for a job in the military—appear interested in going into STEM fields.

"Sea Turtles" Homing In
Almost 200,000 Chinese students joined North American universities in the last academic year, an increase of 23% from the previous year, according to the Institute of International Education. The 764,321 students comprised 25.4% of international students.

According to *The National Journal*, the Chinese call them "sea turtles," the lucky few who go abroad—often to the U.S.—for education and then return with better English and a broader cultural perspective to get good jobs with Western companies. The nickname comes from sea turtles returning home to lay eggs for the next generation.

The biggest increase in international students was a 50% rise in those from Saudi Arabia—up from 22,704 in 2010/11 to 34,139 in 2011/12.

Doctorates Trend Up
Twice as many women received engineering doctorates in 2011 (2,088) than in 2002 (1,004), according to figures compiled by the ASEE. In 2011, some 21.8% of the 9,582 engineering doctorates were awarded to women.

The number of degrees remained steady from the previous year increasing only by 32 degrees.

Year	Doctorates to Women	Percentage to Women
2011	2,088	21.8%
2010	2,056	22.9%
2009	1,928	21.2%
2008	1,913	21.1%
2007	1,877	20.8%
2006	1,690	20.2%
2005	1,345	18.3%
2004	1,176	17.8%
2003	1,018	17.4%
2002	1,004	17.4%

Some 83,001 BS degrees were awarded in 2011, adds ASEE. These recent totals are the highest since the late 1980s.

Enrollment trends indicate that degrees should increase over the next several years.

Year	Degrees Awarded
2010-11:	83,001
2009-10:	78,347
2008-09:	74,387
2007-08:	74,170
2006-07:	73,315
2005-06:	74,186
2004-05:	73,602
2003-04:	72,893
2002-03:	71,165
2001-02:	66,781

PEOPLE

Timothy J. Anderson, Ph.D., *Iowa Alpha '73*, has become dean of

the college of engineering at University of Massachusetts at Amherst. He was a distinguished professor of chemical engineering at the University of Florida, where he had been on the faculty since 1978. Anderson also directed the Florida Energy Systems Consortium, which was created by statute to promote collaboration among the state's 11 public universities and conduct energy research, education, outreach, and technology commercialization.

Leslie K. Guice, Ph.D., P.E., *Louisiana Gamma '78*, is to be the new

president of Louisiana Tech University. He began his career at Tech as an assistant civil engineering professor, and later became dean of the combined college of engineering and science. In 2004, Guice was tapped as Tech's vice president of research and development, and he became executive vice president in 2012. He will replace longtime Tech president **Daniel D.**

Reneau, Ph.D., *Louisiana Gamma '63*, who is retiring.

James H. Garrett Jr., Ph.D., P.E., *Pennsylvania Gamma '82*, has become dean of Carnegie Mellon University's college of engineering. A member of the faculty since 1990 and a Carnegie Mellon alumnus, he was head of the department of civil and environmental engineering and co-director of the Pennsylvania Smarter Infrastructure Incubator.

Sarah A. Rajala, Ph.D., *Michigan Beta '74*, has been named dean of the college of engineering at Iowa State University on April 1, 2013. She has been dean of engineering at Mississippi State University since 2008 and previously was a department chair and associate dean there. Rajala chairs the Global Engineering Deans Council and is a former president of the American Society for Engineering Education.

Ian M. Robertson, Ph.D., *Illinois Alpha '83*, has been selected as the new dean of the college of engineering at the University of Wisconsin–Madison. He has been director of the National Science Foundation's division of materials research and headed the University of Illinois' department of material science and engineering from 2003 to 2009. Robertson earned a doctorate in metallurgy from Oxford University after graduating from Scotland's University of Strathclyde.

FACILITIES

Critical Materials Research
A team led by the Ames Laboratory will receive up to $120 million to establish an energy innovation hub which will develop solutions to domestic shortages of rare earth metals and other materials critical for U.S. energy security. The laboratory is located on the **Iowa State University** campus.

The U.S. Department of Energy has announced the award, over five years, for the Critical Materials Institute, which will bring together leading researchers from academia, four Department of Energy national laboratories, as well as the private sector.

The DOE said rare earth metals and other materials are necessary to make wind turbines, electric vehicles, advanced batteries, and other products needed for energy and national security. Rare earth minerals in demand for these products include dysprosium, terbium, europium, neodymium, and yttrium.

Online Program Launched
A consortium of U.S. universities are launching a new online course program next fall in which undergraduate students can tap into live classes from participating schools across the country.

The New York Times reported: "Semester Online will be operated through the educational platform 2U, formerly known as 2tor, and will simulate many aspects of a classroom.

Students will be able to raise their hands virtually, break into smaller discussion groups, and arrange and hold online study sessions. The virtual classroom is a cross between a Google+ hangout and the opening sequence of 'The Brady Bunch,' where each student has his or her own square, the equivalent of a classroom chair."

Schools in the consortium include **Duke University, Northwestern University, University of Notre Dame, University of Rochester, Vanderbilt University** and **Washington University** in St. Louis.

Morgan State University's school of engineering has inaugurated the Center for the Built Environment and Infrastructure Studies (CBEIS). This is the new home of its departments of civil engineering and transportation studies, as well as the school of architecture and planning.

The 125,000-square-foot, $67-million, state-of-the-art facility will house research and instructional programs in a highly cooperative and collaborative setting.

The building is equipped with innovative technologies such as 3D projectors, an earthquake simulator, solar panels, and an architecture studio with three high-quality printers.

University of Louisville's school of engineering has received an in-kind grant of software valued at $427 million from Siemens PLM Software that will allow students to use the same technology as a wide variety of industries.

Using the PLM (product lifecycle management) software throughout the curriculum should enable students to increase their capabilities through learning how design, simulation, tooling, manufacturing and disposal are connected and interdependent.

Engineering dean **Neville G. Pinto,** Ph.D., *Ohio Beta '80*, called the software grant "an excellent example of collaboration between industry and academia to prepare a globally competitive engineering workforce."

Brain Ticklers

RESULTS FROM FALL 2012

Perfect

*	Fenstermacher, T.Edward	MD	B	'80
*	Griggs, James L., Jr.	OH	A	'56
	Jones, John F.	WI	A	'59
	Spong, Robert N.	UT	A	'58
	Stribling, Jeffrey R.	CA	A	'92
	Voellinger, Edward J.	Non-member		

Other

	Alexander, Jay A.	IL	Γ	'86
	Andersen, Devin	6th grade		
	Andersen, Meaghan	6th grade		
	Andersen, Ryan	6th grade		
	Aron, Gert	IA	B	'58
	Bilodeau, Robert R.	ME	A	'91
	Bohdan, Timothy E.	IN	Γ	'85
	Bremner, Christopher J.	CA	M	'14
	Bremner, David	Father of member		
	Butler, Holly	6th grade		
	Couillard, J. Gregory	IL	A	'89
	DiRe, Peter	6th grade		
	Doniger, Kenneth J.	CA	A	'77
	Drango, Lindsay	6th grade		
	Fanelli, Anna	6th grade		
	Gaffney, Caitlin	6th grade		
	Grewal, Rashi	NJ	Γ	'09
	Grimes, Emma	6th grade		
	Gurin, Ilya V.	CA	A	'07
	Handley, Vernon K.	GA	A	'86
	Hedegard, Alan H.	IN	A	'64
	Hoyt, Joseph	7th grade		
*	Janssen, James R.	CA	Γ	'82
	Jenneman, Jeffrey H.	OK	A	'08
	Johnson, Roger W.	MN	A	'79
	Jones, Donlan F.	CA	Z	'52
	McMahon, Colin	6th grade		
	Marrone, James I.	IN	A	'61
	Medvecz, David J.	IN	A	'83
*	Melton, Walter C.	TX	A	'56
	Mitchell, Amanda	7th grade		
	Nevins, Russell T.	MA	B	'77
	Potter, Megan	6th grade		
	Prince, Lawrence R.	CT	B	'91
	Rawe, Richard A.	KY	A	'57
	Rentz, Peter E.	IN	A	'55
*	Routh, Andre G.	FL	B	'89
*	Schmidt, V. Hugo	WA	B	'51
	Schweitzer, Robert W.	NY	Z	'52
	Silver, Robert E.	NY	P	'80
	Slegel, Timothy J.	PA	A	'80
	Stein, Gary M.	FL	Δ	'04
*	Strong, Michael D.	PA	A	'84
	Summerfield, Steven L.	MO	Γ	'85
	Sutor, David C.	Son of member		

* Denotes correct bonus solution

FALL REVIEW

Problem 3 (about determining the bottles of gold with odd weights) was the hardest regular problem. No. 5 (about hosing down a wall) had the next fewest correct answers. On the bonus, many of our readers overlooked the fact that we asked for an exact answer and gave answers that were not exact. The 6th and 7th graders are students of **Donlan F. Jones,** *CA Z '52*. They correctly solved Fall No. 2.

Due to pressing personal business, **John L. Bradshaw,** *PA A '82*, has found it necessary to resign his position as a Brain Ticklers Judge. We thank John for his service and wish him well. As John's replacement, we are pleased to announce that **J. Charles "Chuck" Rasbold,** *OH A '83*, has accepted our invitation to become a Brain Ticklers judge. Chuck has been a faithful submitter of solutions for many years with a sound record of correct answers, and we look forward to working with him. His first column will appear in the Fall 2013 issue of The Bent.

WINTER SOLUTIONS

Readers' entries to the Winter Ticklers will be acknowledged in the Summer Bent. Meanwhile, here are the answers.

1 The 00 ticket is worth \$7.53, and the 88 ticket is worth \$0.06. The total number of data points is twice the number of quarters or 2(4)(46) = 368. The probability of the last digit of a score being 0 is $p_0 = 101/368 = 0.2745$, and the probability of 00 is $p_{00} = p_0^2 = 0.07533$. Since a ticket can win more than one quarter, the expected value of the winnings from ticket 00 is $E_{00} = 4(25)p_{00} = \$7.53$. Similarly, $p_{88} = (9/368)^2 = 0.000598$ and $E_{88} = 4(25)p_{88} = \$0.06$.

