SPRING 2022

The Bent

Of Tau Beta Pi

THE ENGINEERING HONOR SOCIETY

Decarbonizing the Atmosphere

NAE Fellows 2022

ALUMNI CHAPTERS

79 ALUMNI CHAPTERS
47 ACTIVE

*Inactive chapters shown in **BLUE***

DISTRICT 1
Central CT, Hartford
Greater Boston Area, MA

DISTRICT 2
Buffalo, NY
Central Jersey, NJ
LI Suburban, NY
Newark, NJ
New York City, NY
New York Capital District, NY
Rochester, NY
Southern Tier, Binghamton, NY

DISTRICT 3
Lehigh Valley, Bethlehem, PA
Philadelphia, PA
Pittsburgh, PA
Wilmington, DE

DISTRICT 4
Baltimore, MD
Hampton Roads, Newport News, VA
Kanawha Valley, Charleston, WV
Research Triangle, Durham-Chapel Hill-Raleigh, NC
Richmond, VA
Washington, DC

DISTRICT 5
Atlanta, GA
Central FL, Orlando
Daytona Beach, FL
Gainesville, FL
Miami, FL
Midlands, Columbia, SC
Palm Beach/ Broward, FL
Piedmont, Clemson, SC
Puerto Rico
Tampa Bay, FL

DISTRICT 6
Bluegrass, Lexington-Frankfort, KY
Central Alabama, Birmingham
Great Smoky Mountains, Knoxville-Oak Ridge, TN
Greater Gulf Coast, Mobile, AL
Louisville, KY
Mid-South, Memphis, TN
Rocket City, Huntsville, AL

DISTRICT 7
Ann Arbor Area, MI
Central MI, Lansing
Cincinnati, OH
Columbus, OH
Dayton, OH
Flint, MI
Ohio's North Coast, Cleveland
SE Michigan, Detroit
West Michigan, Grand Rapids

DISTRICT 8
Chicago Area, IL
Central Illinois, Urbana-Champaign
Indianapolis, IN
Milwaukee Area, WI

DISTRICT 9
Kansas City, KS
Pioneer, OK
Rolla, MO
St. Louis, MO

DISTRICT 10
Central Texas, Austin/San Antonio
North Texas, Dallas-Fort Worth
Greater New Orleans, LA
Texas Gulf Coast, Houston

DISTRICT 11
Ames, IA
Minnesota, Twin Cities, MN

DISTRICT 12
Pikes Peak, CO
Front Range, CO/WY
Salt Lake City, UT
Treasure Valley, Boise, ID

DISTRICT 13
Albuquerque, NM
El Paso, TX
Phoenix, AZ
Sun City, AZ
Tucson, AZ

DISTRICT 14
Columbia River Basin, Richland, WA
Portland, OR
Puget Sound, Seattle, WA

DISTRICT 15
Sacramento Vly, CA
SF Bay Area, CA
SF Peninsula, Palo Alto, CA

DISTRICT 16
Los Angeles, CA
Orange County, CA
Greater San Diego, California
Southern California

COLLEGIATE CHAPTERS

257 COLLEGIATE CHAPTERS
622,158 MEMBERS

*6 Inactive chapters shown in **BLUE***

Α = ALPHA
Β = BETA
Γ = GAMMA
Δ = DELTA
Ε = EPSILON
Ζ = ZETA
Η = ETA
Θ = THETA
Ι = IOTA
Κ = KAPPA
Λ = LAMBDA
Μ = MU
Ν = NU
Ξ = XI
Ο = OMICRON
Π = PI
Ρ = RHO
Σ = SIGMA
Τ = TAU
Υ = UPSILON
Φ = PHI
Χ = CHI
Ψ = PSI
Ω = OMEGA

AL ALPHA Auburn University
BETA University of Alabama
GAMMA Univ. of Ala. at Birmingham
DELTA Univ. of Ala. in Huntsville
EPSILON Univ. of South Alabama
AK ALPHA Univ. of Alaska Fairbanks
AZ ALPHA University of Arizona
BETA Arizona State University
GAMMA Northern Arizona University
DELTA Embry-Riddle Univ., Prescott
AR ALPHA University of Arkansas
BETA Univ. of Ark. at Little Rock
CA ALPHA UC Berkeley
BETA Calif. Institute of Technology
GAMMA Stanford University
DELTA University of Southern Calif.
EPSILON UC Los Angeles
ZETA Santa Clara University
ETA San Jose State University
THETA Calif. State Univ., Long Beach
IOTA Calif. State Univ., Los Angeles
KAPPA Calif. State Univ., Northridge
LAMBDA UC Davis
MU Calif. Poly St. Univ., San Luis Obispo
NU Calif. State Poly Univ., Pomona
XI San Diego State University
OMICRON Loyola Marymount Univ.
PI Northrop University (inactive)
RHO California State Univ., Fresno
SIGMA UC Santa Barbara
TAU University of California, Irvine
UPSILON Calif. St. Univ., Sacramento
PHI University of the Pacific
CHI California State Univ., Fullerton
PSI UC San Diego
OMEGA Harvey Mudd College
ALPHA ALPHA Calif. St. Univ., Chico
ALPHA BETA UC Riverside
ALPHA GAMMA San Francisco St. Univ.
ALPHA DELTA UC Santa Cruz
ALPHA EPSILON Univ. of San Diego
CO ALPHA Colorado School of Mines
BETA Univ. of Colorado at Boulder
GAMMA University of Denver
DELTA Colorado State University
EPSILON Univ. of Colorado at Denver
ZETA U.S. Air Force Academy
CT ALPHA Yale University
BETA University of Connecticut
GAMMA University of Hartford
DE ALPHA University of Delaware
DC ALPHA Howard University
BETA Catholic Univ. of America
GAMMA George Washington Univ.
FL ALPHA University of Florida
BETA University of Miami
GAMMA University of South Florida
DELTA University of Central Florida
EPSILON Florida Atlantic University
ZETA Florida Institute of Technology
ETA FL A&M Univ.-FL State Univ.
THETA Florida International Univ.
IOTA Embry-Riddle Aero. Univ.
GA ALPHA Georgia Institute of Technology
BETA Mercer University
GAMMA Georgia Southern Univ.
ID ALPHA University of Idaho
BETA Idaho State University
GAMMA Boise State University
DELTA Brigham Young Univ.-Idaho
IL ALPHA Univ. of IL at Urbana-Champaign
BETA Illinois Institute of Technology
GAMMA Northwestern University
DELTA Bradley University
EPSILON S. Illinois Univ. at Carbondale
ZETA University of Illinois at Chicago
IN ALPHA Purdue University
BETA Rose-Hulman Inst. of Technology
GAMMA University of Notre Dame
DELTA Valparaiso University
EPSILON Trine University
ZETA Indiana Univ.-Purdue Univ. Indpls.
IA ALPHA Iowa State University
BETA University of Iowa
KS ALPHA University of Kansas
BETA Wichita State University
GAMMA Kansas State University
KY ALPHA University of Kentucky
BETA University of Louisville
GAMMA Western Kentucky University
LA ALPHA Louisiana State University
BETA Tulane University
GAMMA Louisiana Tech. University
DELTA Univ. of Louisiana at Lafayette
EPSILON University of New Orleans
ME ALPHA University of Maine
MD ALPHA Johns Hopkins Univ.
BETA University of Maryland
GAMMA U.S. Naval Academy
DELTA Univ. of Maryland Baltimore Co.
EPSILON Morgan State University
MA ALPHA Worcester Polytechnic Inst.
BETA Massachusetts Inst. of Tech.
GAMMA Harvard University (inactive)
DELTA Tufts University
EPSILON Northeastern University
ZETA University of Mass. at Amherst
ETA Boston University
THETA Univ. of Massachusetts Lowell
IOTA Western New England Univ.
MI ALPHA Michigan State University
BETA Michigan Technological Univ.
GAMMA University of Michigan
DELTA University of Detroit Mercy
EPSILON Wayne State University
ZETA Kettering University
ETA Lawrence Technological Univ.
THETA Oakland University
IOTA Univ. of Michigan-Dearborn
KAPPA Western Michigan Univ.
LAMBDA Grand Valley State Univ.
MN ALPHA Univ. of Minnesota-Twin Cities
BETA Univ. of Minnesota, Duluth
MS ALPHA Mississippi State University
BETA University of Mississippi
MO ALPHA Univ. of Missouri-Columbia
BETA Missouri Univ. of Science & Tech.
GAMMA Washington University
DELTA Univ. of Missouri-Kansas City
EPSILON Saint Louis University
MT ALPHA Montana State University
BETA Montana Tech. of the Univ. of MT
NE ALPHA Univ. of Nebraska-Lincoln
NV ALPHA University of Nevada, Reno
BETA Univ. of Nevada, Las Vegas
NH ALPHA Univ. of New Hampshire
BETA Dartmouth College
NJ ALPHA Stevens Institute of Technology
BETA Rutgers University
GAMMA New Jersey Inst. of Tech.
DELTA Princeton University
EPSILON Rowan University
ZETA The College of New Jersey
NM ALPHA New Mexico State University
BETA University of New Mexico
GAMMA NM Inst. of Mining & Tech.
NY ALPHA Columbia University
BETA Syracuse University
GAMMA Rensselaer Polytechnic Inst.
DELTA Cornell University
EPSILON New York Univ. (inactive)
ZETA Brooklyn Polytechnic (inactive)
ETA City College of CUNY
THETA Clarkson University
IOTA Cooper Union School of Eng'g.
KAPPA University of Rochester
LAMBDA Pratt Institute (inactive)
MU Union College
NU SUNY at Buffalo
XI Manhattan College
OMICRON SUNY at Stony Brook
PI Rochester Institute of Tech.
RHO NYU Tandon School of Eng'g.
SIGMA Alfred University
TAU Binghamton University
UPSILON U.S. Military Academy
NC ALPHA North Carolina State Univ.
BETA Univ. of North Carolina (inactive)
GAMMA Duke University
DELTA Univ. of NC at Charlotte
EPSILON NC A&T State University
ZETA East Carolina University
ND ALPHA North Dakota State University
BETA University of North Dakota
OH ALPHA Case Western Reserve Univ.
BETA University of Cincinnati
GAMMA Ohio State University
DELTA Ohio University
EPSILON Cleveland State Univ.
ZETA University of Toledo
ETA Air Force Institute of Tech.
THETA University of Dayton
IOTA Ohio Northern University
KAPPA University of Akron
LAMBDA Youngstown State Univ.
MU Wright State University
NU Cedarville University
XI Miami University
OK ALPHA University of Oklahoma
BETA University of Tulsa
GAMMA Oklahoma State University
OR ALPHA Oregon State University
BETA Portland State University
GAMMA University of Portland
DELTA Oregon Institute of Tech.
PA ALPHA Lehigh University
BETA Pennsylvania State University
GAMMA Carnegie Mellon University
DELTA University of Pennsylvania
EPSILON Lafayette College
ZETA Drexel University
ETA Bucknell University
THETA Villanova University
IOTA Widener University
KAPPA Swarthmore College
LAMBDA University of Pittsburgh
MU Penn State Erie, Behrend College
PR ALPHA University of Puerto Rico
RI ALPHA Brown University
BETA University of Rhode Island
SC ALPHA Clemson University
BETA University of South Carolina
GAMMA The Citadel
SD ALPHA S. Dakota Sch. of Mines & Tech.
BETA South Dakota State University
TN ALPHA University of Tennessee
BETA Vanderbilt University
GAMMA Tennessee Tech. University
DELTA Christian Brothers Univ.
EPSILON University of Memphis
ZETA Univ. of Tenn. at Chattanooga
TX ALPHA University of Texas at Austin
BETA Texas Tech. University
GAMMA Rice University
DELTA Texas A&M University
EPSILON University of Houston
ZETA Lamar University
ETA Univ. of Texas at Arlington
THETA Univ. of Texas at El Paso
IOTA Southern Methodist University
KAPPA Prairie View A&M University
LAMBDA Texas A&M Univ.-Kingsville
MU Univ. of Texas at San Antonio
NU Univ. of Texas Rio Grande Valley
XI University of Texas at Dallas
UT ALPHA University of Utah
BETA Brigham Young University
GAMMA Utah State University
VT ALPHA University of Vermont
BETA Norwich University
VA ALPHA University of Virginia
BETA Virginia Poly. Inst. & State Univ.
GAMMA Old Dominion University
DELTA Virginia Military Institute
EPSILON Virginia Commonwealth Univ.
WA ALPHA University of Washington
BETA Washington State University
GAMMA Seattle University
DELTA Gonzaga University
WV ALPHA West Virginia University
BETA West Virginia Univ. Inst. of Tech.
WI ALPHA Univ. of Wisconsin-Madison
BETA Marquette University
GAMMA Univ. of Wlisconsin-Milwaukee
DELTA Milwaukee School of Eng'g.
EPSILON Univ. of Wisconsin-Platteville
WY ALPHA University of Wyoming

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Tau Beta Pi was founded at Lehigh University, South Bethlehem, PA, 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 and Trademark Office.