2 The area of the interface is 65.969 cm^2. Let r = initial radius of the soap bubbles, and R = radius after they coalesce. The volume of a spherical segment = $\pi h^2(3R - h)/3$, where h is the height of the segment, so $4\pi R^3/3 - \pi h^2(3R - h)/3 = 4\pi r^3/3$, or $4R^3 - 3Rh^2 + h^3 = 4r^3$. Now, $h = R(1 - \cos\theta)$, where θ is the angle between the radius through the center of the segment and a radius to the edge of the segment. Therefore, $R^3[4 - 3(1 - \cos\theta)^2 + (1 - \cos\theta)^3] = R^3(2 + 3\cos\theta - \cos^3\theta) = 4r^3$, so $R = 4^{1/3}r/(2 + 3\cos\theta - \cos^3\theta)^{1/3}$. Now, the curved surface area of a spherical segment = $2\pi Rh = 2\pi R^2(1 - \cos\theta)$, and the area of the circular interface = $\pi h(2R - h) = \pi R^2\sin^2\theta$. Therefore, the area of the double bubble is: $S = 2[4\pi R^2 - 2\pi R^2(1 - \cos\theta)] + \pi R^2\sin^2\theta = 8\pi R^2 - 4\pi R^2 + 4\pi R^2\cos\theta + \pi R^2\sin^2\theta = \pi R^2(4 + 4\cos\theta + \sin^2\theta)$. $S/\pi = R^2(4 + 4\cos\theta + \sin^2\theta) = 4^{2/3}r^2(4 + 4\cos\theta + \sin^2\theta)/(2 + 3\cos\theta - \cos^3\theta)^{2/3}$. $S/(4^{2/3}\pi r^2) = (4 + 4\cos\theta + \sin^2\theta)/(2 + 3\cos\theta - \cos^3\theta)^{2/3}$. We want to minimize surface area; therefore, taking the derivative and setting it to 0 gives $dS/d\theta = 0 = (2+3\cos\theta-\cos^3\theta)^{2/3}(-4\sin\theta + 2\sin\theta\cos\theta) - (2/3)(4+4\cos\theta+\sin^2\theta)(2+3\cos\theta-\cos^3\theta)^{-1/3}(-3\sin\theta+3\sin\theta\cos^2\theta)/(2+3\cos\theta-\cos^3\theta)^{4/3}$, which reduces to $2\cos^3\theta + 3\cos^2\theta - 1 = 0$. Factoring gives: $(2\cos\theta - 1)(\cos\theta + 1)^2 = 0$. Therefore, $\cos\theta = 0.5$ and $\theta = 60°$. The area of the interface = $\pi(R\sin\theta)^2$. Using the above formula for R gives $R = 5.29134$ cm, and $A = \pi(5.29134^2)(0.75) = 65.969$ cm^2.

3 The three coins are 1¢, 5¢, and 22¢. This is easily solved using a spreadsheet. Let the values of the three coins be X, Y, and Z (smallest to largest). Then, program the spreadsheet's columns as follows:
Col. A—Integers from 1 through 99
Col. B—FLOOR(Col. A/Z)
Col. C—FLOOR(MOD(Col. A, Z)/Y)
Col. D—MOD(Col. C, Y)
Col. E—Col. B + Col. C + Col. D
Cols. B, C, and D are the number of Z, Y, and X coins, respectively, needed to make change for an amount of N cents. Summing Col. E from 1 through 99 gives the total number of coins required to make change for amounts from 1¢ through 99¢. The approach is to try values for X, Y, and Z until a minimum is reached. The trial and error can be minimized based on the following observations. First, it is obvious that X must be 1. Second, it is probably good to have about the same number of each coin for the 99¢ case. Taking the cube root (since there are three coins) of 99 yields 4.6, which suggests a ratio of coin values of 5 to 1. Starting with (1, 5, 25) and trying close variations quickly shows that the minimum occurs for (1, 5, 22) and (1, 5, 23), both of which require a total of 526 coins. Since the king wants the smaller total, the answer is 1¢, 5¢, and 22¢.

4 If $N = 2^m M$, then the number of

trapezoidal decompositions (TDs) is $\tau(M) - 1$, where $\tau(M)$ is the number of divisors of M. Let $n > 1$ be the length of a TD of N, and let a be the first term. Then, $N = a + (a+1) + (a+2) + \ldots + (a+n-1) = n(2a + n - 1)/2$. Rearranging gives $a = N/n - (n-1)/2$. For N an odd integer, there are two cases. If $N/n > (n-1)/2$, a is a positive integer which is the first term of a TD of length n. If $N/n \leq (n\text{-}1)/2$, a is 0 or negative. Letting A = -a, in this case the first $2A+1$ terms cancel, leaving a TD of length $n-2A-1$ starting with $1+A$. Thus, each divisor (except 1) leads to a TD. If $N = p_1^a p_2^b p_3^c \ldots p_n^k$, $\tau(N) = (1+a)(1+b)\ldots(1+k)$. If N is even, any even divisors of N do not give an integral a; only odd divisors are of interest. If $N = 2^m M$, the number of TDs is $\tau(M) - 1$. As an example, consider $90 = 2(3^2)(5)$. The number of TDs is $\tau(45) - 1 = (1+2)(1+1) - 1 = 5$. The divisors are 3, 5, 9, 15, and 45. For 3, a = 90/3 – (3–1)/2 = 30–1 = 29, which gives the TD 29+30+31. From the other factors we get: 16+17+18+19+20; 6 + 7 + 8 + 9 + 10 + 11 + 12 + 13 + 14; 2+3+4+5+6+7+8+9+10+11+12+13; and 21+22+23+24. Alternately, one can determine the number of divisors for small values of N (up to 50 or so) and deduce the relationship by analyzing the results.

5 The maximum number of cards in a Spot-It deck with eight symbols on each card is 57. Let C = number of cards in the deck; N = total number of different symbols; and n = number of symbols on each card. The statement that one, and only one, symbol in common appears on any pair of cards means that each pair of symbols can appear on only one card, for otherwise there would be two cards with two symbols in common. The total number of pairs of symbols is $C(N, 2) = N(N-1)/2$, where $C(i, j)$ is the combinations of i things taken j at a time, and the number of pairs of symbols appearing on each card is $C(n, 2) = n(n-1)/2$. Therefore, the number of cards $C = [N(N-1)/2]/[n(n-1)/2] = N(N-1)/[n(n-1)]$. If we choose $n(n-1) = N-1$, we get $C = N$, but N is also equal to $n(n-1)+1$, so $C = n(n-1)+1$. For the given problem, n=8; therefore, $C = 8(7)+1 = 57$, although designing the 57 cards is not easy. You can also solve for n = 3, 4, and 5 and deduce the solution for n = 8.

Bonus Each package contains 22 red and 8 green N&Ns. Let R = number of red and G = number of green N&Ns in a package. First, consider Al's situation. The number of ways to get a red and a green N&N as the last two N&Ns is $(R+G-2)!/[(R-1)!(G-1)!]$, and the number of ways to get a red and two green N&Ns as the last three N&Ns is $(R+G-3)!/[(R-1)!(G-2)!]$. Since the ratio of these is 4, we have $(R+G-2)!(R-1)!(G-2)!/[(R+G-3)!(R-1)!(G-1)!] = (R+G-2)/(G-1) = 4$, or $R = 3G-2$. Now, consider Beth's situation. The probability of x greens left when the last red is eaten is $(R+G-x-1)!/[(R-1)!(G-x)!2^{R+G-x-1}]$. The probability of having $x+1$ greens left is $(R+G-x-2)!/[(R-1)!(G-x)!2^{R+G-x-2}]$. Since the ratio of these two values equals 4, then $(R+G-x-1)/[(G-x)2]=4$, or $R=7G-7x+1$. Equating these two values of R and solving for G gives $G=(7x-3)/4$. The only value that works is x=5, which gives G=8 and R=22. Another approach is to get the answer by trial and error construction of probability diagrams for various values of R and G.

Double Bonus The remainder on dividing $2^{4,700,063,497}$ by 4,700,063,497 is 3. Problems of this sort are most easily solved using modular arithmetic (see any book on number theory) on a spreadsheet. Let 4,700,063,497 = N. The approach is to first express N as the sum of powers of 2 i.e. $N = 2^0+2^3+2^8+2^9+2^{10}+2^{14}+2^{16}+2^{18}+2^{21}+2^{27}+2^{28}+2^{32}$. Therefore, $2^{4,700,063,497}$ = 2 to the power $2^0 \times 2$ to the power $2^3 \times 2$ to the power $2^8 \times \ldots 2$ to the power 2^{32}. If we find the value of each of these terms (mod N) and then find their product (mod N), we will have the desired answer. This is easily accomplished on a spreadsheet set up as follows. In Col. A, list the integers from 0 to 32. In Col. B, calculate the corresponding powers of 2. Start col. C with a 2 (which equals 2 to the power 2^0 or 2^1); then in the 2nd row, calculate the square of the entry directly above (i.e., 2^2 = 2 to the power 2^1) and determine the remainder when divided by N (use the MOD function). Continuing down col. C will generate 2 to the power 2^n (mod N). Thus, the values in the three columns represent n, 2^n, and 2 to the power 2^n. Next, copy to col. D values from col. C corresponding to the powers of 2 in the expression for N. Now, starting with the first value in col. D, successively multiply by the next entry and, after each multiplication, find the remainder when divided by N. (Hint: Start by multiplying 2 by 256 to get 512. Since this is smaller than N, we now multiply by 3,573,049,424 and then find the remainder upon dividing by N to get 1,076,604,755, etc.) When you get to the end, your final remainder will be 3. Incidentally, this is the smallest value of N such that $2^N \equiv 3$ (mod N). Keep in mind that for this procedure to work, you need sufficient accuracy so that there are no rounding errors.

NEW SPRING PROBLEMS

Here are the new Spring Ticklers to keep the little gray cells active during Spring break. For the most part they can be solved without a computer.

1 Joe has wired 100 bulbs, labeled 1 to 100, into an electrical circuit along with a button switch. He starts with all the bulbs unlit. When he pushes the button, every light lights. When he pushes it a second time, every second light (i.e., lights 2, 4, 6, etc.) goes off. On the third push, every third light changes status, that is, if it is off, it turns on, and if it is on, it turns off. On the fourth push the same thing occurs for every fourth light, and so on for the fifth through hundredth pushes. At this point, how many lights are lit?

—*The Electric Toilet Virgin Death Lottery and Other Outrageous Logic Problems*, by Thomas Byrne and Tom Cassidy

2 As part of an experiment to study the alertness of students, the letters A to F were permuted and briefly shown (in the form of a six letter "word") to seven students. After an hour, the students were asked to write down the order of the letters. What the

students wrote was: Greg, BCDAEF; Hal, DAEFBC; Ivan, ABEFDC; Jill, BCFDEA; Kate, AEBDFC; Lila, CFEABD; and Mel, DCAEFB. The students were then asked a series of questions that each answered based on what he or she had written as his or her recollection of the order of the letters. For each possible pair of letters, they were asked if, reading from left to right, one letter came before another. A typical question was, "Does A come before D?" (The letters in the questions were always in alphabetical order.) Each student got a different even number of questions correct. (No one had them all wrong.) What was the correct order of the letters?

—Susan Denham in *New Scientist*

3 A typical roll of NECCO® wafers contains 40 wafers with a random distribution of eight different flavors. Suppose NECCO® decides to make sample rolls containing only 12 wafers. What is the probability that a twelve-wafer roll will have at least one wafer of each flavor? Assume that the rolls are made up from batches of wafers that contain equal numbers of each flavor and that the wafers in each roll are selected at random.

—Howard G. McIlvried III, *PA Γ '53*

4 Consider a double row of regular hexagons, ten in the top row and nine in the bottom row, arranged like the cells in a honeycomb. Starting at the upper left hexagon and zigzagging down and up, label the hexagons A through S. How many different paths are there, starting at A and ending at S, where a path consists of a series of ten to 19 letters indicating the order in which the hexagons are visited? You can only move from one hexagon to another hexagon that shares a common edge. No hexagon can be visited more than once for a given path.

—*Why Do Buses Come in Threes?* by Rob Eastaway and Jeremy Wyndham

5 Find three different nonzero digits such that each of the six permutations of the digits, read as six three-digit integers, is a semiprime. A semiprime is an integer that is the product of two, not necessarily different, primes. For example, 121 = 11×11 and 143 = 11×13 are semiprimes, while 153 = 3×3×17 and 105 = 3×5×7 are not.

—Richard England in *New Scientist*

Bonus Al, Beth, Carl, and Dawn are sitting around a table at a bar, as Al tries to guess Beth's age. They all know she is at least 21, or she wouldn't have been allowed into the bar. Al asks Beth five questions, pausing for contemplation after each question:

1. Is your age a multiple of 17?
2. Is your age a multiple of 3?
3. Is your age a prime number?
4. Are you older than I am? (Beth knows Al's age.)
5. Have you celebrated your 51st birthday?

At this point, Al announces that he has deduced Beth's age, but Beth tells him he is wrong. Carl, whose age is a prime number, has been listening to this conversation and is able to correctly deduce Al's age. From his knowledge of Beth, he surmises that she has not answered all the questions truthfully and guesses that she has alternated correct and incorrect answers. He knows that Beth is older than he is, and although he has guessed correctly how many of Beth's answers are incorrect, he has assumed the wrong ones. So, when he announces what he has deduced as Beth's age, Beth tells him he is also wrong. Finally, Dawn, who has also been listening in and is sharper than Carl, guesses correctly which of Beth's answers are incorrect. Now, knowing that Beth is younger than she is, Dawn is able to correctly announce Beth's age. What are the ages of Al, Beth, Carl, and Dawn, and what are Al's and Carl's incorrect guesses? It may help to know that Dawn's age is divisible by 13 and they all know that their ages are all different.

—*Brain Puzzler's Delight* by E.R. Emmet

Computer Bonus You are floating in a sea of 7's on a raft with the number 101. You discover that you can take a 7 and insert it into your raft to enlarge it (getting 7101; 1701; 1071; or 1017). Unfortunately, every time you do this, the raft divides itself by its smallest prime factor (leaving in the above case 2367; 567; 357; or 339). If the raft goes below 100, it will sink. What is the maximum number of insertions you can make before you sink? Remember, 1 is not a prime.

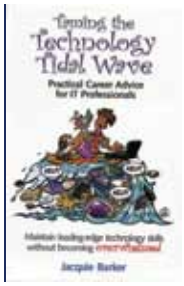
—*Technology Review*

Send your answers to any or all of the Spring Brain Ticklers to **Curt Gomulinski, Tau Beta Pi, P.O. Box 2697, Knoxville, TN 37901-2697** or email to *BrainTicklers@tbp.org* as plain text only. The cutoff date for entries to the Spring column is the appearance of the Summer BENT in early July. The method of solution is not necessary, unless you think it will be of interest to the judges. We welcome any interesting problems that might be suitable for the column. The Computer Bonus is not graded. Curt will forward your entries to the judges who are **F.J. Tydeman,** *CA Δ '73*; **D.A. Dechman,** *TX A '57*; **J. C. Rasbold**, *OH A '83;* and the columnist for this issue,

—H.G. McIlvried III *PA Γ '53*

AUTHORS

Jacquelyn J. Barker, *Ohio Alpha '78*, is a software engineer, author, and adjunct faculty member at The George Washington University. She has written *Taming the Technology Tidal Wave: Practical Career Advice for IT Professionals.* This is a guide to managing your career with respect to technology change so you can update your technical skills as needed. It shows ways to recognize technologies worth spending time to master, rather than "passing fads". It is published by ObjectStart Press.



Paul J. Bartusiak, *Tennessee Gamma '88*, has spent some 24 years working at Fortune 500 companies, first as an engineer and then as a corporate attorney. He has authored and published *Pencils Down, Faces Up*, the tale of a young man's progress through the corporate ranks and the questions this leads him to ask. It is a drama of high tech corporate intrigue layered with complexity in its moral and spiritual investigation of a person.

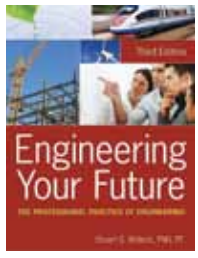
Anthony N. Kordyban, *Michigan Delta '80*, has combined a career in the cooling of electronics with writing humorous engineering books to explain the powers of hot air. He has now authored *The Loose Meat Sandwich King of Hamtramck*, the saga of a man's return for a job interview to his birthplace Detroit, "a town where high school garage bands compose songs about Richard Nixon." "From one minute to the next Terry doesn't know if he'll end up in a coffin next to his best friend, or end up the new Loose Meat Sandwich King of Hamtramck." Publisher is CreateSpace Independent Publishing.

Oge Marques, Ph.D., *Florida Epsilon '87*, is an associate professor of computer science and electrical engineering at Florida Atlantic University. He has produced the textbook *Practical Image and Video Processing Using MATLAB®*. This is the first book to combine image and video processing with a practical MATLAB®-oriented approach to demonstrate important image and video processing techniques and algorithms. The contents are presented in a clear, objective manner, encouraging experimentation. It is published by Wiley-IEEE.

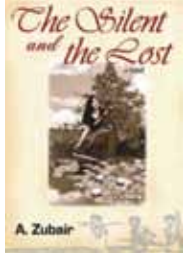
Mark Monmonier, Ph.D., *Maryland Alpha '64*, is a distinguished professor of geography at Syracuse University who has authored 15 books in the mapping/weather field. His latest, *Lake Effect*, charts the phenomenon of lake-effect snow and explores the societal impacts of extreme weather. Monmonier introduces readers to natural philosophers who identified this distinctive weather pattern, and to tales of communities adapting to disruptive storms. Publisher is Syracuse University Press.

Henry Petroski, P.h.D., P.E., *New York Xi '63*, is a professor of civil engineering and a professor of history at Duke University, and author of more than a dozen books. The latest, *To Forgive Design: Understanding Failure* is about the nature of failure, especially in large systems. It looks at accidents initially blamed on design but which proved to be due also to human nature. Among cases discussed are the Titanic, Tacoma Narrows Bridge, Deepwater Horizon, and recent construction-crane accidents. Publisher is Belknap Press of Harvard University Press.

Stuart G. Walesh, Ph.D., P.E., *Indiana Delta '63*, has written *Engineering Your Future: The Professional Practice of Engineering*, a combination textbook and reference book for all disciplines. He is an independent consultant who seeks to help engineers, beginning as students and extending into practice, achieve higher levels of creativity and innovation. It is published by Wiley and ASCE Press.



Abu Bin M. Zubair, *Massachusetts Eta '82*, is an electrical engineer and California farmer. He has written, *The Silent and the Lost*, an historical novel chronicling the violent birth amid genocide of his native Bangladesh in 1971. Zubair tells of a war refugee in California's torment over the fate of his natural parents in the former East Pakistan. Publisher is Pacific Breeze.



CHAPTER ETERNAL

The condensed style of these notices of death is made necessary by Tau Beta Pi's large membership and space limitations in The Bent. *You may email or write the Editor for further facts concerning the following deceased members. The assistance of all is earnestly sought in reporting the deaths of Association members, with appropriate details.*