Member, *American Society for Engineering Education*; co-founder *Association of College Honor Societies*; and Affiliate, *American Association for the Advancement of Science.*

VISIT www.tbp.org

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COUNCIL'S CORNER

MingDe Lin, Ph.D., *NY Γ '01*, ΤΒΠ 2022 Councillor

BUILDING INTENTIONAL COMMUNITY

Hello Tau Bates,

I hope 2022 has been going well so far and you have been weathering the pandemic as best you can. In 2021, the Executive Council (EC) operated fully virtual with select hybrid in-person meetings. Although video conferencing kept us connected, I longed for the closeness of in-person community with family and friends. This desire for communal connection underscores the vision and plans the EC has to improve networking, accessibility, and diversity within our membership and outreach.

Many Tau Bates have been exploring the role the Association can play in society on the topic of diversity and inclusion. We are leaders in our field and an organization which prides itself on both distinguished scholarship and exemplary character. The Diversity, Equity, and Inclusion (DEI) Committee, chartered in December 2021, was created to cast a wider net in our aim for better outreach and inclusiveness. Five sub-committees were formed to research current initiatives from technical societies and published work, to promote a welcoming environment within ΤΒΠ, to engage underrepresented individuals within the engineering pipeline, to promote nominations for Association awards, and to develop initiatives that increase initiation rates. We believe these efforts will improve networking, accessibility, and diversity which will help unify members of our community.

While participating in both the alumni and collegiate levels, I have seen firsthand the importance of nurturing collegiate Tau Bates to become alumni who continue the progress of ΤΒΠ's mission. I have experienced the positive outcomes when local alumni invest in our collegiate members. Questions that I often hear from graduating Tau Bates include: "What do alumni chapters do?", "Is there an active chapter where I'm going?", and "How do I get involved?" Alumni members often ask: "Why is there limited participation from regional collegiate members?" and "How can we better partner with collegiate members?" Clearly, there is a need to bridge the gap between collegiate and alumni members to better sustain and grow ΤΒΠ. Our goal is to improve the connection with local faculty and alumni advisors; they are the long-term advocates for ΤΒΠ within the collegiate chapters, which are the source of new members. We also aspire to clearly present the value of ΤΒΠ membership and the return on investment to deans and department chairs while including and involving the career centers.

Work is being done to revamp the Association Management System (AMS), which will improve information exchanges between chapters and ΤΒΠ HQ, as well as between the chapters. With a stronger and better connected membership platform, membership transitions such as collegiate to alumni, or joining a new alumni chapter will become seamless. The system will make updating contact information easier and assist HQ in reconnecting with members who have missing or incomplete information. An updated AMS will come at an opportune time whereby the role of mentor-mentee relationship has become even more precious and valuable —especially in light of the pandemic, which has been limiting professional development and relationship-building. This will open opportunities to facilitate ΤΒΠ relationships by connecting members with similar interests or career objectives. Mentorship relationships help develop career opportunities and gain insight through close collaborative partnerships with mentors. Engaging in new opportunities, projects, and activities outside of the educational setting are experiences that make ΤΒΠ an exceptional organization.

Two personal mentor-mentee relationships within ΤΒΠ helped push my career forward and opened my eyes to new approaches. I had, by and large, kept an unrevised curriculum vitae (CV) since graduate school all the way through my first job, only updating the list of new scientific manuscripts I published. The content and structure, however, remained the same. When my tenure was concluding, I realized my CV needed work. I met Richard A. Campos, Ph.D., ***NY A '85***, at a healthcare hackathon in 2018, and shared with him the desire to put my best foot forward when it came to my CV. He graciously agreed to help guide me in restructuring my CV so it highlighted my direct contribution and role in project results and success. When an opportunity presented itself, I was prepared with a more representative CV resulting in my current job directing clinical research partnerships with academic hospitals. My second example was receiving help from District 4 Director Russell L. Werneth, ***MD B '64***, in reactivating the Baltimore Alumni Chapter in 2014. He kindly provided the chapter a personal tour of the Goddard Space Flight Center in Greenbelt, MD. We saw the assembly and testing of the James Webb Space Telescope in the world's largest clean room. The visit was a great experience, quite different from my biomedical engineering work settings.

In both experiences, I learned new things and built life-long relationships with fellow Tau Bates. In the same vein, I have been paying it forward through my involvement with the members of the CT Alpha Chapter at Yale University.

Continues on page 56.

YOUR LETTERS

Send letters to media@tbp.org. Text may be edited for length and clarity; not all letters can be published.

History of Howard University

I enjoyed your Howard University article. However, as a 50-year resident of West Stockbridge, MA, and "historian" of our historical society, I am compelled to provide a clarification. Howard University was conceived in 1866, largely by the Board of DC's First Congregational Church, led by Minister Charles Boynton. Their initial recognition was the need for trained black ministers. In 1867, the name was changed to Howard University and Boynton was recognized as president. On March 2, 1867, Congress chartered Howard University and in August, Byron Sunderland replaced Boynton as president.

William A. Loeb, *MA B '45*

Why Do We Call It a Curie

I would like to add a couple of minor points to your article about Marie Curie.

Originally, Curie was not nominated for the Nobel Prize in Physics. The two nominees, Pierre Curie and Henri Bequerel, insisted that she be included in the award. The result was the first woman to win a Nobel Prize.

In addition, Marie and Irene Curie are the first parent/child pair to win Nobel Prizes. This would not happen again until the Bohr's in the 1950s.

Victor J. Skowronski, Ph.D.*, NJ A '71*

Realm of Engineering & Music

As a semi-professional musician (composer, arranger, and performer), one important item missing from this welcome piece is the existence of music notation software such as Finale, Sibelius, and others. Most sheet music is no longer written on paper with india ink and fountain pens, as I learned to do some 50 years ago, but is instead printed from a computer running a music notation program. Such software is used by most professionals working in musical theater and scoring films. It has made a huge difference in productivity in that it is as easy to make a change in a musical document as it is in a word document, while the old "technology" was pen and ink.

Alan Glasser, *NY Z '74*

Realm of Engineering & Music

While I enjoyed Moormon's article, the scope was much narrower than what was indicated by the title. She focused almost exclusively on electrical/computer issues in the creation and recording of music. I also expected a robust discussion of acoustic engineering, which is used extensively in the creation of instruments, performance venues, and recording studios.

Rev. Rich R. Andre, *NY K '96*

Realm of Engineering & Music

I thoroughly enjoyed the article by Bridget Moorman. I worked as a sub-micron chip (ASIC) designer at IBM for 32 years. My wife and I met singing in the Chamber Singers at the University of California, Davis, and we have been active community and church musicians for our entire lives. After retiring from IBM in 2013, I immediately went back to graduate school and earned a master's of music degree in choral conducting at San Jose State University. Since graduation, my encore career has involved directing a local Presbyterian Church choir and a non-auditioned 40-voice women's chorus.

Along with everyone else in the music and engineering communities, our musical lives took an immediate turn in March 2020. Both of my choirs began rehearsing (as best we could) on Zoom. Also, I started producing virtual videos of our church choir. For the past two years, I have been using software skills I acquired during my career at IBM to learn and integrate audio (Audacity) and video (DaVinci Resolve) processing software into our musical lives. While it has been very difficult to make music during our enforced time apart, the technology of Zoom and these DAW components have allowed people from across the country (as far away as North Carolina) to join our central-California choir.

Thanks for a great reflection on the intersection of engineering and music!

Hugh W. McDevitt, *CA Λ '81*

Realm of Engineering & Music

I am a long-time reader of the magazine and enjoyed this piece on engineering's role in music. I began a technical career in my early teens by recording musical performances at a summer camp for souvenir LPs, progressing to concert sound reinforcement while in college — along with designing a recording studio as an independent study project — so it's good to see this aspect of engineering covered for the broader engineering community.

Andy H. Maltz, *NY N '82*

FROM THE EDITORS

Dylan Lane and **Patricia McDaniel**

SAYING GOODBYE TO THE GECKO

March 31 will mark the end of a 15-year partnership with GEICO and the last day to take advantage of the exclusive TBII member discount on new insurance policies. The Association has promoted this benefit of membership since 2007. Many members may not know that GEICO has sponsored thirteen $2,000 Scholarships, six $10,000 Fellowships, and the Award Banquet at Conventions since 2007. As a regular exhibitor at our Convention recruiting fairs, members met the Gecko in person and have come away with clever t-shirts and various sizes of stuffed Geckos as souvenirs. See GEICO's ad on the inside back cover. Please contact *pat@tbp.org* if you have questions.

The Editorial Staff apologizes for the following error:

In the Winter 2022 issue, page 46 of Alumni Notes, it was incorrectly noted that David J. Miller, *MA E '71*, has degrees from Northwestern University. David's degrees were earned at **Northeastern University**. We apologize for this error.

Thank you to our readers for helping maintain the accuracy of the magazine. If you find an error or inconsistency, please email dylan@tbp.org *or call 865/546-4578.*

WHO'S WHO IN TAU BETA PI

Recognizing Tau Bate accomplishments

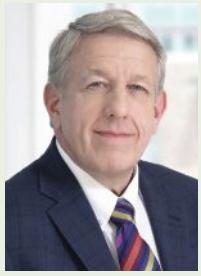
Marvin L. Adams Ph.D.

Mississippi Alpha '81

was named to the President's Council of Advisors on Science and Technology. He is a professor of nuclear engineering, a Regents Fellow, and Director of National Laboratories Mission Support for the Texas A&M University System. Dr. Adams will be one of 30 members of the council advising President Biden and is considered the nation's foremost academic expert in nuclear stockpile stewardship.

Brad W. Corson Ph.D.

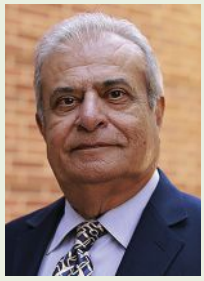
Alabama Alpha '83



was honored as a Distinguished Auburn Engineer by the Alumni Engineering Council for his distinguished professional career. Since 2020, he has served as chairman, president, and CEO of Imperial Oil, Canada's largest petroleum refiner. Previously, he was president of Upstream Ventures and VP of ExxonMobil Corp. and earned his B.S. in chemical engineering from Auburn.

Asad M. Madni Ph.D.

California Epsilon '69



was selected to receive the 2022 IEEE Medal of Honor, the institute's highest award and "Nobel Prize" of the electronics field. He was recognized "for pioneering contributions to the development and commercialization of innovative sensing and systems technologies, and for distinguished research leadership." He is a distinguished adjunct professor at UCLA and retired president & CEO of BEI Technologies, Inc.

Rhonda Jordan Antoine Ph.D.

New York Alpha '04

received a 2021 U.S. C3E International Award from the U.S. Clean Energy Education & Empowerment Initiative. As a senior energy specialist at The World Bank, she works on energy investment and advisory projects across Sub-Saharan Africa. She has worked around the world in areas of power sector planning, solar home system deployment, and renewable energy integration.

Stephen R.P. Edwards

Florida Theta '07

was appointed managing director of the National Road Operating and Constructing Company Ltd. in Jamaica. A former lecturer in the faculty of engineering and computing at the University of Technology, Jamaica, he earned a B.S. in civil engineering from FIU. His focus will be on the construction and management of a modern network of highways and support roads across the country.

Sonya T. Smith Ph.D.

Virginia Alpha '94

is president of Women in Engineering ProActive Network, Inc. (WEPAN) and was recently elected to the American Academy of Arts and Sciences. A professor of mechanical eng'g and director of the Applied Fluids & Thermal Engineering Research Laboratory at Howard University, Dr. Smith previously served as Sigma Xi president and a DC Alpha Chapter Advisor.

NATIONAL ACADEMY OF MEDICINE

Three Tau Bates were elected as members of the National Academy of Medicine. Election to the Academy is considered one of the highest honors in the fields of health and medicine.

Guillermo Antonio Ameer Sc.D. — *Texas Alpha '93*
Professor of biomedical engineering and surgery at Northwestern University Feinberg School of Medicine.