AL A '47 **Ledyard Jr., Robert Elisha;** December 12, 2012.
'49 **Sample, Wilburn Jonathan;** November 9, 2011.
'68 **McGinnis, Richard Riley;** January 18, 2013.
'84 **McLellan, Bruce K.;** March 5, 2010.
AL B '42 **Heaton, Roy Gordon;** November 29, 2012.
'48 **Tiller, James S.;** January 4, 2013.
'65 **Troha, John Milton;** August 26, 2012.
AL Γ '77 **White, Clyde Parker;** October 28, 2012.
AZ A '56 **Jochums, Robert Eugene;** April 30, 2012.
AZ B '27 **Forman, Alfred Hennen;** October 8, 2000.
'69 **Kwasigroh, Larry D.;** September 25, 2012.
AZ Γ '09 **Roberts, Matthew Steven;** August 25, 2012.
AR A '38 **Roark, James J.;** December 14, 2005.
'64 **Gifford, William C.;** April 18, 2012.
CA A '37 **Paules, Earl Carpenter;** April 5, 2011.
'43 **Vallerga, Bernard Anthony;** January 5, 2013.
'51 **Janopaul, Robert N.;** December 5, 2012.
'51 **Jennings, Robert W.;** December 4, 2012.
'52 **Wiegand, F. Byron;** October 21, 2012.
'56 **Knapp, Warren S.;** August 31, 2012.
'87 **Schreifels, Steve W.;** September 13, 2011.
CA B '37 **Smith, Joe Mauk;** June 7, 2009.
'91 **Chen, Leonard Peter;** no details.
CA Γ '38 **Lindsay, Franklin A.;** October 13, 2011.
'54 **Toepfer Jr., George O.;** no details.
CA Δ '36 **Anderson, Frank A.;** July 2012.
'48 **Williamson, Albert Edward;** January 17, 2013.
'50 **Dixon, Thomas P.;** June 17, 2012.
'50 **Kendall, Alex Joseph;** November 15, 2011.
'51 **Boothe, Clyde O.;** December 20, 2012.
'58 **Geldson, Norman P.;** December 28, 2012.
'59 **Tucker, Charles T.;** April 8, 2012.
'66 **Gularte, Ronald Carl;** January 15, 2013.
CA Z '47 **Moeck, Robert C.;** January 21, 2013.
'50 **Ennis, John F.;** December 4, 2012.
CO A '38 **Reiser, Castle O.;** November 21, 2007.
'50 **Chapman, Walter M.;** March 25, 2012.
CO B '49 **Nuttall, Arch F.;** May 13, 2010.
CO Γ '55 **Vote, Frederick C.;** March 22, 2011.
CT A '43 **McCabe, Lynn A.;** January 18, 2013.
'48 **Davis, John M.;** July 5, 2012.
'49 **Parker, Gordon C.;** January 20, 2013.
DE A '38 **Rambo, Marvin L.;** September 17, 2006.
'54 **Robinson, David M.;** no details.
'60 **Svendsen, Ib A.;** no details.
DC A '36 **Davis, Stephen S.;** no details.
DC Γ '67 **Flowers, Earl Crama;** December 11, 2012.
FL A '38 **Leadon Jr., Bernard M.;** December 22, 2009.
'56 **Brown, Gilbert M.;** December 3, 2012.
'65 **Humphries, Jack T.;** October 3, 2012.
GA A '37 **Shepley, Raymond;** no details.
'38 **Humphrey, Floyd L.;** July 16, 1996.
'38 **Rayle Jr., Roy E.;** March 14, 1997.
'40 **Saeman, Walter Carl George;** no details.
'46 **Faustini, Albert J.;** October 14, 2012.
'59 **Joye Jr., Clealand M.;** October 6, 2011.
'63 **Paul, Clayton R.;** June 27, 2012.
'80 **Gorton, Tracy R.;** January 4, 2013.
ID A '59 **Welker, J. Reed;** October 25, 2011.
IL A '36 **Gray, Paul Gordon;** September 3, 2011.
'38 **Korst, Helmut H.;** June 1, 2012.
'50 **Dwyer, John D.;** August 8, 2012.
'50 **Kohlbecker, John L.;** no details.
'75 **Shank, Dane G.;** May 10, 2010.
'79 **Mather, Bruce C.;** May 12, 2011.
IL B '35 **Lehmann, Herbert W.;** no details.
'38 **Kliphardt, Raymond A.;** May 23, 2009.
'48 **Tate, Roger W.;** August 7, 2011.
'57 **Armbruster, Ronald H.D.;** November 25, 2012.
'57 **Bischoff, Kenneth B.;** no details.
'64 **Brodsky, Harvey A.;** December 14, 2007.
IL Γ '38 **Gamson, Bernard W.;** April 13, 2000.
'45 **Jones, William S.;** January 12, 2010.
IN A '34 **Malless, Stanley;** no details.
'37 **Easley, Gilbert J.;** September 13, 2012.
'38 **Belsley, Steven E.;** October 21, 1996.
'38 **Ehinger, Charles D.;** April 24, 1990.
'38 **Griffenhagen, Raymond P.;** July 26, 2008.
'38 **Murray, J. Ronald;** November 16, 2004.
'38 **Schlundt, Robert H.;** September 6, 2004.
'40 **Harris Jr., William J.;** December 5, 2012.
'43 **Winslow, Robert A.;** August 25, 2012.
'49 **Gimber, Nicholas A.;** December 25, 2012.
'50 **Butcher, Bernard B.;** no details.
'50 **Kaiser, Thurman W.;** June 2, 2009.
'55 **Male Jr., Edwin K.;** June 14, 2005.
'76 **Voss, Janice E.;** February 6, 2012.
IN E '77 **Lehman, Scott A.;** July 19, 2011.
IA A '33 **Roach, Vincent M.;** June 14, 1997.
'36 **Beresford, Robert;** January 12, 2009.
'43 **Malony, George A.;** October 1, 2012.
'47 **Jacobson, Allen F.;** November 1, 2012.
'49 **Swanson, Eugene K.;** November 26, 2006.
'52 **Heemstra, Howard C.;** July 22, 2011.
'54 **Nordeen, Donald L.;** August 21, 2012.
IA B '37 **Major, Coleman J.;** August 21, 2012.
'38 **Kiesling, Franklin Claude;** September 10, 2007.
'50 **Johnston, Edward W.;** no details.
'58 **Acer, John W.;** no details.
'97 **Bodmer, James Ellis;** March 31, 2012.
KS A '37 **Payne, Leigh W.;** March 18, 1997.
'38 **Johnson, Karl E.;** March 6, 2002.
'38 **Latham, Arthur G.;** April 29, 2005.
'42 **Gray, Richard T.;** July 16, 2011.
'70 **Grojean, Timothy Meyer;** August 18, 2012.
KS B '57 **Hoehne, Vernon O.;** December 3, 2012.
KY A '41 **Johnston, John F.;** no details.
'51 **Strunk, Loran H.;** May 11, 2012.
'63 **Arrington, William M.;** November 2, 2010.
KY B '37 **Herin, James Louis;** December 11, 2004.
'38 **Hood Jr., William H.;** May 2, 1996.
'54 **Beilman, Donald S.;** September 11, 2012.
LA A '38 **Edwards, William R.;** October 5, 2001.
'38 **Le Blanc, Francis J.;** May 14, 2003.
'38 **Pritchard, Eustace H.;** March 25, 1988.
'79 **Dillon, Bill Zack;** August 6, 1999.
LA B '47 **Peyronnin Jr., Chester A.;** December 12, 2012.
LA Γ '40 **Henry Jr., Herman L.;** December 26, 2012.
ME A '34 **Burr, Lloyd W.;** June 10, 2000.
MD A '37 **Nopper, Richard Earl;** March 17, 2012.
'38 **Fax, David H.;** January 2, 2011.
'49 **Frey Jr., George W.;** April 2005.
'54 **Mowery, Vincent O.;** August 25, 2005.
MD B '39 **Phillips, Irving S.;** April 23, 2009.
'49 **Martin Jr., Frank;** November 1, 2012.
MA A '38 **Elliott, Richard M.;** April 4, 2011.

'42 **Birchall Jr., George H.;** September 11, 2012.
MA B '34 **Lem Wu, Wing F.;** January 16, 2002.
'38 **Banzett, Howard;** January 28, 2011.
'38 **Bates Jr., Alexander P.;** March 2, 2007.
'38 **Chapin, Jack F.;** February 28, 2011.
'39 **Withington, Holden W.;** December 2011.
'41 **Turnock, Lawrence C.;** January 12, 2013.
'45 **Blitzer, William F.;** January 21, 2012.
'45 **Leonard, Harry Jack;** April 11, 2010.
'56 **Pierce Jr., John F.;** March 11, 2003.
'67 **Nash-Webber, James L.;** no details.
'70 **Agnew, Carson E.;** no details.
MA Δ '37 **Pote, Lloyd W.;** September 24, 2011.
'40 **Lister, Charles A.;** August 9, 2012.
'46 **Mooney II, Rodney T.;** December 12, 2012.
'51 **Yamartino, Raymond L.;** January 4, 2013.
'53 **Cuthbert, Donald J.;** October 6, 2009.
MI A '49 **Carter, John S.;** August 21, 2006.
'49 **Cole, Leslie A.;** December 4, 1997.
'49 **Crocker, Bernard E.;** no details.
'49 **Custer, George A.;** May 18, 1991.
'49 **Edinborough, Warren T.;** May 28, 1998.
'49 **Edmondson, Robert N.;** July 25, 1999.
'49 **Ehman, John T.;** December 26, 2004.
'49 **Hannewald, Carl R.;** no details.
'49 **Hiscox, Richard A.;** January 8, 2005.
'49 **Kaechele, Lloyd E.;** July 11, 1994.
'49 **Lee Jr., Harold V.;** June 13, 2005.
'49 **Malarik, Roy W.;** October 17, 2006.
'49 **Mohlie, Raymond Eugene;** October 26, 1994.
'49 **Montross, Denton S.;** October 3, 2000.
'49 **Moore, Emmett J.;** February 4, 2001.
'49 **Nixon, Joseph P.;** August 22, 2009.
'49 **Nuechterlein, Melvin H.;** March 13, 2007.
'49 **Paananen, Roy A.;** January 16, 1998.
'49 **Robinette, Ross M.;** June 3, 2008.
'49 **Seymour, George A.;** September 28, 2010.
'49 **Trebilcock, James M.;** no details.
'49 **Wargowski, Robert J.;** March 25, 1996.
'49 **White, James F.;** September 13, 1987.
'50 **Anderson, Clayton E.;** November 23, 2011.
'50 **Bicknell, Marvin D.;** January 9, 2009.
'50 **Cadwell Jr., Everett Blaine;** February 18, 1995.
'50 **Christensen, Max C.;** January 8, 2008.
'50 **Cummings, Russell F.;** October 31, 2002.
'50 **Duncan, Charles W.;** October 30, 2010.
'50 **Fik, Harry J.;** no details.
'50 **Holt, Paul A.;** June 2, 2003.
'50 **Horn Jr., Harry J. B.;** September 3, 2006.
'50 **Jones, James R.;** August 19, 1995.
'50 **Keinath, Richard L.;** July 7, 2010.
'50 **Lappin, Richard J.;** no details.
'50 **Lehtonen, Ray;** August 22, 1998.
'50 **Mueller, Wayne H.;** February 28, 2007.
'50 **Nahikian, William S.;** August 2, 2000.
'50 **Nay Jr., Henry T.;** April 21, 2006.
'50 **Ogletree, Ezra G.;** February 4, 2010.
'50 **Patterson, Stanley B.;** August 29, 2007.
'50 **Post, James B.;** no details.
'50 **Post, Lewis W.;** no details.
'50 **Resnick, Harry W.;** January 9, 2009.
'50 **Sunris, Charles B.;** June 25, 1997.
'50 **Whipple, Loris D.;** August 15, 1998.
'51 **Armstrong, James E.;** January 3, 2008.
'51 **Cudney, Gene R.;** June 25, 2009.
'51 **Freimanis, Laimons;** January 26, 2003.
'51 **Henderson, T. Bruce;** January 14, 2001.
'51 **Howell, Alan J.;** February 14, 2006.
'51 **Kurisu, Albert G.;** October 18, 1998.
'51 **Larue, John J.;** May 19, 1996.
'51 **Marine, Gordon L.;** July 15, 1999.
'51 **Maurer, Dean F.;** February 28, 2004.
'51 Molnar, Martin A.; October 29, 1999.
'51 **Mottel, William J.;** May 14, 2011.
'51 **Mueller, Martin T.;** December 13, 1996.
'51 **Pury, Thomas;** no details.
'51 **Schreiner, Donald W.;** no details.
'51 **Tauch, Fred;** July 26, 2007.
'52 **Buxton, John L.;** October 5, 1996.
'52 **Cruise, William W.;** July 2, 2003.
'52 **Edwards, Richard E.;** September 24, 2009.
'52 **Hawks, Bernard;** August 23, 1995.
'52 **Holm, William C.;** January 15, 1989.
'52 **Lockwood, Germaine C.;** May 11, 2004.
'52 **Marceau, Jack E.;** October 13, 2004.
'52 **Milvenan, James G.;** October 12, 1993.
'52 **Owen, Charles J.;** November 21, 2011.
'52 **Reed, James R.;** September 21, 2005.
'52 **Troll, William C.;** April 8, 2000.
'52 **Ueberroth, Alfred E.;** July 11, 2003.
'52 **Zolnick, Richard R.;** no details.
'53 **Backus, Floyd I.;** November 25, 2004.
'53 **Buck, Ronald H.;** July 1, 2010.
'53 **Callihan, Clayton D.;** July 7, 2010.
'53 **Cronkrite, William;** March 13, 1998.
'53 **Dudek, Stanley J.;** March 21, 2002.
'53 **Friday, William H.;** August 12, 2008.
'53 **Galezewski, Steven;** September 20, 1996.
'53 **Huss, Walter W.;** May 7, 2007.
'53 **Morton, Robert L.;** no details.
'53 **Schiefer, Harry M.;** April 6, 1996.
'53 **Scholten, Lawrence M.;** February 15, 1988.
'53 **Sidwell, Kenneth W.;** December 19, 2003.
'54 **Busch, William A.;** January 18, 2002.
'54 **Cherry, Gordon C.;** October 7, 1993.
'54 **Crampton, William M.;** February 7, 1997.
'54 **Massa, Gerald R.;** December 17, 2011.
'54 **Myers Jr., Joe G.;** January 12, 2004.
'54 **Smith, Laurence D.;** January 11, 2011.
'54 **Wheaton, Rolland Z.;** June 7, 2010.
'55 **Alkema, Randall J.;** December 18, 2005.
'55 **Curran, James M.;** no details.
'55 **Fleming, Dale A.;** July 13, 1996.
'55 **Hyde, Clyde M.;** February 5, 1998.
'55 **Janowitz, John F.;** January 4, 2006.
'55 **Kline, Paul E.;** April 5, 2005.
'55 **Knapper, Engel;** November 9, 2000.
'55 **Kohlmeyer, Robert B.;** June 18, 2003.
'55 **Kortge, Cleon R.;** August 5, 2008.
'55 **Long, Gary S.;** April 7, 1998.
'55 **McFadden, Fred R.;** August 9, 2009.
'55 **Pearson, Gerald W.;** November 28, 2006.
'55 **Reif, James R.;** November 5, 1996.
'55 **Schermerhorn, Don M.;** September 16, 2009.
'55 **Walker, Jerome C.;** no details.
'56 **Davies, John L.;** November 18, 2008.
'56 **Fife, Dennis W.;** April 28, 2005.
'56 **Hassencahl, Lloyd J.;** July 7, 2002.
'56 **Huyck Jr., William J.;** September 19, 2009.
'56 **Liddle, Wayne C.;** September 21, 2003.
'56 **Linton, Thomas J.;** April 30, 2011.
'56 **MacAuley, Jack S.;** December 20, 2003.
'56 **Stocking, Robert L.;** October 11, 2002.
'57 **Brown, John F.;** June 8, 2003.
'57 **Burns, Donald L.;** June 28, 2001.
'57 **Falk, James M.;** no details.
'57 **Furtney Jr., Ralph W.;** no details.
'57 **Grate, Richard E.;** January 2, 2000.
'57 **Greene, John T.;** March 16, 2007.
'57 **Hanson, Eugene E.;** November 9, 2007.
'57 **Miller, George D.;** June 28, 2012.
'57 **Morgan, Richard D.;** June 18, 2003.

'57 **Paganini, Frank T.;** September 6, 2004.
'57 **Prindle, Horace A.;** August 20, 2005.
'57 **Shippen, Howard T.;** January 2, 2003.
'58 **Auld, Stanley D.;** July 29, 2006.
'58 **Collins, Leo F.;** January 20, 2011.
'58 **Dascher, Albury J.;** December 30, 1998.
'58 **Heis Jr., William J.;** November 8, 2010.
'58 **Le Cronier, Richard E.;** March 21, 2011.
'58 **MacKay, Roderick C.;** April 19, 2001.
'58 **Nissley, Lloyd E.;** June 18, 2011.
'58 **Orr, Dean W.;** December 3, 1988.
'58 **Rhodes, Harold T.;** September 23, 2003.
'58 **Sadler, Keith A.;** November 15, 2006.
'58 **Sebrell, Wayne A.;** April 5, 2006.
'58 **Smith, Lowell C.;** no details.
'58 **Taulbee, Dale B.;** February 15, 2012.
'59 **Anderson, Charles V.;** November 5, 1994.
'59 **Barry, Russell F.;** November 9, 2008.
'59 **Cooper, Robert E.;** October 2, 2002.
'59 **Davis, Charles A.;** February 7, 2007.
'59 **Dorer, David K.;** May 3, 1996.
'59 **Garter, Jack L.;** April 9, 2005.
'59 **Mavis, Clayton L.;** December 29, 1997.
'59 **Snow, Alfred L.;** May 6, 2003.
'59 **Sullivan, Thomas D.;** July 19, 2010.
'59 **Watt, Charles R.;** September 19, 2007.
'59 **Wiberg, John O.;** November 17, 2007.
'59 **Williams, Duane J.;** January 25, 2004.
'60 **Bender, Joseph M.;** January 12, 2012.
'60 **Ip, Ping Ye;** July 22, 1991.
'60 **Maruoka, Donald T.;** October 14, 2009.
'60 **McGrath, Donald A.;** February 2, 1998.
'60 **Morrison, Donald M.;** April 7, 2012.
'60 **Newkirk, Curtis;** no details.
'60 **Rashleigh, John L.;** February 28, 2002.
'60 **Sager, Richard A.;** March 20, 2011.
'60 **Violante, Andre;** no details.
'61 **Brown, Galen K.;** June 8, 2005.
'61 **Hansen, Charles H.;** October 19, 1999.
'61 **Maresco, George J.;** October 26, 2006.
'61 **McKelvey, Francis X.;** January 27, 2006.
'61 **Schwartz, Harlow W.;** March 20, 1997.
'62 **Ball, Murray E.;** January 27, 2009.
'62 **Douglas, Bruce G.;** March 7, 2005.
'62 **Gray, Donald L.;** no details.
'62 **Hopkins, Gerald C.;** July 17, 2012.
'63 **Davidson, Lester A.;** March 12, 1991.
'63 **Holzhei, Don E.;** May 26, 2007.
'63 **Pecknold, Wayne M.;** September 19, 2000.
'63 **Savage, Kern S.;** February 1, 2006.
'64 **Bennett, David W.;** October 12, 2004.
'64 **El-Sherif, Helmy H.;** March 10, 2012.
'64 **Scholl, Martin M.;** April 24, 2004.
'64 **Vincent, Merton L.;** October 22, 2008.
'64 **Wheaton, Fredrick W.;** March 25, 2011.
'65 **Grimm, David M.;** no details.
'65 **Hay, Robert A.;** October 3, 2002.
'66 **Arndt, Dennis L.;** October 8, 2007.
'68 **Farrell, Steven R.;** no details.
'73 **Hanson, Daniel L.;** February 12, 2005.
'73 **Vaclavik, Frank L.;** July 28, 2009.
'76 **Ashenfelter, Roger N.;** May 21, 2008.
'76 **Berkimer, Charles W.;** no details.
MI B '32 **Foster, Frederick;** March 5, 2012. *[Centenarian 84]*
'42 **Bomke, Elmer H.;** May 28, 1999.
'47 **Moon, John Jeffery;** November 30, 2012.
'49 **Perdzock, Robert C.;** November 19, 2010.
'54 **Adams, William L.;** July 20, 2012.
'56 **Post, Roger C.;** June 1, 2012.
MI Γ '35 **Buhl, Walter T.;** September 28, 2003.
'36 **Hastings, Reeve R.;** November 26, 2008.
'38 **Basler, Donnan E.;** February 23, 2002.
'38 **Brondyke, Willis F.;** May 9, 1997.
'38 **Brown, Irving C.;** August 19, 1997.
'38 **Goloff, Alexander A.;** April 13, 2008.
'38 **Spitzley, Joseph H.;** no details.
'48 **Schenk, Karl M.;** April 21, 2008.
'50 **Hanson, Carl L.;** January 10, 2012.
'50 **Smedley, John H.;** June 9, 2012.
'55 **Balzhiser, Richard E.;** December 23, 2012.
MI E '50 **Chapman Jr., Charles Sherman;** December 18, 2012.
'52 **Hordes, Herbert J.;** no details.
MI Z '38 **Olson, Bert T.;** May 21, 2009.
MI H '38 **Hockeimer Sr., Henry E.;** July 13, 2012.
MNA '40 **Thomas, David F.;** no details.
'84 **Murthy, Varanasi Rama;** October 12, 2012.
MS A '38 **Montgomery, Bryant S.;** October 30, 2009.
MOA '57 **Johnson, Carl W.;** no details.
'69 **Beougher, Loren C.;** October 5, 2012.
MOB '38 **Ballman, Edward A.;** August 4, 2010.
'38 **Seibel, Robert C.;** October 4, 2011.
'50 **Bartels, Eugene A.C.;** December 30, 2012.
'54 **Gudermuth Jr., Charles A.;** December 30, 2006.
'56 **Yiannos, Peter N.;** July 2, 2012.
'77 **Hofman, Jerry L.;** no details.
MOΓ '37 **Moore, John R.;** July 13, 2007.
'38 **Klasing, Waldemar J.;** May 26, 2012. *[Centenarian 88]*
'42 **Rumer, Robert Richard;** no details.
'50 **Ringo, Boyd C.;** no details.
'87 **Herbener, Kathryn Rae;** no details.
MT A '38 **Cochran, David;** July 15, 2003.
'41 **Boyack, Andrew McIntosh;** May 11, 2012.
NE A '47 **Robison, Wendall C.;** June 17, 2012.
'55 **Becker, John C.;** January 21, 2013.
NH A '50 **Herrin, Ned E.;** December 14, 2012.
'56 **Leeper Jr., Durward D.;** July 13, 2011.
'71 **Merrill, Theodore F.;** June 15, 2012.
NJ A '38 **Foehl, Julian A.;** January 25, 1997.
'38 **Leontis, Thomas E.;** May 29, 1995.
'50 **Fitch, Kenneth R.;** May 31, 1992.
'50 **Van Court, Donald P.;** November 1, 2012.
NJ B '38 **Campbell, David J.;** March 23, 1999.
'44 **Truszynski, Gerald M.;** December 1, 2012.
'63 **Szyszko, Charles J.;** November 18, 2012.
NJ Γ '37 **Herman, T. August;** November 2, 2004.
'38 **Bredder, H. Stanley;** July 11, 1996.
'38 **Kreitler Jr., Frank C.;** October 8, 2012.
'38 **Ritter, Herman O.;** June 20, 2009.
'40 **Felber, George Stephen;** December 23, 2012.
'43 **Sitarski, Alfred Walter;** July 14, 2012.
'44 **Guttenberg, William S.;** no details.
'50 **Poliseo, Joseph W.;** December 9, 2012.
'51 **De Boer, Theodore K.;** October 31, 2012.
'74 **Erdman, Michael J.;** January 2, 2013.
NM A '38 **Field, James W.;** January 15, 1999.
'80 **Antzoulatos, Daniel G.;** no details.
NY A '48 **Belasco, Bernard I.;** January 4, 2013.
NY B '38 **Cheney, Lloyd T.;** July 17, 2009.
'39 **Joslyn, William C.;** February 27, 2009.
NY Γ '38 **Nippes, Ernest F.;** April 3, 2010.
'50 **Leer, Robert S.;** no details.
'51 **Makitalo, Dauno M.;** July 25, 2012.
'61 **Bernstein, Lawrence;** November 2, 2012.
'78 **Endriss, Kevin J.;** May 22, 2012.
NY Δ '43 **Correll, William B.;** December 6, 2011.
'43 **Holmes, Dyer Brainerd;** January 11, 2013.
NY E '49 **Palmer, Arthur J.;** August 30, 2011.
NY Z '38 **Heller Jr., Paul R.;** December 24, 2003.
'48 **Greenspan, Lawrence E.;** November 25, 2012.
'51 **Kahn, Leonard R.;** June 3, 2012.
'65 **Hershkowitz, Bernard;** November 7, 2012.
NY H '39 **Posner, David L.;** no details.