David E. Clapham M.D., Ph.D. — *Georgia Alpha '74*
President and Chief Scientific Officer, Howard Hughes Medical Institute and Harvard Medical School Professor Emeritus.

Andrés J. Garcia Ph.D. — *New York Delta '91*
Executive Director, Petit Institute for Bioengineering and Bioscience and Regents' Professor at Georgia Institute of Technology.

Ameer

Clapham

Garcia

Eric Werwa Ph.D.

Pennsylvania Delta '92

was appointed deputy assistant secretary for policy and environmental management in the Office of Policy, Management and Budget at the U.S. Department of the Interior by President Biden. Previously, Eric served as Deputy Chief of Staff and Legislative Director for Rep. Deb Haaland, who is now Interior Secretary. He graduated from UPenn with a B.S. in materials science & eng'g and earned a Ph.D. from MIT.

THE NATIONAL ACADEMY OF ENGINEERING (NAE)

Elects 111 New Members

President John L. Anderson, Ph.D., *DE A '67*, has announced the election of **111 new members** and **22 international members** to the NAE. Election to the Academy is among the highest professional distinctions accorded to an engineer. It honors those who have made outstanding contributions to "engineering research, practice, or education" and to "pioneering of new and developing fields of technology and making major advancements... ." **The 30 new Tau Beta Pi/NAE members are listed below.**

Ahmad K. Abdelrazaq, *TX A '83*
Former senior executive vice president, Samsung C&T Corp., South Korea. For innovation in design, construction, and health monitoring of the world's tallest and most complex building structures.

Rena Bizios, Ph.D., *MA Z '68*
Endowed Chair Professor, University of Texas, San Antonio. For contributions to the theory and applications of cellular tissue engineering, cell/biomaterial interactions, and surface modification biomaterials.

Robert L. Clark Jr., Ph.D., *VA B '87*
Mechanical eng'g professor, Univ. of Rochester. For development of automated tools for rapidly identifying and indexing desirable genetic traits for next-generation seed & biotechnology product development.

Louis J. Durlofsky, Ph.D., *PA B '81*
Professor, department of energy resources, Stanford University. For the development of innovative modeling and optimization techniques to enable the recovery of hydrocarbon and water resources.

William S. Hammack, Ph.D., *MI B '84*
ChBE professor, Univ. of Illinois, Urbana-Champaign. For innovations in multidisciplinary eng'g education, outreach & service to the profession through development & communication of internet-delivered content.

John D. Hooper, P.E., S.E., *WA Γ '81*
Director, earthquake engineering, Magnusson Klemencic Associates, WA. For advancement of building code seismic design provisions and earthquake-resistant structural design of major buildings.

Jill M. Hruby, *IN A '81*
Undersecretary for nuclear security, U.S. Department of Energy, and administrator, National Nuclear Security Administration, NM. For exceptional service and blazing a trail for women in national security & eng'g.

Petros A. Ioannou, Ph.D., *IL A '82*
Chair and professor, Viterbi SOE, University of Southern California. For contributions to robust adaptive control and intelligent transportation systems for improved traffic flow and driver safety.

Samson A. Jenekhe, Ph.D., *MI B '77*
Professor, chemical engineering, University of Washington. For discovery and understanding of conjugated materials for organic light-emitting diodes (OLEDs) widely used in the commercial sector.

Christoper W. Jones, Ph.D., *MI Γ '95*
ChBE professor and chair, Georgia Tech. For contributions to the design & synthesis of catalytic materials and for advancing technologies related to carbon capture and sequestration.

Thomas W. Kenny, Ph.D., *CA Γ '83*
Professor, school of engineering, Stanford University. For the performance enhancement and commercialization of silicon MEMS resonators for timing applications.

Nicholas D. Lappos, *GA A '73*
Senior technical fellow (emeritus), Sikorsky Aircraft Corp., Lockheed Martin Corp., UT. For improving rotary wing flight performance and serving as test pilot, engineer, inventor, technologist, and business leader.

Rebecca B. Liebert, Ph.D., *KY A '90*
Executive vice president, global industrial & automotive OEM coatings businesses, PPG Industries Inc., PA. For leadership in developing and executing innovative initiatives to strengthen the U.S. manufacturing industry.

Robert J. Madix, Ph.D., *IL A '61*
Sr. research fellow, Harvard Univ., SOE. For development of quantitative models for predicting catalytic selectivity through fundamental understanding of reaction mechanism and kinetics.

John C. Mauro, Ph.D., *NY Σ '01*
MATSE professor, Pennsylvania State University. For developing and applying data-driven models and machine learning that enable high-strength, damage-resistant glasses.

John D. McDonald, P.E., *IN A '73*
Smart grid business development leader, GE Grid Solutions, GA. For leadership in smart grid development and for advancing the professional growth of power system engineers.

Sanjay Mehrotra, *CA A '78*
President and chief executive officer, Micron Technology Inc., CA. For contributions to nonvolatile memory design and architecture enabling multilevel cell NAND flash products.

Roland J. Menassa, Ph.D., *NY Θ '84*
Vice president, manufacturing technology, Champion Home Builders, MI. For contributions to robotics and automation in aerospace, automotive, and e-commerce.

Daniel N. Miller, *WI A '85*
Senior fellow, The Skunk Works, Lockheed Martin Corp., WA. For theoretical contributions and practical innovations in flow control that improve the performance of aircraft propulsion systems.

Al Myers, *IL A '70*
President and founder, Ag Leader Technology, IA. For inventing and bringing to market technology that is the foundation of precision agriculture.

Roger M. Myers, Ph.D., *MI Γ '84*
Consultant, R Myers Consulting LLC, WA. For technical leadership in the development of advanced electrical and chemical space propulsion systems.

John W. Palmour, Ph.D., *NC A '83*
Chief technology officer, Wolfspeed Inc., NC. For development of silicon carbide (SiC) – based advanced electronic devices.

Colin J. Parris, Ph.D., *DC A '85*
Senior vice president and chief technology officer, GE Digital, MA. For leadership and advancement of industrial operational technologies and innovation based on digital data analytics and the Internet of Things.

David A. Petti, Sc.D., *MA B '82*
Fellow (emeritus), Idaho National Laboratory. For leadership in the development of high-temperature nuclear reactor fuels and for improving the safety of fission and fusion reactors.

Maryann T. Phipps, S.E., *NY Δ '79*
President, Estructure, CA. For leadership in structural engineering and contributions to assessment, mitigation, and design of building components for seismic effects.

Sarah A. Rajala, Ph.D., *MI B '74*
Professor & Dean (emeritus), Iowa State University COE. For innovations in eng'g education: outcomes assessment, greater participation and retention of women in eng'g & an enhanced global community.

Julie Mae Schoenung, Ph.D., *IL A '83*
MSE chair and professor, University of California, Irvine. For innovative and interdisciplinary applications of materials eng'g in trimodal composites, coatings, additive manufacturing, and green engineering.

Michael M. Watkins, Ph.D., *TX A '83*
Director and VP, NASA Jet Propulsion Lab and California Institute of Technology. For leadership in the development of space geodesy and leading robotic missions for exploration of the Earth and planetary bodies.

Charles E. Wyman, Ph.D., *MA Z '67*
Distinguished Professor and chair, University of California, Riverside, COE. For advances in transforming lignocellulosic feedstocks to low-carbon-footprint fuels and chemicals.

James A. Yurko, Ph.D., *MI Γ '97*
Director, materials engineering, Apple Inc., CA. For innovation, leadership, and the accelerated development of materials applied to consumer electronic products.

Decarbonizing the Atmosphere: Opportunities and Cautions

BY TRUDY E. BELL

The United States has committed itself to cutting net emissions of greenhouse gases at least 50 percent below 2005 levels by 2030—just eight years away. What engineering will that entail?

INTRODUCTION

This past November (2021), the White House issued a 61-page document titled *The Long-Term Strategy of the United States: Pathways to Net-Zero Greenhouse Gas Emissions by 2050*. After noting how "[w]ildfires, storms, floods, extreme heat, and other climate-fueled impacts are causing deaths, injuries, degraded health, economic hardship, and damage to the earth's ecosystems," the executive summary stated:

> The most recent report from the Intergovernmental Panel on Climate Change (IPCC) vividly illustrates, with robust scientific confidence, the need to limit warming to 1.5°C, or as close as possible to that crucial benchmark, to avoid [more] severe climate impacts. Achieving this target will require cutting global greenhouse gas (GHG) emissions by at least 40% below 1990 levels by 2030, reaching global net-zero GHG emissions by 2050 or soon thereafter, and moving to net negative emissions thereafter.

"Net negative emissions" will require nothing less than removing carbon dioxide from the atmosphere—a task that will require "scaling up land carbon sinks as well as engineered strategies."[14]

Just what innovations, implementations, and timetable would that require?

SCALE OF THE CHALLENGE

Despite the illusion that the Earth's atmosphere is vast, here are a few perspectives on its actual finitude. Although the nominal edge of space is arbitrarily set to be 50 miles up, over three-quarters of the mass of the atmosphere is concentrated in its lowest layer—the troposphere. The troposphere is only 5 to 10 miles thick, thinner at the poles than at the equator. Now, 5 to 10 miles (horizontally) is a distance that can be jogged or bicycled in less than an hour or driven in under nine minutes. Above the troposphere is the stratosphere, where jets fly.

Compared to the diameter of the Earth, the troposphere is roughly as thin as is the skin on a large apple—yet that all-important layer is where weather happens, people and animals breathe, and industrial processes discharge waste gases.

By mass, the most significant of those waste gases is carbon dioxide (CO_2), the same gas humans and other mammals exhale. Currently, about half the global CO_2 emitted each year by natural and industrial activities is taken up by soil, photosynthesizing plants, and the oceans as part of the natural carbon cycle; the excess beyond the planet's carbon budget remains suspended in the atmosphere[7] (**Figure 1**). But even in minute concentration—parts per million— CO_2 acts like an insulating blanket, trapping heat (long-wavelength infrared radiation) from the sun and warming the planet, in what has long been called the greenhouse effect.

Although the greenhouse effect originally enabled life to arise on Earth, the volume of CO_2, emitted since pre-industrial times—roughly since the founding of the United States—has increasingly thrown off the balance of the planet's natural carbon cycle.[11] Today, anthropogenic processes worldwide release CO_2 into the atmosphere at a prodigious rate: 35 to 40 gigatons (billions of metric tons, denoted $GtCO_2$) ***each year***, largely from combustion of fossil fuels (coal, oil, and natural gas).

For perspective on the physical scale of those emissions, data in $GtCO_2$ can be converted to their solid carbon equivalent (GtC) by multiplying by the fraction 12/44 (the ratio of their molecular weights). So, emissions of 40 $GtCO_2$ would come to just under 11 Gt (10.9, to be more exact) of solid carbon emitted into the atmosphere ***per year***; that much solid carbon would occupy a volume of about 11 cubic kilometers. (For detailed grounding on carbon dioxide and its atmospheric effects, see "Engineering Beyond Carbon: Pulling Answers Out of the Air," *The Bent*, Spring 2007.)

Such voluminous emissions are a big problem, because the excess CO_2 has a centuries-long residence time in the atmosphere. Thus, over the past 250+ years, analyses from tree rings and other sources reveal that CO_2 has been accumulating in the atmosphere at an ever-accelerating rate. It has risen from a concentration of about 280 parts per million (ppm) in 1750 to 410 ppm today—more than half of that rise since the 1970s. Currently, it is continuing to accumulate at a rate of about 2.3 ppm per year.[4,7,13]

CO_2 is not the only anthropogenic planet-warming gas. Another culprit is methane (CH_4), the principal ingredient of natural gas; primary sources include enteric fermentation from livestock, natural gas systems, landfills, coal mining, and petroleum systems.[4] Methane is some 25 times more powerful than CO_2, meaning that the same warming effect as a given volume of CO_2 would be produced by only 1/25th that concentration of CH_4. However, emitted CH_4 has a much shorter lifetime in the atmosphere: a decade or two. Nonetheless, it is crucial on immediate time scales, as it accounts for half the last century's 1°C rise in global surface temperature.[14]

Other powerful greenhouse gases—notably nitrous oxide (N_2O), sulfur dioxide (SO_2), and fluorinated gases used for refrigerants and air conditioning—also contribute. But in the United States, most of the greenhouse gases emitted are CO_2 (80 percent) and CH_4 (10 percent).[12]

Some 6.6 $GtCO_2$ of those global annual emissions originate from the U.S., second only to China; China emits about twice as much, but the U.S. tops the list for emissions per capita. Moreover, at the same time, a vast number of terrestrial ecosystems that naturally would have absorbed some 27 percent of that carbon from the atmosphere have been lost "because of the clearing of forests, draining of wetlands, and the conversion of forests and grasslands to croplands and pastures."[13]

Today, according to the IPCC, "estimated anthropogenic global warming is currently increasing at 0.2°C...per decade due to past and ongoing emissions."[8] At that rate, between 2030 and 2052, global mean surface temperature is likely to reach 1.5°C higher than it was in 1850-1900, depending on whether and what steps the United States and other countries take to reverse the trend. If nations make immediate and deep reductions in emissions and implement other strong mitigation measures before 2030, by 2100 global mean temperature could stabilize at around 1.8°C higher.

However, if by 2030—that's in just eight short years, folks—too little or nothing is done, and greenhouse gases continue to be emitted and to accumulate at the high rates of business as usual, computational climate models project that by 2100, global surface temperature could reach as high as 3.3°C to 5.7°C more, with concomitant catastrophic climate alterations worldwide. For perspective, noted the IPCC, "The last time global surface temperature was sustained at or above 2.5°C higher than in 1850–1900 was over 3 million years ago."[7] Although 2100 sounds like an irrelevant science-fiction–long time in the future, it is not: a child born today—if able to survive, that is—would celebrate a 78th birthday then.

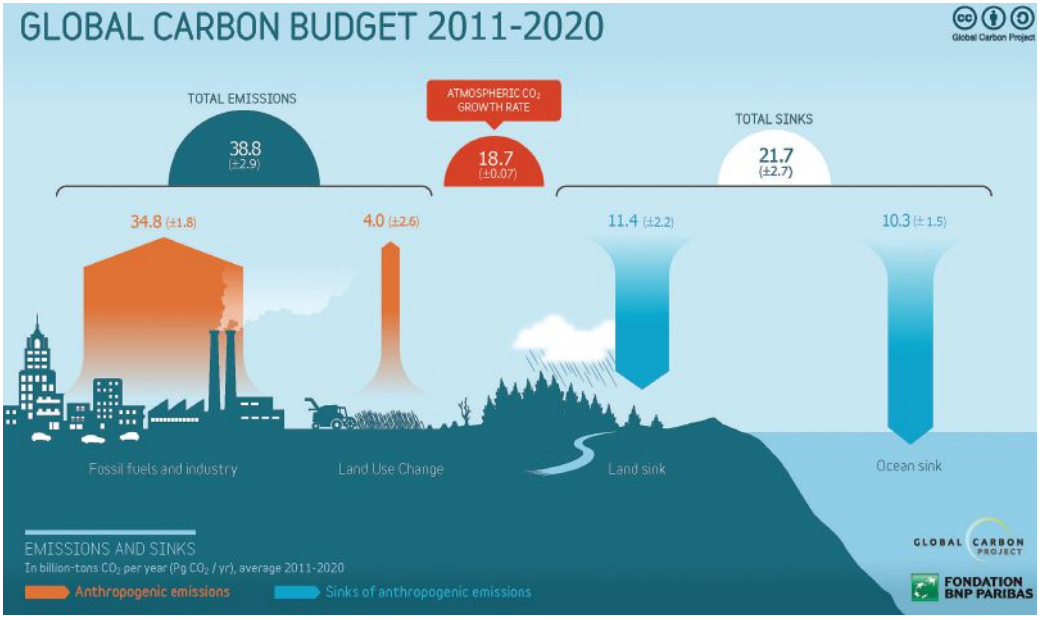


Figure 1: Globally, humans are now releasing close to 40 gigatons (billion metric tons) of carbon dioxide ($GtCO_2$) per year into the atmosphere, of which only about half is being absorbed by natural carbon sinks; the excess remains in the atmosphere. Roughly 7 $GtCO_2$/yr is emitted by the United States. Numbers shown are from 2018; they are larger today. Credit: Global Carbon Project

AVOIDING EMITTING CARBON DIOXIDE

At this stage, all strategies for reaching net-zero emissions by 2050—that is, a state where new greenhouse gas emissions from all sectors of the global economy are counterbalanced by natural and technological carbon dioxide removal (CDR)—will require two major steps, taken simultaneously. The first step—and the only long-term solution—is to stop putting carbon into the atmosphere in the first place.

That means rapidly moving away from fossil fuels to zero-carbon sources of energy: renewable resources (e.g., solar photovoltaic, concentrated solar thermal, wind, geothermal, hydroelectric). Zero-carbon sources of energy would also include nuclear power.[20] All are proven technologies operating in commercial utilities, some for decades.

The other major step is itself twofold: **a)** actively capturing interim carbon emissions (from both CO_2 and CH_4) from existing fossil-fuel plants during the transition to zero-carbon sources, and **b)** actively removing built-up legacy carbon dioxide from the atmosphere.[12,14] Indeed, stated the U.S. National Academies of Sciences, Engineering, and Medicine, "NETs [negative emissions technologies] provide the only means to achieve deep (i.e., >100 ppm) emissions reductions, beyond the capacity of the natural sinks."[13] Specifically, by mid-century, it will be necessary to subtract a good 10 $GtCO_2$ /year from the atmosphere worldwide —more than the U.S. emits—and 20 $GtCO_2$ /year by 2100.[11]

For curbing methane emissions, known and existing options can be implemented quickly at comparatively low cost: what The World Bank characterizes as "low-hanging fruit."[5] One unbelievably huge one is: eliminating profligate waste to increase energy efficiency and incidentally maximize profits.

In all too many oil fields, methane gas is treated as a waste product that is routinely and continuously vented or flared into the atmosphere (**Figure 2**). For nine years running, the United States has been one of the top gas flaring countries in the world—most recently, fourth after Russia, Iraq, and Iran.[5] Yet, low-cost (or even profitable) options already exist to detect and repair methane leaks to curb fugitive emissions from refineries and other oil and gas systems.[14]

If all the gas currently flared—i.e., wasted—worldwide were recovered for generating electricity, the annual potential has been estimated at 688 TWh,[21] or somewhere between the annual national power consumptions of Brazil and Japan. Thus, The World Bank has called upon the U.S. and other governments "to put gas flaring reduction front and center" and for oil-producing countries to "position it at the heart of their 'net-zero' and energy transition plans."[5]

There are also vast opportunities for retrofits and new technologies to attain efficiencies. In the U.S., the biggest source of greenhouse gas emissions is the tailpipes of millions of cars and trucks driven by internal combustion or diesel engines, followed by the smokestacks of industry and electric power generating utilities (**Figure 3**). But another major source is the energy consumption by buildings, both commercial and residential, for always-on lights and electronic devices, hot water, heating, and air conditioning. Inadequate insulation in older buildings is also significant (see "Aggressive Engineering for Passive Houses," *The Bent*, Summer 2011).

CARBON DIOXIDE REMOVAL (CDR)

Both natural and engineered strategies exist for removing carbon dioxide from the atmosphere. Some natural strategies are both proven and low-cost, and could be fielded immediately, well before 2030 (local, state, and federal politics willing). Essentially, they are land use and management practices to undo the decades-long human destruction of natural carbon sinks that absorb atmospheric CO_2 through photosynthesis and sequester it in living plants or soils. A detailed discussion of natural strategies is beyond the scope of this article, but it has been estimated that depending on the total acreage of wetlands and shorelines restored, such practices have the technical potential to sequester 1 to 10 $GtCO_2$/year in the U.S. alone.[13]

Of the 4 TWh of electricity the U.S. generated in 2020, a bit over 60 percent came from fossil fuels—natural gas accounting for two-thirds of that energy and coal for the rest.[22] A good share of those power plants, especially the natural gas plants, likely have many years of useful life ahead of them and are thus unlikely to be retired soon. So, the U.S. Department of Energy is focusing

Figure 2: Unwanted methane, a powerful greenhouse gas, is routinely flared into the atmosphere in unconventional oil fields and other facilities across the U.S. and worldwide. The irony of such wholesale waste is that methane is the very product sought and monetized by drillers elsewhere, including in Ohio and Pennsylvania. Credit: Trudy E. Bell

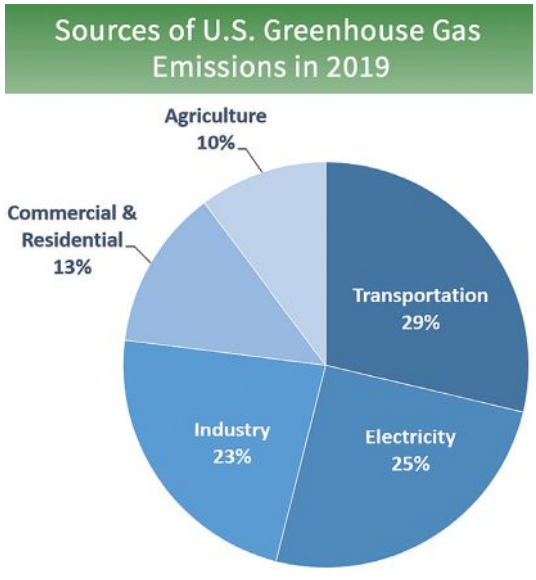


Figure 3: Many engineering opportunities exist across the U.S. economy to deeply curtail the waste of energy and emission of greenhouse gases. Source: U.S. Environmental Protection Agency.

Figure 4: The U.S. Department of Energy's National Carbon Capture Center in Wilsonville, AL, has, for more than a decade, tested 60+ methods of capturing carbon dioxide from flue gases of fossil-fuel power plants as well as testing technologies for direct air capture. It is available to developers in the U.S. and other countries aiming to field pilot technologies with a goal of attaining commercial scale with net-zero greenhouse gas emissions.
Credit: Southern Company

research on methods of removing CO_2 from post-combustion flue gases—potentially useful also for the flue gases from steel manufacturers and other heavy industries reliant on fossil fuels. The goal is to find practical ways to retrofit existing facilities. The DOE is also researching technologies for pre-combustion CDR for fossil-fuel power plants still on the drawing board (**Figure 4**).

Among other things, the DOE is investigating solvents, sorbents, and membranes, plus some advanced novel approaches. Solvent-based techniques involve physical or chemical absorption of CO_2 into a liquid carrier; the absorption liquid is regenerated for reuse by increasing the temperature or reducing the pressure to break the CO_2-carrier bond and release the CO_2. Today's amine-based systems have high capacity to absorb CO_2, and a high tolerance for impurities in the flue gases, but also require high energy to regenerate the absorbent carrier. The search is on for solvents that require lower regeneration energy.

Sorbent-based CDR involves physical or chemical adsorption (with a d) of CO_2 onto or into a solid, which can be similarly regenerated by raising temperature or reducing pressure to desorb (release) the CO_2. Sorbent techniques are less well developed and have technical challenges under active research. Membranes use permeable or semi-permeable materials to separate CO_2 from flue gases, so the search is on for low-cost, durable membranes. Novel approaches include hybrid post-combustion systems as well as investigating cryogenic separation, electrochemical membranes, and other technologies.[15]

In contrast, pre-combustion CDR must be designed into prospective integrated gasification combined cycle (IGCC) power plants before they are built. In an IGCC plant, a carbon-based fuel (usually coal) is reacted with steam and oxygen under pressure to create a synthetic gaseous fuel ("syngas"), which consists mainly of molecular hydrogen (H_2), carbon monoxide (CO), and CO_2. The syngas is used to fuel a gas turbine generator to produce electricity.

In pre-combustion CDR, the CO_2 is captured before the syngas goes to the gas turbine for combustion. Moreover, through what is called a water-gas-shift reaction, CO is converted into CO_2 and hydrogen is produced. Pre-combustion methods are more efficient than post-combustion methods because of the higher pressure of the syngas and the higher concentration of CO_2.[16] The DOE's R&D efforts focus on developing advanced solvents, solid sorbents, and membrane systems for separating the H_2 and CO_2, plus some advanced hybrid or novel approaches that do not themselves require intensive power.

SEQUESTERING THE CO_2 — SAFELY

All these systems, however, face a huge challenge: once you capture the CO_2, what do you do with it? In theory, the gas can be compressed into a liquid for transportation either to an installation that has need of CO_2 as part of an industrial process (e.g., in making a product)—an option often called carbon capture, utilization, and storage (CCUS). Alternatively, it could be injected deep underground, perhaps into a saltwater aquifer, for (hopefully permanent) sequestration.

However, compressing the gas is an energy-intensive process. And transportation could involve pipelines. Ordinary oil and gas pipelines are unsuitable because of the cryogenic requirements to keep the CO_2 liquefied. So, engineers may be faced with the possible necessity of designing or building a wholly new pipeline infrastructure around the country.