	'41	**Dwork, Leo E.;** March 27, 2012.
NY Θ	'44	**Reehl Jr., George H.;** no details.
	'53	**Brown, Douglas B.;** no details.
NY I	'43	**Parr, Oscar J.;** January 17, 2011.
	'61	**Gerkensmeier, Otto Fredericj;** January 4, 2013.
NY M	'62	**Mullee, Garrett Richard;** January 18, 2013.
	'79	**Anzalone, Samuel Paul;** January 12, 2013.
NY N	'56	**Sheppard, Leonard E.;** March 28, 2012.
NY Ξ	'35	**Lyons, Daniel Gerard;** February 12, 2012.
	'47	**Dowling, Joseph Francis;** no details.
NC A	'45	**Collins, Ivey Kimbrough;** May 31, 2012.
	'50	**Thigpen, Alton H.;** April 24, 2012.
	'59	**Dobyns Jr., Richard Allison;** January 21, 2013.
NC B	'38	**Gove, John R.;** July 27, 1999.
NC Γ	'38	**Jenkinson, Harvey T.;** June 2, 1997.
	'47	**Stephenson, Harold P.;** November 3, 2012.
NC Δ	'89	**Duncan, Larry Minor;** June 2009.
ND A	'52	**Mahrer, Albert H.;** July 22, 2012.
	'68	**Strong, James H.;** no details.
	'95	**Steckler, Mitchell A.;** August 2012.
OH A	'38	**Engelhardt, Richard A.;** February 25, 2011.
	'42	**Nassau, James;** November 24, 2012.
	'42	**Panek, Richard E.;** no details.
	'43	**Bletcher, Arthur L.;** no details.
	'90	**Welsh, Timothy Allen;** August 8, 2008.
OH B	'51	**Griffin, Fred McMurray;** December 27, 2012.
OH Γ	'38	**Guard Jr., Charles L.;** no details.
	'38	**Radow, Robert S.;** May 7, 1997.
	'41	**Verink Jr., Ellis D.;** no details.
	'44	**Williams, Robert O.;** July 30, 2012.
	'46	**Paprocki, Stan J.;** July 14, 2011.
	'47	**Herr, Lester A.;** October 21, 2012.
	'49	**Lamp Jr., Benson J.;** September 14, 2012.
	'49	**Lane, Sanford A.;** May 7, 2011.
	'49	**Withers, Raymond R.;** July 28, 2012.
	'50	**Hawk, Ellis L.;** November 2, 2012.
	'50	**Withrow, Alfred E.;** July 8, 2012.
	'51	**Behymer, Richard C.;** August 3, 2008.
	'53	**Priebe, Edward Paul;** November 5, 2012.
	'55	**Benford Jr., Charles L.;** January 8, 2013.
OH Δ	'56	**Okafor, Rowland M.;** November 29, 2012.
OK A	'38	**Bone, Harold K.;** October 5, 1995.
	'43	**Yarberry Jr., Hurley H.;** September 15, 2012.
	'51	**Young, Joseph P.;** September 28, 2011.
	'53	**Savage, Howard H.;** November 18, 2012.
	'61	**Foster, Charles Edward;** July 19, 2011.
	'80	**Trotter, Joel A.;** no details.
OR A	'38	**Cornell, Holly A.;** July 1, 1997.
PA A	'38	**Emrich, Raymond J.;** September 7, 2005.
	'54	**Burdick, William Elton;** July 4, 2012.
PA B	'40	**Graber, Ralph Carl;** December 27, 2012.
	'48	**Watkins, John R.;** December 12, 2009.
	'53	**Andrysick, Edward F.;** May 21, 2006.
	'53	**Hanna, Howard C.;** November 4, 2011.
	'55	**Mazeika, Daniel F.;** November 6, 2012.
	'58	**Cover, Norman W.;** April 2011.
	'61	**Conway, Joseph C.;** June 26, 2003.
PA Γ	'38	**Hargrave, Benjamin S.;** May 1, 2007.
	'38	**Pinkerton, David C.;** February 2, 2002.
	'78	**Murray, Alexander P.;** October 10, 2012.
PA Δ	'38	**Allegrini, Aldo P.;** April 11, 1988.
PA E	'51	**Rahn Jr., Hilton N.;** December 7, 2011.
PA Z	'38	**Crompton, Albert W.;** February 20, 2005.
	'38	**Hayes, James H.;** March 6, 2008.
	'38	**Jacoby, Nicholas P.;** January 23, 2002.
	'51	**Klein, Joseph C.;** July 19, 2011.
	'55	**Eddy, Donald Howard;** August 4, 2012.
PA H	'50	**Tostanoski, Bernard M.;** no details.
PA I	'68	**Brandau, Robert E.;** August 2007.
RI B	'48	**Wilbur, Leslie C.**; January 2, 2013.
	'58	**Asdoorian, John;** July 22, 2012.
	'58	**Maguire, John N.;** November 27, 2012.
SC A	'37	**Rogers, Gordon F.;** October 28, 2000.
	'38	**Chapman, James K.;** February 16, 2007.
	'41	**Edwards, James Leon;** December 16, 2012.
	'64	**Earle, Elias Preston;** January 2, 2012.
	'86	**Harris, Don R.;** January 2, 2013.
SC B	'38	**Alley, Reuben E.;** March 8, 2007.
SD A	'36	**Hatch, George Edwin;** November 14, 2012.
TN A	'36	**Gall, William R.;** November 24, 2003.
	'38	**Hellen Jr., Robert E.;** October 10, 2001.
	'38	**Matthews Jr., Robert C.;** July 23, 2000.
	'52	**Fonde, David Stuart;** December 2, 2012.
	'54	**Searcy, Charles E.;** November 16, 2012.
TN Γ	'63	**Eldridge, James E.;** December 31, 2011.
TX A	'38	**Fox, Jeff S.;** no details.
	'55	**Lyda Jr., Carl B.;** September 13, 2012.
	'58	**Curry Jr., Keys Alexander;** April 14, 2010.
	'67	**Moseley II, Joe Clifton;** November 25, 2012.
TX B	'38	**Ball, John Sigler;** December 30, 2012.
TX Γ	'38	**Pfeiffer, Paul Edwin;** October 7, 2012.
	'40	**Smith, John T.;** no details.
	'44	**De La Garza, Rodolfo;** November 8, 2007.
	'45	**Cox, Thomas H.;** September 9, 2012.
	'48	**Shelden Jr., Frank Clifton;** July 31, 2012.
	'49	**Klumb Jr., George A.;** May 29, 2012.
TX Δ	'34	**Holmes, William W.;** December 20, 2003.
	'38	**Hobgood, Price;** February 14, 1999.
	'49	**Droemer, Daniel R.;** June 19, 2012.
	'49	**Gibson, Edwin G.;** no details.
	'57	**Lyon III, Ervin F.;** February 19, 2012.
TX E	'62	**Casey, Lewis Odell;** December 31, 2012.
TX Z	'74	**Shimek, David L.;** September 30, 2012.
TX H	'62	**High, Jarald E.;** September 23, 2012.
TX Λ	'38	**Eidson Jr., John R.;** January 6, 2006.
UT A	'49	**Hahne, Edward;** no details.
VT A	'68	**Paulus, David A.;** December 12, 2012.
VA B	'38	**Gibbs, Lambeth T.;** April 4, 1998.
	'43	**Lanford, Luke D.;** January 16, 2008.
	'49	**Cahen, George L.;** November 17, 2012.
	'63	**Brothers, John A.;** no details.
VA Δ	'38	**Beebe, Matthew Roger;** March 17, 2009.
	'41	**Dobyns, Samuel Witten;** October 14, 2012.
WA A	'77	**Gorr, Lynn M.;** July 5, 2008.
WA B	'36	**Borton, John R.;** December 1, 2012.
	'38	**Farrah, George H.;** May 2, 2005.
	'38	**Radmacher, Donald S.;** October 5, 2003.
WV A	'48	**Cornetet Jr., Wendell H.;** November 18, 2012.
	'88	**McGrath, P. Brian;** September 11, 2010.
WI A	'43	**Smith, Leon D.;** 2012.
	'48	**Melby, Anton O.;** March 23, 2012.
	'58	**Blumenstock, Theodore;** January 4, 2012.
WI B	'37	**Nelson, William R.;** September 25, 2007.
	'38	**Kitzerow, Donald J.;** October 21, 2011.
	'38	**Lechtenberg, Leo J.;** October 2, 2004.
	'46	**Hurlbert, Gordon C.;** no details.
	'67	**Noelle, Wayne E.;** August 10, 2012.
WY A	'38	**Holmes, John W.;** February 14, 1997.