There are serious technical challenges. Colorless and odorless, CO_2 is an asphyxiation hazard both to humans and livestock, plus gasoline and diesel-powered vehicles require air to run. CO_2 is also heavier than air, so a leak could allow it to collect in hollows and valleys. Ultimately, it would end up back in the atmosphere at large, defeating the whole purpose of capturing it. Thus, there are significant concerns should a CO_2 pipeline (or disposal site) leak, as happened for the first time on February 22, 2020: a Denbury Resources CO_2 pipeline ruptured half a mile from the village of Satartia, in Mississippi's rural Yazoo County, sending 45 people to hospitals and necessitating the evacuation of 300 more.[2]

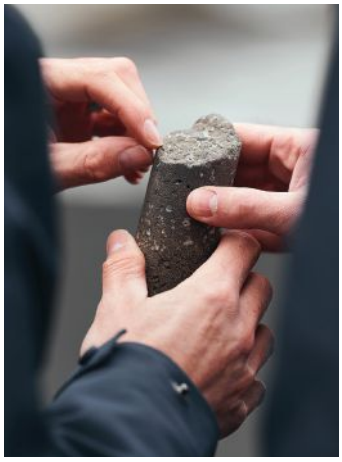
VACUUMING THE AIR

One category of negative emissions technologies that has captured the imaginations of policymakers and the general public, as well as engineers, is direct air capture (DAC): removing CO_2 from the ambient air. Air is constantly mixing everywhere around the planet, so anywhere worldwide has about the same 410 ppm concentration of CO_2. Thus, a DAC facility could be located anywhere on the globe.

However, the concentration of CO_2 in ambient air is thousands of times more dilute than it is in flue gases, so monumental energy is required to draw in large enough volumes of air to treat. The process of heating a solvent or sorbent to release to CO_2 is also power hungry, as are other phases of the process.

In 2020, two authors at RWTH Aachen University, Germany, published a life-cycle analysis of a hypothetical low-temperature solid sorbent DAC plant, from resources through construction, operation, and end of life. They concluded that placing such a plant on non-arable land in Iceland would be optimum, as the electricity there is from renewable geothermal and the CO_2 can be stored nearby underground (virtually eliminating the need for pipelines) in the safest possible way: as a solid.[3]

To that end, last September (2021) the firm Climeworks from Zurich, Switzerland, inaugurated what they hailed as the largest commercial DAC facility in the world in Hellisheiði, Iceland. Called Orca, the Icelandic word for "energy," it is capable of annually removing 4,000 tons of CO_2 from ambient air. That is, of course, minuscule compared to the magnitude of the need: 250,000 DAC facilities the size of Orca would be needed to remove just 1 $GtCO_2$ per year. But the facility is of a modular design that is intended to be readily scaled up to any desired size (**Figures 5**).



Figures 5: Beginning operation in September 2021, the Orca direct air capture (DAC) facility (above) in Iceland is powered by a nearby geothermal generating plant. Orca is constructed with eight modular units, each about the size of a shipping container, stacked two high. Each unit has a dozen giant fans (facing away from the viewer) that draw in ambient air, which passes over a sorbent filter that traps CO_2. Once the filter is saturated, the unit heats the sorbent to the boiling point of water to release the separated CO_2, which is piped to a connecting building. There it is mixed with water (27 tons of water per ton of CO_2); the resulting carbonated water then is piped about a quarter mile where it is injected deep into the Earth. Underground, it chemically reacts with Iceland's abundant basalts to produce carbonate minerals (left), permanently trapping the CO_2 over about two years. Credit: Climeworks

IS IT ENOUGH? GLOBAL WARNINGS

In 2016, many of the world's nations adopted Article 2 of the United Nations Framework Convention on Climate Change (UNFCCC) Paris agreement to limit total warming below 2°C, with an aspirational target of 1.5°C. At this late date, however, National Academies observed that even holding warming to 2°C is "exceedingly challenging."[13]

In fact, as early as 2018, the IPCC noted that nations' pledged reductions in the Paris agreement were not enough to achieve what is needed. Indeed, "[p]athways reflecting current nationally stated mitigation ambition until 2030 are broadly consistent with cost-effective pathways that result in a global warming of about 3°C by 2100, with warming continuing afterwards. ...*The lower the emissions in 2030, the lower the challenge in limiting global warming* to 1.5°C after 2030 with no or limited overshoot"(italics added).[8]

In April 2020, the European open-access journal *Frontiers in Climate* published a special multi-author issue on the role of negative emission technologies in addressing climate goals. The overall conclusion was that "the era of unabated CO_2 emission to the atmosphere must end, and we are now called upon to implement a rapid transition to net-zero greenhouse gas emissions."[23] It is crucial, however, that NETs not be viewed as a replacement for reductions in emissions, but as an additional means for accelerating reductions, including reductions of legacy emissions. Yet, already there is evidence of "efforts and suggestions [by fossil fuel interests] to use NETs to sustain fossil fuel use."[23]

It will also be imperative to minimize energy-intensive applications, or at least not power them with fossil fuels. One example is massively multiplayer online computer gaming, although nationwide and global numbers are elusive.[9] A more quantified example is the rapidly growing energy consumption of blockchain applications such as cryptocurrency mining (especially when using Proof-of-Work),[10,18] and non-fungible tokens (NFTs) embraced by the digital art world as a means of certifying authenticity.[1]

As of mid-December 2021, an online tool from the Cambridge (University)

Centre for Alternative Finance calculated that the energy consumed annually worldwide by just the single biggest cryptocurrency Bitcoin was just under 128 TWh, surpassing the entire annual energy consumption of whole countries, including Norway and Argentina (**Figure 6**).[21] Moreover, that power consumption and concomitant carbon footprint are increasing apace.

'HARSH ARITHMETIC'

The magnitude of the challenge and urgency to head off the worst of climate change has become so great that the National Academies has recommended research into large-scale moderate- to high-risk approaches to increase how much CO_2 the oceans can absorb. The oceans cover 70 percent of the planet and already absorb about a quarter of annual CO_2 emissions, at the expense of becoming both more acidic and warmer —consequences that, among other things, have impaired the ability of shellfish to form shells, bleached coral reefs, and contributed to the worldwide rise of sea levels. Warmer water is also less able to absorb CO_2 than colder water.

In addition to various biological approaches to altering seawater chemistry, the National Academies identified possible engineering methods to make the oceans colder and more alkaline, as well as to sequester the CO_2. Possible technologies include means for mining, pulverizing, dispersing, and dissolving natural silicate and carbonate materials across the oceans, vertically transporting CO_2-rich waters to great depths as well as augmenting the upwelling of cold water from the depths, and electrochemical means of increasing alkalinity and/or stripping the gas from seawater for undersea sequestration.[11]

However, *Frontiers in Climate* cautioned that "an unsettling gap" exists between model scenarios of the potential of carbon dioxide removal technologies and their practical use at a global scale, requiring intensive research.[23] Also lacking is full understanding of possible unintended consequences of such planet-wide alterations. And common to all forms of CDR "is the requirement to track the CO_2 along the value chain in both space and time."[23] That would entail rigorous accounting and verification of both emissions and removals, all the way from the mining of raw materials and manufacture of parts through consumer use and end-of-life disposal.

For example, hydrogen-powered vehicles have been hailed as zero-carbon—and that may be true for "green" hydrogen derived from the electrolysis of water powered from a zero-carbon fuel. But today, most hydrogen is produced from fossil fuels, notably through steam methane reforming (SMR) from natural gas. A relatively new concept is "blue" hydrogen produced by SMR with carbon capture and storage; however, recent computational modeling reveals that the production of "blue hydrogen has emissions as large as or larger than natural gas used for heat."[6]

Similarly, the current widespread move to all-electric vehicles will reduce overall CO_2 emissions ***only if*** the recharging stations are connected to power plants using zero-carbon sources—otherwise, they just create greater demand for fossil fuels. It will also be important to account for CO_2 emissions (not to mention other unintended environmental consequences) generated by the large-scale mining and processing of the

Continues on page 41.

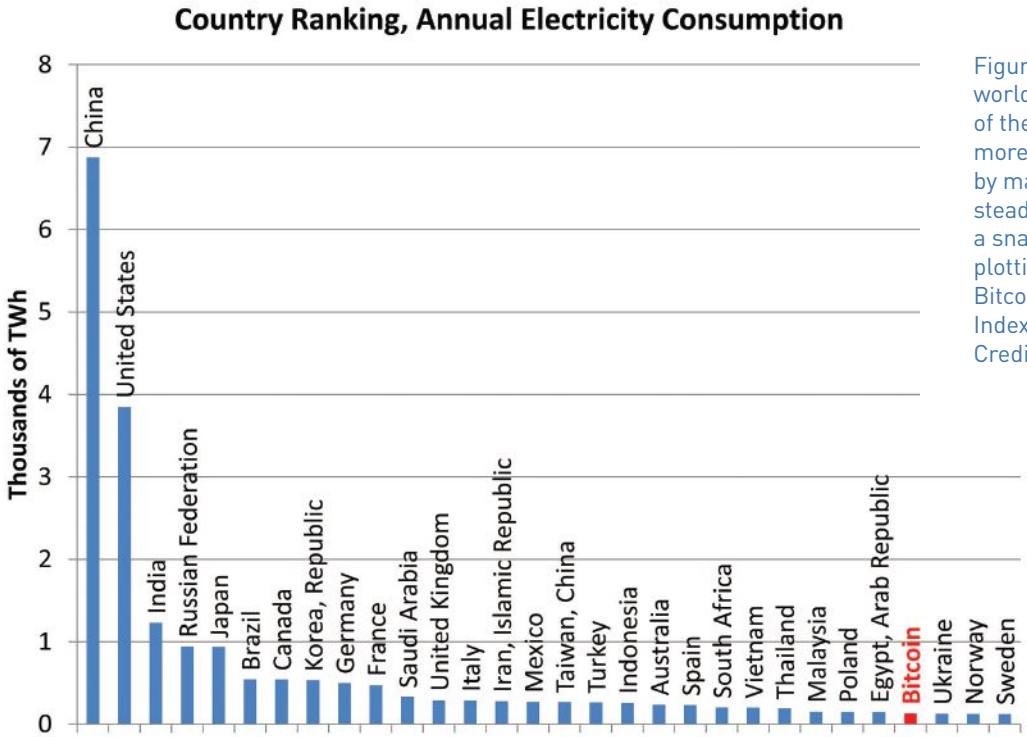


Figure 6: "Mining" operations worldwide for Bitcoin, the largest of the cryptocurrencies, consumes more power annually than is used by many entire nations, and is steadily increasing. Chart represents a snapshot as of December 11, 2021, plotting data from the Cambridge Bitcoin Electricity Consumption Index, University of Cambridge. Credit: Trudy E. Bell

CHAPTER ENDOWMENT INITIATIVE

The Chapter Endowment Initiative (CEI) program, launched in Spring 2014, allows alumni, companies, and foundations to permanently endow the Association's activities that support any of our 251 student chapters. Last year we reported 21 gifts/pledges and this year we have another 35 to add to the list as we strive to endow all of our chapters.

$5,975,000

The value of the Chapter Endowment Initiative fund, including growth and interest, at TBP's fiscal year-end (July 31, 2021).

MINIMUM GIFT AMOUNT:

The minimum gift being accepted for this initiative is $5,000. All checks received that are designated for this initiative in an amount less than $5,000 will be paid into Tau Beta Pi's annual fund which supports the same programs as the initiative.

HOW YOU CAN HELP:

There are a number of ways to support this initiative. Checks can be made out to "Tau Beta Pi – The Engineering Honor Society" and sent to Tau Beta Pi, Attention: Curtis Gomulinski, Executive Director, P.O. Box 2697, Knoxville, TN 37901-2697. Other options include gifts of highly appreciated stock held for over one year as well as matching gifts, IRA rollover gifts, and including Tau Beta Pi in your estate plans.

TAX-DEDUCTIBLE:

Gifts through this initiative will be reflected in an individual's total giving to TBΠ. As a non-profit organization, we are exempt from federal income taxes under Section 501(c)(3) of the Internal Revenue Code. Your gift is tax-deductible to the full extent allowed by law.

THE CHAPTER ENDOWMENT INITIATIVE:

You can learn more about the progress and developments of the CEI on our website, *www.tbp.org?CEI* or by contacting Director of Development Sherry Jennings-King, *TN Alpha '93*, by phone at **(612) 226-2922** or by email at development@tbp.org.

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U.S. Air Force Academy
$100,000

Beverly & Kenneth R. Jinkerson, *MO B '75*
MISSOURI BETA
Missouri Univ. of Science & Tech.
$90,000

Donald C. Forslund, *NJ A '60*
NEW JERSEY ALPHA
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$75,228

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$57,520

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Villanova University
$15,000

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COLORADO ALPHA
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$20,000

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OHIO ALPHA
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$14,671

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CALIFORNIA EPSILON
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$10,000

David E. Kepler II, *CA A '75*
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$10,000

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OHIO ALPHA
Case Western Reserve University
$10,000

William F.H. Sinclair, *MS A '63*
MISSISSIPPI ALPHA
Mississippi State University
$10,000

John Fritz Angle, M.D., *NY Δ '82*
NEBRASKA ALPHA
University of Nebraska-Lincoln
$5,000

Richard O. Ayres, *IL Γ '79*
CALIFORNIA ETA
San Jose State University
$5,000

James M. Braden, *AL Γ '76*
ALABAMA GAMMA
University of Alabama at Birmingham
$5,000

Bobby S. Shackouls, *MS A '72*
MISSISSIPPI ALPHA
Mississippi State University
$5,000

Capt. Thomas C. Crane, USN (ret), *MD B '62*
MARYLAND BETA
University of Maryland
$5,000

Brian M. Crawford, *IA A '04*
MICHIGAN ALPHA
Michigan State University
$5,000

Francis E. Gardiner Jr., *DE A '62*
DELAWARE ALPHA
University of Delaware
$5,000

Subhendu Ghosh, *NJ A '89*
NEBRASKA ALPHA
University of Nebraska-Lincoln
$5,000

Mary & Clinton R. Gilliland, *GA A '59*
GEORGIA ALPHA
Georgia Institute of Technology
$5,000

Henry G. Herzing, Ph.D. (*hc*), *IL Γ '59*
ILLINOIS GAMMA
Northwestern University
$5,000

Irwin M. Jacobs, Sc.D., *NY Δ '56*
CALIFORNIA PSI
University of California, San Diego
$5,000

James S. Jarratt, *TN A '68*
TENNESSEE ALPHA
University of Tennessee
$5,000

Raymond R. LaFrey, *MI A '61*
MICHIGAN ALPHA
Michigan State University
$5,000

Robert E. Levin, Ph.D., *CA Γ '53*
CALIFORNIA GAMMA
Stanford University
$5,000

Stewart C. O'Dell, *TX Γ '78*
TEXAS NU
University of Texas Rio Grande Valley
$5,000

Barbara & Ralph A. Rockow, *OH Γ '58*
ANY CHAPTER
$5,000

Frederick "Larry" Stiles, *TN A '71*
TENNESSEE ALPHA
University of Tennessee
$5,000

Steven M. Wear, *OK Γ '85*
OKLAHOMA GAMMA
Oklahoma State University
$5,000

Anonymous, *MA B '58* **&** *MA B '67*
MASSACHUSETTS BETA
Massachusetts Institute of Technology
$5,000 EACH ($10,000 TOTAL)

Anonymous, *RI B '81*
RHODE ISLAND BETA
University of Rhode Island
$5,000

Ronald P. Brand, *VT A '60*
VERMONT ALPHA
University of Vermont
ESTATE PLANNING/DEFERRED GIFT

The goal of this initiative is to endow all collegiate chapters to provide permanent funding for the activities that benefit the students of those chapters. Chapters with support above $80,000 are eligible to receive grants to support their activities; Headquarters will contact the chapters once funding is available.
In addition to the chapters mentioned on the previous page, as of January 31, 2022, the Association has received cash and pledges totaling less than $100,000 for each of the chapters listed below.

ALABAMA ALPHA
$5,000
ALABAMA GAMMA
$25,000
ALABAMA EPSILON
$5,000
ARIZONA ALPHA
$5,000
ARIZONA BETA
$10,000
ARKANSAS ALPHA
$5,000
CALIFORNIA ALPHA
$45,000
CALIFORNIA BETA
$25,084
CALIFORNIA GAMMA
$67,000
CALIFORNIA EPSILON
$90,000
CALIFORNIA ZETA
$15,000
CALIFORNIA ETA
$30,000
CALIFORNIA LAMBDA
$5,000
CALIFORNIA NU
$5,000
CALIFORNIA PSI
$20,000
COLORADO ALPHA
$40,000
COLORADO BETA
$20,000
DELAWARE ALPHA
$10,000
D.C. ALPHA
$5,000
FLORIDA ALPHA
$5,000
FLORIDA EPSILON
$5,171
GEORGIA ALPHA
$40,886
ILLINOIS GAMMA
$30,857
INDIANA ALPHA
$40,000
INDIANA BETA
$5,000
INDIANA EPSILON
$30,000
IOWA BETA
$35,000
KANSAS BETA
$5,000
LOUISIANA EPSILON
$10,118
MARYLAND GAMMA
$10,000
MARYLAND EPSILON
$5,000
MASSACHUSETTS BETA
$55,000
MICHIGAN ALPHA
$35,000
MICHIGAN ETA
$5,075
MICHIGAN IOTA
$8,040
MINNESOTA ALPHA
$20,000
MONTANA ALPHA
$5,000
NEBRASKA ALPHA
$25,000
NEW HAMPSHIRE BETA
$10,200
NEW JERSEY ALPHA
$25,000
NEW YORK BETA
$73,707
NEW YORK GAMMA
$65,000
NEW YORK THETA
$5,000
NEW YORK KAPPA
$15,071
NEW YORK MU
$15,000
NEW YORK NU
$5,000
OHIO DELTA
$35,000
OHIO MU
$5,000
OKLAHOMA GAMMA
$5,000
OREGON ALPHA
$10,000
PENNSYLVANIA BETA
$40,000
PENNSYLVANIA GAMMA
$5,000
PENNSYLVANIA DELTA
$5,000
PENNSYLVANIA ZETA
$10,000
PENNSYLVANIA ETA
$10,000
PENNSYLVANIA THETA
$50,000
PENNSYLVANIA LAMBDA
$15,000
PUERTO RICO ALPHA
$10,000
RHODE ISLAND ALPHA
$20,000
RHODE ISLAND BETA
$5,000
TENNESSEE ALPHA
$65,000
TENNESSEE BETA
$5,000
TEXAS ALPHA
$21,240
TEXAS GAMMA
$5,000
TEXAS DELTA
$25,000
TEXAS ZETA
$10,000
TEXAS THETA
$5,000
TEXAS IOTA
$5,000
TEXAS NU
$40,031
VIRGINIA BETA
$50,069
WASHINGTON ALPHA
$20,000
WEST VIRGINA BETA
$8,000
WISCONSIN ALPHA
$53,120
WISCONSIN BETA
$5,000
WISCONSIN GAMMA
$5,000
ANY CHAPTER
$35,000

Current Endowed Chapters: $100,000 or more in cash and pledges:

CALIFORNIA DELTA
Univ. of Southern California
$100,000
CALIFORNIA UPSILON
Calif. State Univ., Sacramento
$100,000
COLORADO ZETA
U.S. Air Force Academy
$100,000
FLORIDA GAMMA
Univ. of South Florida
$105,000
ILLINOIS ALPHA
Univ. of Illinois at Urbana-Champaign
$187,520
INDIANA GAMMA
Univ. of Notre Dame
$125,000
IOWA ALPHA
Iowa State Univ.
$110,289
LOUISIANA ALPHA
Louisiana State Univ.
$100,000
MARYLAND BETA
Univ. of Maryland
$135,000
MICHIGAN BETA
Michigan Tech. Univ.
$100,000
MICHIGAN GAMMA
Univ. of Michigan
$104,912
MICHIGAN EPSILON
Wayne State Univ.
$250,000
MICHIGAN ZETA
Kettering Univ.
$100,000
MISSISSIPPI ALPHA
Mississippi State Univ.
$110,000
MISSOURI BETA
Missouri Univ. of Science & Technology
$100,000
NEW JERSEY ALPHA
Stevens Institute of Technology
$100,228
NEW JERSEY DELTA
Princeton Univ.
$100,000
NEW YORK DELTA
Cornell Univ.
$105,000
OHIO ALPHA
Case Western Reserve Univ.
$100,000
OHIO BETA
Univ. of Cincinnati
$100,000
OHIO GAMMA
Ohio State Univ.
$100,000
OHIO EPSILON
Cleveland State Univ.
$100,000
SOUTH DAKOTA ALPHA
South Dakota School of Mines & Technology
$204,675
TEXAS BETA
Texas Tech Univ.
$100,113
VIRGINIA ALPHA
Univ. of Virginia
$115,000
WYOMING ALPHA
Univ. of Wyoming
$100,000

Bill Collins
FL Gamma '75

The William L. Collins Jr., Memorial Endowment for Florida Gamma Chapter at the University of South Florida. Editor's Note: Bill passed away on March 6, 2021, at the age of 77.

William "Bill" Collins was a "mature student" when he entered the University of South Florida (USF) in 1968, seven years after graduating from high school. He had never intended to study engineering, but his life path took him there.

As a middle and high school student in Tampa, Bill excelled in sports, particularly football. He was recruited to play college ball, but, decided instead to join the U.S. Air Force. His ASVAB scores qualified him for any Air Force career, but he chose specialty electronics, serving four years as a radar technician. While on assignment in Saratoga Springs, NY, he met his wife, Carol, on a blind date.

After leaving the Air Force, Bill's next career move was to RCA on the Air Force Eastern Test Range missile project on Ascension Island. In such a remote location, there was plenty of time for R&R. Bill took up scuba diving, became a disc jockey on the local radio station, and discovered photography. It started as a hobby and became a passion. Over the years, he chronicled family occasions, documented student STEM competitions, and captured dozens of USF/TBΠ events. At last count, he had archived more than 53,000 images.

Following Bill and Carol's marriage in 1967, Bill transferred with RCA to Trinidad. At the Atlantic Missile Range Tracking Station, he maintained equipment that provided surveillance and tracking of ballistic missiles as part of the Cold War Early Warning System. Bill and Carol immersed themselves in the community, enjoying the food, culture, steel drum music, and, especially Carnival.

In 1968, they returned to Tampa. After a career in the Air Force and with RCA, Bill decided to pursue a technical degree. He enrolled at USF, where he received both his bachelor's and master's degrees in electrical engineering. Bill was integral in establishing the Florida Gamma Chapter (1974) and served as the second student president. He led his chapter in receiving the R.C. Matthews

Outstanding Chapter Award in 1975. He also helped design the base for their chapter's Bent monument to be removable for polishing before each initiation ceremony. Years later, Bill assisted in the planning and helped raise funds for a new Bent, dedicated in November 2019. The college of engineering then installed the original Bent on a wall in an engineering building on campus.

After graduation, Bill first worked for Honeywell. He then spent more than three decades with Johnson & Johnson medical device companies as a test development manager, principal development engineer, and research & development project director. He retired from Johnson & Johnson in 2004. Highlights of his professional work include implementing a small electronics assembly operation, discovering a significant design error in a Critikon infusion pump, and being co-inventor of several patents.

The entire family had a penchant for science and engineering. In 8th grade, Bill and Carol's son, Rich, applied engineering principles to address project constraints when he built a winning popsicle stick suspension bridge. Rich went on to earn an undergraduate degree in industrial engineering and a master's in computer science. Both he and his wife, Meg, work as IT entrepreneurs. Bill's sister is a retired electrical engineer, and Carol was a science educator for more than 35 years.

Carol notes that mentoring and STEM initiatives were a significant part of Bill's life. He saw the significance of helping potential and current engineering students make connections with those in the profession. He was willing to take any opportunity to help young people advance, advising them in their academic and professional endeavors. A Tau Bate USF alumna reflected that he "was an incredible mentor of mine, but really [for] any student who knew Bill. He had an easygoing way about him, managing to provide encouragement or inspiration in every conversation."

Bill was also very involved in STEM initiatives such as the FIRST Lego League and participated in summer programs and helped judge competitions in Cincinnati while he was with Ethicon EndoSurgery. After he retired and moved back to Tampa, he volunteered with Robofest for many years, spending countless hours recruiting volunteers, mentoring and inspiring students, setting up competitions, and judging robotics events.

Bill became even more involved with TBΠ in his retirement. He attended several Conventions and served as both president of the Tampa Alumni Chapter and as an advisor to the FL G Chapter (2013-17). As alumni chapter president, Bill established connections between alumni in local companies and current students to facilitate networking with practicing engineers.