FAMILIES

Centenarians

Eighty-three members have previously reached their second century and been identified by The Bent. The full list is available at *www.tbp.org* under Distinguished members. We have identified four more gentlemen:

Frederick M. Foster Jr., *MI B '32*
b. March 3, 1911
d. March 5, 2012

J. Wiley Finney Jr., *TN A '33*
b. March 31, 1911

Casimir J. Doda, *WI B '36*
b. January 5, 1913

Arthur W. Allison, *SC A '35*
b. January 11, 1913

Bi-Spousal

The names of 780 Tau Beta Pi couples have appeared in The Bent. To this most popular category, we welcome 35 additional couples.

Mandy L. Barker, *SD A '82*
Timothy B. Barker, *SD A '82*

Laura H. Borden, *NC A '82*
Roy H. Borden, *IL Γ '80*

Mary Ann Reeves, *TN A '69*
Patrick Bryan, *NY N '87*

Jessica M. Brysch, *TX Λ '06*
James S. Brysch, *TX Λ '06*

Cheryl A. Crow, *MO B '87*
Timothy R. Crow, *MO B '86*

Susan V. Dadd, *CO B '96*
Jeffery S. Dadd, *CO Δ '97*

Katherine McVay-Dunning, *GA A'88*
James E. Dunning Jr., *IL Γ '89*

Amanda R. Galante, *IN B '07*
Joseph M. Galante, *IN B '06*

Bonnie K. Giddens, *TX B '89*
Kyle W. Giddens, *TX B '88*

Erika G. Hamrick, *GA A '96*
Spencer C. Hamrick, *NC A '99*

Michelle C. Hauer, *CA O '97*
Brian G. Hauer, *CA O '98*

Cindy L. Hoppe, *CO A '92*
Hans C. Hoppe, *CO A '92*

Monica L. Hawley, *MA H '90*
David W. Kaczka, *MA H '90*

Susan M. Hockenmaier, *CA E '79*
Peter A. Hockenmaier, *CA E '79*

Cynthia J. Jonas, *PA A '82*
Gordon M. Jonas, *PA A '81*

Cynthia L. Jones, *NE A '74*
William D. Jones, *NE A '74*

Sheryl L. Cossins, *SD A '94*
Jade M. Kizer, *SD A '99*

Olga Kugar, *IL Z '12*
Konstantin Kugar, *IL Z '12*

Catherine E. McCarrell, *FL Z '10*
Ian T. McCarrell, *FL Z '10*

Diane M. McPeek, *SD A '93*
Mark V. McPeek, *SD A '93*

Susan M. Moore, *SD A '92*
Patrick M. Moore, *CO A '91*

Angela M. Oberlander, *SD A '95*
Michael P. Oberlander, *SD A '95*

Kelly L. Piacsek, *WI B '96*
Thomas C. Piacsek, *WI B '91*

Brook A. Plavec, *SD A '98*
Keith J. Plavec, *SD A '98*

Martha S. Polston, *TN A '79*
Steve A. Polston, *KY B '70*

Heather M. Reed, *WY A '09*
Martin T. Reed, *WY A '09*

Glenda M. Rose, *CT B '81*
Jack D. Morris, *UT A '69*

Zhi L. Rudy, *MI Γ '10*
Ryan Q. Rudy, *MI Γ '09*

Mechele A. Ryska, *MI Θ '95*
Jason A. Ryska, *MI Θ '95*

Sherri R. Sevegney, *MI E '99*
Michael S. Sevegney, *MI E '99*

Janis C. Tsang, *MA E '87*
Paul Tze L. Tsang, *MA E '84*

Sarasina Tuchen, *IN A '89*
Michael H. Tuchen, *RI A '87*

Mary Beth D. Turek, *IN Γ '79*
Joseph A. Turek, *IN Γ '79*

Catherine M. White, *MI Γ '99*
Michael D. White, *MI Γ '99*

Judith M. Zenk, *MN A '08*
Robert P. Zenk, *MN A '08*

Multi-Generation

Baby Eamon Clark Hughey is not a member. However, mother Rachel Clark Hughey, *WI A '00*, was Chapter President, and father is Michael P. Hughey, *TX Δ '99*. They joined grandfather Robert M. "Mike" Hughey, *AL B '73*, and great-grandfather the late Grover C. Strickler, *OH Γ '44*. "Mike's" Tau Bate siblings are Carroll E. Hughey Jr., *AL A '70*, Dorothy P. Hughey, *AL A '81*, and Richard T. Hughey, *AL B '77*. Rachel's brother is Ramsey Strickler Clark, *FL A '03*. Here are more families with at least two successive generations.

The Bauer Family
(See Spring 2012 Twins)
Carol L., *MN A '85*
Amy E., *IA A '11*
Christine M., *IA A '11*

The Borden Family
Laura H., *NC A '82*
Roy H., *IL Γ '80*
Thomas A., *NC A '11*

The Bohrer-Tydeman Family
†Charles N. Bohrer, *MI Γ '37*
†Stephen F. Tydeman, *WA A '43*
Frederick J. Tydeman, *CA Δ '73*
Frederick B. Tydeman, *NV A '13*

The Boos Family
Alice A., *OH K '85*
Brandon T., *OK A '14*

The Bottum Family
†Curtis E., *MI Γ '20*
Curtis E., Jr., *IA A '48*

The Button-Shafer Family
†Charles T. Button, *OH B '25*
Janice Button-Shafer, *MA Z '54*
Charles F. Shafer, *NY Δ '92*

The Colvin Family
Sammy C., *SD A '78*
Jacob M., *SD A '03*
Matthew A., *SD A '04*

The Corey Family
Marion W., *MS A '54*
Mark W., *MS A '79*
Nannette C., *MS A '87*

The Cover Family
†Norman W., *PA B '58*
Andrew B., *PA B '82*

The Ehrgott Family
Murlin C., *NJ Γ '49*
M. Charles, Jr., *FL E '92*

The Ellsworth-Jonas Family
Richard D. Ellsworth, *UT A '48*
Cynthia J. Jonas, *PA A '82*
Gordon M. Jonas, *PA A '81*
Joseph D. Jonas, *PA A '13*

The Fann Family
James L., *SC Γ '86*
Matthew R., *SC Γ '12*

The Fitch Family
†Kenneth R., *NJ A '50*
Kenneth R., Jr., *NJ A '74*
Jeffrey S., *NY Δ '13*

The Grundmann Family
John W., *IN A '73*
Christina M., *CA Θ '09*

The Hang Family
Daniel F., *IL A '41*
Kenneth W., *IL A '66*
Daniel W., *NY Δ '99*

The Howe Family
†Paul J., *NJ A 1906*
†Harlan L., *NY Γ '44*
Donald C., *KS B '78*
Gregory D., *GA A '10*

The Hunt Family
Douglas J., *CO Δ '76*
Mallory K., *WY A '11*

The Irish Family
Frederic E., Jr., *ME A '50*
John D., *DE A '82*

The Johnk Family
Carl, *MO B '42*
Robert T., *CO B '77*
Kevin T., *CO E '13*

The Jongeward Family
Penny B., *MI Z '85*
Scott D., *MI Z '85*
Erik S., *MI H '12*

The Kromann Family
Gary B., *WA B '81*
Jenna Sue, *TX Δ '12*

The Lusted Family
John A., *LA A '69*
Kent C., *OR A '99*
Scott A., *TN A '04*

The Malloch Family
†Charles D., *MI Γ '23*
Charles D., *MI Γ '57*

The Marussich Family
Sharon B., *FL A '75*
Hector W., *FL A '75*
Lauren K., *FL B '12*

The Morrow Family
†Thomas M., *IL A '39*
Richard J., *KS A '76*
Brian H., *KS A '05*

The Piacsek-Ropella Family
Kristina M., *WI B '85*
Kathleen M., *WI B '12*

The Pierre Family
Donald A., *IL A '58*
John W., *MT A '86*
Louise O., *MT A '84*
Brian J., *ID Γ '11*

The Plotkowski Family
Paul D., *MI Θ '80*
Alexander J., *MI Λ '12*

The Snyder Family
Lisa F., *NY Θ '83*
Carl P., *MD A '12*

The Strutz Family
†George A., Jr., *OH E '55*
Michele L., *IN A '12*

The Tostanoski Family
†Bernard M., *PA H '50*
Lisa H., *PA H '12*

The Wainerdi Family
Richard E., *OK A '52*
Sean M., *TX Δ '08*
Jennifer L., *TX Δ '08*

The Winn Family
Robert C., *CO Z '68*
Kara M. Greene, *CO Z '98*

Siblings

THE BENT publishes here the names of brother and sister members, as well as pairs of twins (indicated).

The Deerman Twins
Clint R., *AL Δ '13*
Drew J., *AL Δ '13*

The Ingram Family
Robert J., *LA A '11*
Elizabeth W., *LA A '13*

The Kelly Family
Brian A., *RI A '08*
Kristen A., *RI A '06*

The Lawburgh Twins
Brian P., *SD B '13*
James H., *SD B '13*

The Mackovjak Twins
James M., *MD Γ '14*
John M., *MD Γ '14*

The Milton Twins
Adam T., *AL A '14*
Stephen T., *AL A '15*

The Nguyen Twins
Priscilla, *TX A '14*
Ursula, *TX A '14*

The Parulekar Twins
Jaya S., *IL B '15*
Medha S., *IL B '15*

The Pearson Twins
John B., IV, *PA M '13*
Taylor L., *PA M '13*

The Ponzio Triplets (two of)
Frank W., *TN Γ '11*
John M., *TN Γ '12*

The Radhakrishnan Twins
Saikripa M., *CO B '14*
Srinidhi, *CO B '14*

The Reardon Twins
Jonathan P., *VA Δ '14*
Matthew F., *VA Δ '14*

The Sikorski Twins
Anthony E., *IN Γ '13*
Henry J., *IN Γ '13*

The Sullivan Twins
Jonathan S., *NJ B '12*
Zachary S., *NJ B '12*

The Waselewski Twins
Alexander C., *MI Γ '15*
Eric A., *MI Γ '15*

The Weintraub Twins
Elie, *NY I '14*
Hillel J., *NY I '14*

The Welsh Twins
Elise A., *TX B '12*
Jennifer M., *TX B '12*

† Member is deceased.

California Delta

Roberto C. Medrano, '80, was named to the HITEC 100 by the Hispanic IT Executive Council, an award that recognizes professionals in information technology. He is executive vice president at SOA Software, a provider of enterprise API management and SOA governance solutions.

California Epsilon

Asad M. Madni, Ph.D., '69, has received the 2012 IEEE Aerospace and Electronic Systems Society's Pioneer Award.

He was president, chief operating officer, and CTO of BEI Technologies Inc. from 1992 until his retirement in 2006. Madni led development of micro-sensors and systems for aerospace, military, and transportation industries, including the gyrochip technology used for stability control and rollover protection in passenger vehicles.

California Lambda

Rory R. Davis, Ph.D., P.E., '79, is lead engineer of analysis-driven design and senior technical advisor at consulting firm ATA Engineering, Inc., in San Diego, CA.

Colorado Alpha

Megan M. Woodworth, '13, was chosen to lead the 2012 Academic All-America NCAA Division II women's soccer teams by the College Sports Information Directors of America. She was a third team Academic All-America selection as a sophomore, and led the Orediggers to a berth in the South Central Regionals.

Connecticut Alpha

Philip J. Bronstein, '12, is a financial analyst at the Yale Investments Office in New Haven, CT.

Florida Alpha

Barney L. Capehart, Ph.D., '61, received 2012 fellow awards from the Association of Energy Engineers, and the American Society of Heating, Refrigerating and Air Conditioning Engineers. Dr. Capehart is a professor emeritus in the college of engineering at the University of Florida, and is a Fellow of AAAS, IIE, and IIEE.

Indiana Alpha

Barbara B. Haney, '79, and **Walter C. Riordan,** Arizona Alpha '80, were married May 26 in Tempe, AZ. They met while engineers at Intel Corporation, Chandler, AZ. She is currently a program manager at Medtronic, in Tempe, and they live in Phoenix, AZ.

Indiana Beta

Richard R. Roll, '81, received the 2012 environmental engineer award from the New York Water Environment Association. This recognizes a member who has made a significant impact on environmental engineering and management, and has demonstrated a long-term commitment. Roll is director of technical and regulatory services for the Niagara Falls Water Board.

Kentucky Alpha

Tyler H. Riggs, '13, was voted a 2012 first-team Academic All-America by the College Sports Information Directors Association. The Kentucky junior men's soccer forward, a third-team Academic All-American selection in 2011, is the first player in program history to earn the award multiple times in his career. He was UK's leading scorer for two consecutive years.

Massachusetts Beta

Ivan K. Fong, '83, has been named senior vice president, legal affairs and general counsel of the 3M Co. His previous positions included general counsel of the U.S. Department of Homeland Security; chief legal officer and secretary of Cardinal Health, Inc.; senior vice president and general counsel of GE Vendor Financial Services; and chief privacy leader and senior counsel, information technology of the General Electric Co.

Michigan Eta

Jeffrey M. Roman, P.E., '01, has joined architecture and design firm Little as its national director of engineering. This follows fifteen years of experience encompassing a wide range of project types, including commercial workplace, retail, civic, education, and mixed-use.

Michigan Kappa

Telly J. Townsend, '12, is now with engineering consulting and testing firm Professional Services Industries (PSI) as a staff engineer in Cypress, CA.

New York Eta

Jeffrey M. Levy, P.E., '74, is president

and CEO of RailWorks Corporation, provider of track and transit systems construction services throughout North America. He also serves on organizations including the New York Building Congress, Construction Industry Round Table, Nontraditional Employment for Women, and the ACE Mentor Program.

New York Lambda

Kevin T. Kornegay, Ph.D., '85, is the Motorola Foundation professor and associate professor at Georgia Institute of Technology's school of electrical and computer engineering. He also serves on the technical program committees of the Custom Integrated Circuits Conference, the International Solid-State Circuits Conference, the Radio Frequency Integrated Circuits Symposium, and the International Conference on Circuits and Systems.

North Carolina Delta

Ronnie R. Fesperman Jr., Ph.D., P.E., '01, is a mechanical engineer with the National Institute of Standards and Technology. He is at the production systems group of the intelligent systems division in Gaithersburg, MD.

Ohio Alpha

Jacquie Jost Barker, '78, has launched a non-profit organization, Pets Bring Joy, focused on animal rescue. She is also still involved in her career as a software engineer and offers object technology mentorship and training via ObjectStart LLC. Barker recently authored *Taming the Technology Tidal Wave: Practical Career Advice for IT Professionals.*

Ohio Zeta

Ellie R. Armstrong, '01, and **Chris K. Armstrong,** '00, have welcomed Simone Allison, who "was 7 lbs 0 oz, 19 3/4 inches long and just perfect." District 7 Director Ellie added: "Her big brothers are thrilled and we are all doing well."

Ohio Gamma

Gary A. Mirka, Ph.D., '85, is associate dean for undergraduate and graduate education at the Iowa State University college of engineering. Previously he was professor and department chair of industrial and manufacturing systems engineering. He joined ISU in 2007 after 15 years on the faculty at North Carolina State University.

Texas Theta

Gerald G. Barrett, '70, has completed all the requirements to become a Distinguished Toastmaster. This is the highest educational achievement awarded by Toastmasters International, which focuses on developing communications and leadership skills. Jerry was recognized as the district toastmaster of the year at the District 55 (Central and South Texas) Fall 2012 conference in Austin.

Tennessee Gamma

David W. Bible, P.E., '87, below, and **Eriks W. Jekabsons,** P.E., '95, have joined the engineering and architectural firm Barge, Waggoner, Sumner, and Cannon, Inc. Bible, who was a project manager for ARCADIS US, is with the water services group in the Chattanooga, TN, office as a project manager. Jekabsons is a senior structural engineer in the industrial and building services group in Knoxville, TN. He previously was a senior structural engineer at Merrick & Company in Oak Ridge, TN.

Washington Gamma

Bradley D. Swanson, P.E., '95, is an attorney with Belcher Swanson Law Firm, PLLC, in Bellingham, WA. The firm provides legal services in a variety of areas, with a special emphasis in real estate and business matters.

Texas Alpha

Matthew T. Smith, M.D., '92, has been named by Baylor Medical Center at Carrollton, TX, as its first vice president of medical affairs and chief medical officer. As VPMA, Smith will be responsible for leading improvements in quality, safety, electronic health record implementation, and medical staff support.

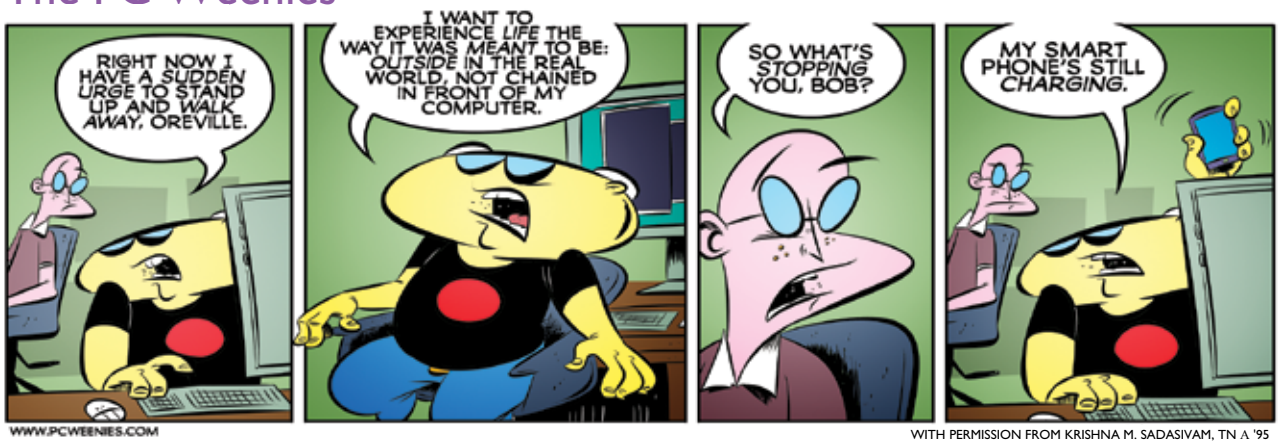
Texas Delta

Lance L. Stricklin, P.E, '88, is senior counsel for international trade compliance at Halliburton Energy Services, Inc., in Houston, TX.

Write Your Own Note!

Your fellow Tau Bates are interested in news about you. Send items about civic activities, honors won, weddings, births, promotions, changes in address, etc. to Tau Beta Pi, P.O. Box 2697, Knoxville, TN 37901-2697 or to *alumnote@tbp.org*. Material for publication must be received for the **Spring** issue by February 1, **Summer** issue by May 1, **Fall** issue by August 1, and **Winter** issue by November 1. Include name, address, chapter, class year, and email address or phone number. Thank you!

The PC Weenies



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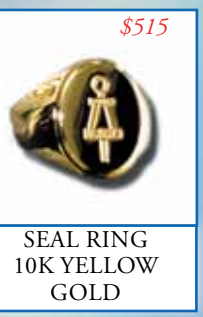

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