In 2021, the FL G Chapter established scholarships in memory of two former advisors: Bill Collins and Paul Schnitzler, Ph.D., *FL Γ '57*. Carol notes that their family established the endowment for the FL G Chapter through the Chapter Endowment Initiative to honor Bill because he valued the opportunities for student mentoring and learning experiences provided through chapter activities.

Don Forslund

NJ Alpha '60

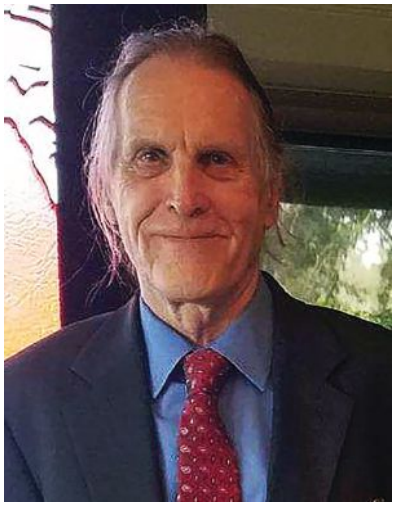
The Donald C. Forslund Endowment for the New Jersey Alpha Chapter at Stevens Institute of Technology.

Don Forslund developed a global perspective early on which influenced a lifetime's worth of career and personal choices. He and his identical twin brother hale from Boston. As eight-year-olds, their father pursued an opportunity within the military to work in Bermuda and the family lived there for years. Don recalls attending a private British school, saluting the British flag, and singing "God Save The King."

As high schoolers and back in the States, their father bought them a saw and they performed odd jobs around the neighborhood as tree trimmers. Don recalls that he seemed to be a budding aviation engineer as he cut logs into pieces of wood resembling wings, covering them with paper, and attempting to fly, unsuccessfully. One of their customers had a friend who was a professor at Stevens Institute of Technology. Following a family introduction and the offer of substantial scholarships from Stevens and the International Nickel Company, the boys chose to pursue studies in engineering. Don notes that it was an all-men's school at the time and they were the first class given the opportunity to choose a specific discipline of engineering as their major. Don chose mechanical engineering, and aided by a National Science Foundation Fellowship, went on to pursue a master's degree in electrical engineering.

He graduated from Stevens with a bachelor's degree (historically called mechanical engineer) in 1960, and in 1962, received a master's degree.

Upon graduation, Don accepted a job with Mitre Corporation in Bedford, MA. Mitre contracted with the U.S. Air Force to rework a SAGE prototype computer for psychologists studying human responses to the use of certain kinds of equipment. A few years later, IBM approached Don with an offer. Thinking he would work there for a year and then move on, he stayed for almost 30 years working in a number of departments and positions requiring creativity. IBM awarded



him four levels of Invention Achievement Awards for inventions related to manufacturing developments. Don appreciated working within a company that offered numerous opportunities for work and advancement. However, he said there was a time when he was considering quitting his current job. After returning from lunch one day, six different departments approached him with offers. One was in the field of patent engineering. Don decided he wasn't interested in supporting individuals through the patent process but wanted to come up with the inventions himself, resulting in six patents. Don's specialty was in the field of manufacturing line semiconductor inspection.

Ultimately, IBM shut down their development program and Don was in the process of taking early leave when a layoff occurred. As part of his package, Don was offered educational classes and used this benefit to take and pass the U.S. Patent and Trademark Office bar exam. He performed patent agent work on his own helping a friend on the side who was working for the Taiwan Semiconductor Manufacturing Company.

Don jokes, "Engineering isn't just a piston going up and down. The students of today are going to be tackling global problems and need to think in broad terms as they confront change — to the environment, how they do their work — and the financial implications that are part of the decision-making process."

Don encourages students to travel throughout their lives to become familiar with different cultures and become true global citizens. He recalls an encounter with a peer from upstate New York who had never been to New York City or even next door to Connecticut. Don has followed an interest, developed as a teenager, in reaching out to those beyond his immediate community as an amateur radio operator.

While at Stevens, Don became interested in aviation and eventually earned his pilot's license. In later years, he was licensed to teach and sign off on logbooks. He also designed, built, and flew his own single-seater airplane with a Volkswagen Beetle engine. Other interests and activities included design and construction of a home and furniture, lobbying for domestic relations law reform, founding a statewide self-help group, volunteering as a local court mediator, and traveling the world becoming a perpetual student of Asian travel, language, and culture. In retirement, Don makes a daily ride on his bicycle across the highway to the University of South Florida where he studies Chinese language and culture taught by professors from Nankai University through the Confucius Institute of PR China.

Don made his Chapter Endowment Initiative gift in support of New Jersey Alpha at Stevens Institute of Technology because he finds value in seeing joy on the faces of those around him and has already begun to see the benefits to students.

CEI Profiles continue on page 42.

Authors

Recently published a book? If so, we would like to recognize you! Send details and a cover image to dylan@tbp.org.
Note: This section has become extremely popular and submissions are first come, first served as room allows. Thanks!

Jill B. Almaguer, P.E.
Texas Delta '83

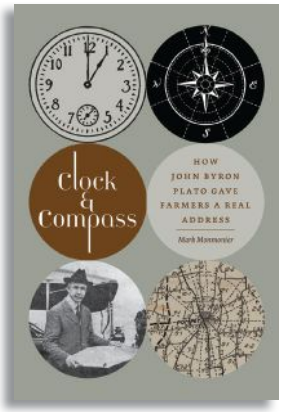
Houston After Harvey: Stories From Inside The Hurricane

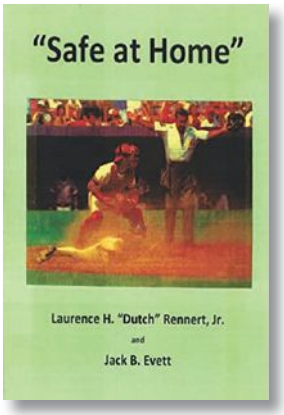
This coauthored ebook was published on Amazon in 2021. Proceeds from the sales go to a scholarship fund for bio-medical engineering students. Jill is senior project manager at Memorial Hermann Health System and has a B.S. in bio & biomedical engineering from Texas A&M University.

Mark Monmonier, Ph.D.
Maryland Alpha '64

Clock & Compass: How John Byron Plato Gave Real Farmers an Address

Mark has written more than 20 books. His latest, published by University of Iowa Press in 2022, tells the story of its namesake, who became a farmer and patented several inventions, including the "Clock System," which assigned addresses to rural residences without house numbers.





Jack B. Evett, Ph.D., P.E.
South Carolina Beta '64

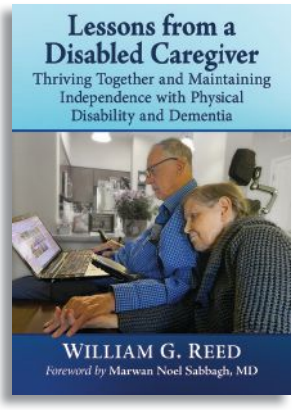
Safe at Home

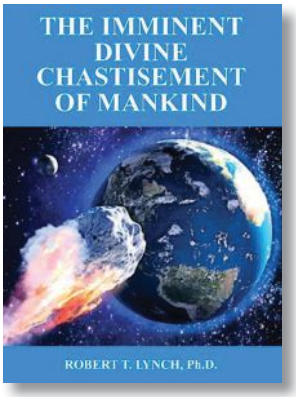
Jack coauthored this auto-biography published in 2021, of Laurence H. "Dutch" Rennert Jr., a baseball umpire in the minor leagues and later in the major leagues. Jack is a professor emeritus at the University of North Carolina at Charlotte, having taught for 32 years.

William G. Reed, Ph.D.
Pennsylvania Beta '63

Lessons from a Disabled Caregiver

In his book, published in 2021, William describes progressive nerve and muscle diseases resulting in needing a motorized wheelchair and other specialized equipment to perform life's daily activities. At the same time, he's been the sole caregiver for his wife, who has Alzheimer's.





Robert T. Lynch, Ph.D.
Massachusetts Epsilon '61

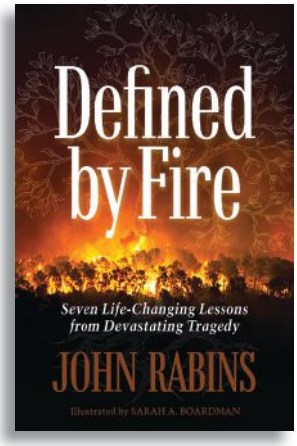
The Imminent Divine Chastisement of Mankind

Author of this book, Robert earned his B.S. degree in electrical engineering from Northeastern University. **Warning:** Catholic prophecies of death and destruction in our time may be disturbing to some readers.

John M. Rabins, Ph.D.
Ohio Eta '78

Defined by Fire

John wrote this book, published in 2020, and also *Spiritual Musings from the Saddle of a Bicycle*. After serving in the U.S. Air Force for 25 years, John became an optometrist. He has captured seven valuable lessons about a relationship with God, through unspeakable personal tragedy in 2013.



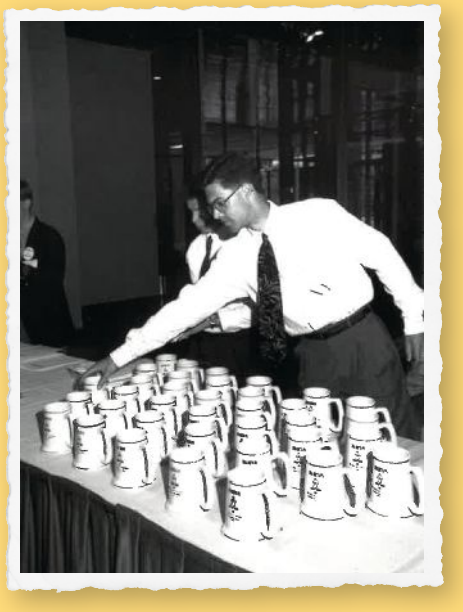
The STORY BEHIND The PHOTO

Announcing the Spring 2022 "Caption This Photo" Contest!

This photo was taken at the 87th Convention in East Lansing, MI, and appeared in the Winter 1993 issue of *The Bent*. A member of the host chapter instructs everyone to select their Convention souvenir!

How to Enter: Send us your witty caption(s) for this photo from *The Bent* archives. If the judges vote yours as one of the top three (and you have not been a previous winner), **we'll send you a ΤΒΠ t-shirt of your choice!**

Email your entry to captions@tbp.org or mail to *The Bent* of Tau Beta Pi, Caption Contest, P.O. Box 2697, Knoxville, TN 37901-2697.



DEADLINE: MONDAY, MAY 2, 2022 5 P.M. (ET)

The WINNERS of the Winter 2022 "Caption This Photo" Contest:

Readers young and not so young sent in 36 captions for the Winter 2022 contest. Thank you! You can read all entries, including captions and results from recent contests, at **tbp.org/pubs/captionContest.cfm**.

1ST PLACE:

"The bidding was fast and furious at the "Win a Date with an Engineer auction."

Thomas G. Hausheer, *IL Β '70*
—Previous winner

2ND PLACE:

"I motion that the person holding the "2" found the best way to second a motion. Who would like to second my motion?"

Alec G. Richardson, *PA Λ '87*
—Previous winner

3RD PLACE:

"Members of the Convention enthusiastically demonstrate their second to the motion of a break!"

Allison R. Procak, *DE Α '20*

4TH PLACE:

"Sold! To the man with the pit stain in the back for $500! Maybe you'll find a use for the rights to these so-called 'wireless networks'... ."

B. Zeke Holloman, *NC Ζ '21*

▲ The Winter 2022 image (above) was taken at the 89th Convention in Buffalo, NY. Following a session on Robert's Rules of Order, chapters attempt to find ways to improve a seconding motion.

CONGRATULATIONS TO OUR WINNERS!

Is it Time for this Baseball Rule to Change?

BY MICHAEL A. CHIARITO, *MARYLAND BETA '84*

Above Image Creator: Bob Levey. Credit: 2019 Getty Images

BASEBALL SITUATION

This was not the first such incident and certainly would not be the last, but seldom were the stakes so high. Game 6 of the 2019 World Series between the Washington Nationals and Houston Astros at Minute Maid Park (Texas) was the setting. In the top of the seventh inning, Nationals' shortstop Trea Turner hit a slow roller toward the left side of the infield. Although it was not a bunt attempt, the ball traveled as if it were. It was retrieved by the pitcher who threw toward first base, not where it could be caught, but rather at Turner's back. In real time, it appeared that the ball, the first baseman's glove, Turner's back, his foot, and first base all made contact at about the same time. The ball ricocheted into foul territory as the glove was dropped by the fielder. The first base umpire indicated safe, but this was overturned by home plate umpire Sam Holbrook who ruled that the runner interfered with the throw to first base.

THE RULE

Mr. Holbrook cited Major League Baseball (MLB) Rule 5.09(a)(11)[1] as the justification for the call. In essence, there is a three-foot wide area (aka, running lane/runner's box) along the base path encompassing the last half of the distance between home plate and first base in which the runner must remain until reaching first base (**Figure 1**).

[Note: The rule is only applicable when there is a potential force-out throw to first base.] The rule does not state that the umpire must call interference. It only states that he ***may***, if in his judgment, interference has occurred. The fact that Turner violated this rule is likely not debatable, and whether or not it should have been enforced in this and in similar cases has been debated extensively. However, there has been comparatively little debate regarding the reasonableness of the rule itself.[2]

For the vast majority of the plays at first base, this rule is not enforced because it is almost never relevant. As an example,

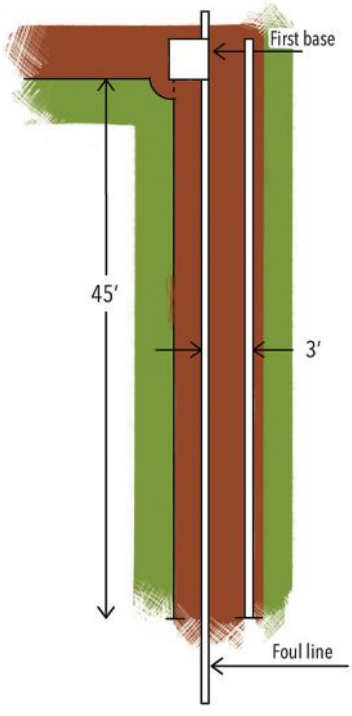


Figure 1: Running Lane Relative to First Base. Image Credit for all figures in this feature: Wilhelmina Hill-Bearhs

for routine ground-outs by one of the infielders, the ball thrown to first base is nowhere near the runner. So, the fact that he is not in this running lane usually does not matter. As another example, even for routine sacrifice-bunts, the ball is deliberately thrown either to the left of first base, or over the runner's head to ensure it can be caught without hitting the runner. It seems it is only when the call may be close that the ball appears to be thrown at the runner's back, likely so that the home plate umpire will be influenced to call interference. And of course, the first baseman is very skilled at "dropping" his glove which probably serves no purpose except to add dramatic effect. How many times have you seen a fielder drop his glove after making contact with a person or object (e.g., the outfield fence)? It virtually never happens. Yet, during this so-called interference scenario, it happens often.

Hall of Fame pitcher John Smoltz, the Fox Sports analyst during that World Series TV broadcast, stated that "players are taught to make that throw" so that interference ***will be*** called. During the massive debate that followed this incident, Turner attempted to make his case that he ran where he had to run in order to reach first base. Although he did not claim to adhere to the rule, he may have been correct that he ran where he had to run. There is no doubt that he ran to first base in the most efficient manner possible.

RUNNING A STRAIGHT LINE?

As everyone knows, the shortest distance between two points is a straight line. Therefore, a right-handed batter will tend to be in fair territory the entire distance between home plate and first base (**Figure 2**). Even a left-handed batter will be to the inside of the foul line for most of the last 20 feet of that distance — an area where it is not permitted (**Figure 3**). A left-handed batter will typically enter the running lane in the actual spot which the rule dictates, although in his case, it is a matter of coincidence rather than intent since he leaves the batter's box in foul territory. In order to affect his run in a straight line, he has to cross the foul line well before first base.

The phrase "…in the immediate vicinity of first base…" in the last sentence of "MLB Rule 5.09(a)(11) Comment"[1] identifies a necessary condition before a shift to the base may be attempted by the runner. So, what exactly is meant by "immediate vicinity?" Literally, this could mean "an infinitesimal distance," but of course, that is not the intent, but exactly what ***is*** intended?

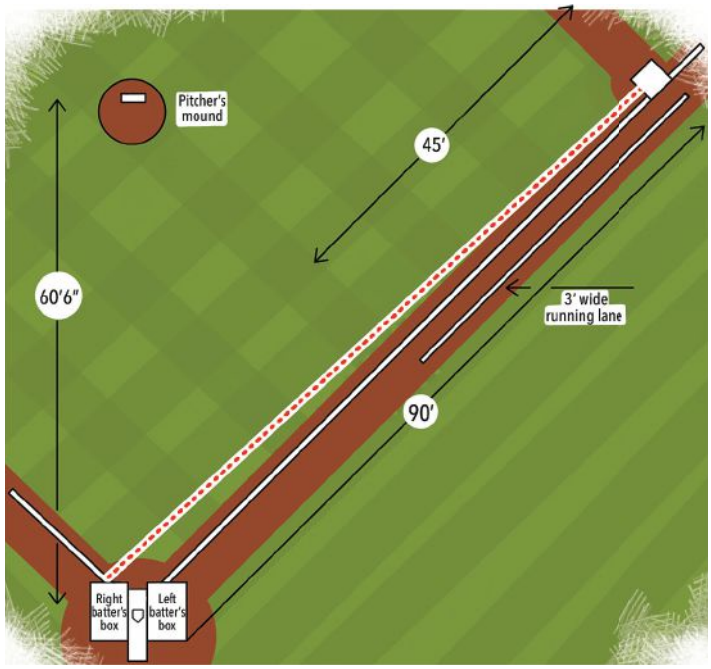
REACTION TIMES

What if one wishes to give the MLB rules committee the benefit of the doubt and interpret "immediate vicinity" as loosely and as generously as possible? Is this rule at all practical? Consider the following thought experiment: One necessary data point would be the time duration required to move from the running lane to first base. For comparison purposes, Dr. Marc Green, about whom it has been reported to have studied the concept of human reaction time for many years,[3] estimates that while driving a vehicle, the average duration required to move one's foot from the accelerator to the brake pedal is 0.7 seconds with reaction likely 0.5 seconds and movement 0.2 seconds.[3] This distance is probably much smaller than where a runner would be in the three-foot area, but considering that MLB players are professional athletes, let us assume he can move his foot toward first base in 0.1 second. The fastest MLB runners can approach 30 ft/s by the time they reach first base.[4] At this speed, he would have to begin this effort about three feet before first base. Ideally, the runner would like to land with his heel in the dirt and the front of his foot on the base. This minimizes the distance needed to travel and also minimizes the chance of injury. The last place he wants to land is "hang five" at the back part of the bag. However generous one wants to interpret "immediate vicinity," three feet would not seem to be what is intended by the wording. But wait, even that is not soon enough.

The runner will actually need to begin this effort to shift toward first base at the point where his right foot is planted at least one step before the bag. He cannot make this shift in the air. Since his center of mass will continue going straight when he moves his left leg toward first base, the rest of his body will move slightly to the right. Can you imagine what would happen if you landed on first base with your left foot while the rest of your body is shifting to the right while running? The mere thought of such an event is probably painful.

For short distances, the average running stride length for men is around 7 feet 9 inches.[5] Intuitively, for tall MLB players, it is likely about 8 feet. Therefore, the average running step length for players is probably around 4 feet. So, if 3 feet before first base does not satisfy the rule, 4 feet will not either.

Figure 2: Typical running path for right-handed batter to first base.



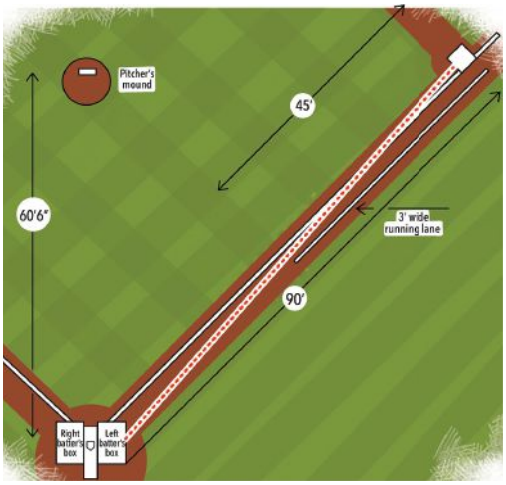


Figure 3: Typical running path for left-handed batter to first base.

Even if it were permitted, making such a shift running at full speed may not be wise. There are enough injuries running in a straight line to first base. For example, on May 13 of last year, Atlanta Braves' right fielder Ronald Acuña Jr. injured his ankle after landing on first base.[6] Although this type of injury does not happen often, it certainly is not unheard of. So, MLB is proposing that the runner has to add lateral movement to this effort, another degree of motion, which would make injury even more likely.

But wait, what if the move cannot be accomplished in 0.1 second? What if the scenario of moving one's foot from gas to brake while driving is analogous to shifting from the runner's box to first base, and 0.2 seconds is the right duration? Now, that move must begin a full stride (8 feet) before reaching first base. However, that assumes the runner's right foot is the one planted at that spot. If his left foot is there, and he attempts to begin that shift with his right foot, he will trip himself. Looking at several videos, it appears that both right-handed and left-handed batters (who are tall and fast) tend to land on first base with their left foot. This makes sense if there is only one step difference between the two runners' distances while each runner will begin running with his dominant foot. Considering each batting stance, this is almost the only possible way he could start his run. Hence, in this case, the shift will actually need to begin 12 feet before first base. Furthermore, that last step toward first base is sometimes a leap. One does not want to run and then leap unless going in a straight line.

HOW YOU GET TO FIRST BASE

Actually, there is one scenario during which the runner could easily adhere to this rule. If he remains in the three-foot area and slides head first with his left arm outstretched, he could swipe first base as he is going past it. However, according to MLB with the aid of Statcast, a case was made that running the full distance to first base was faster than sliding into first base. [7] This is intuitively obvious to most people since (unlike the other two bases) running past first base is permitted.

What difference does it make where the runner ***was*** before reaching first base since he will be at first base when reaching first base?! In other words, if in that World Series game Turner was in the runner's lane and was somehow able to miraculously shift toward first base a split second before landing there, he would still be at the same position he was in when the ball hit him (assuming for argument's sake it did not take longer to get to the bag). Apparently, with the umpires' thinking, this does matter.

In an online video "TECH TALK: Running inside the base paths with umpire Ted Barrett" dated May 7, 2015,[8] Barrett discusses the running lane with Fox Sports Ohio's Chris Welsh. At one point, Mr. Barrett says, "So, about a step or two before the base, we allow him to go into fair territory to touch the bag. And so, you might see a ball hit him just in front of first base, he's okay because we allow him to ... come into fair territory to physically touch the bag."[8] It certainly makes sense that one step (for a slow jog) and at least two steps (for running full speed) should be allowed since there is no other way to accomplish this feat as previously indicated. That begs the question, what is the purpose of the term "immediate vicinity?" It seems to be superfluous and completely irrelevant. Immediately after that last quote, Mr. Barrett points to the foul line and says, "If he's running inside this line all the way and he gets hit with a thrown ball, he's probably going to be out for interference."[8] The wording of this sentence and the previous use of "we" (two times) strongly implies that Mr. Barrett is speaking for most umpires.

Even though the umpires have discretion regarding whether or not to call interference, it appears they are choosing to penalize the runner for not being in the running lane even though the scenario at the end of the play is the same (i.e., the runner gets hit with the ball as he lands on first base, while in one case, he was previously in the lane before that occurrence and in the other case he was not there). Perhaps, it was this mindset that compelled Sam Holbrook to call interference in the World Series game previously discussed.

PROPOSED RULE CHANGE

This seems to violate logic in addition to being inconsistent with other rules of baseball. For example, if a ball is hit into foul territory, and then enters fair territory before reaching first or third base and remains there, it will be declared fair. Whether it was previously in foul territory does not matter. Also consider, if an infielder attempts to retrieve a ground ball, and misplays it miserably but somehow is still able to throw the runner out, he will not be charged with an error despite his clumsy fielding effort.

MLB Rule 5.09(a)(11) should be modified so that the so-called three-foot area is eliminated and allow the runner to do what he is already doing almost all the time, namely running directly from the batter's box to first base. He wants to ensure he lands near the middle of the bag because too close to either side will likely result in an injury. Almost no one runs in the running lane as the rule dictates. It is probably the most under-used section of real estate on the entire baseball field.

OTHER EXAMPLES

Would there still be a need to prevent runner interference? Sure, if the runner is to the left of the bag, whether intentional or not, this could be the new criterion for calling interference. With this change, the fielder will not be intentionally throwing at the runner, and the first baseman will likely not attempt to catch the ball if he does. This will eliminate other related injuries such as what happened to first baseman Max Muncy on the last day of the 2021 regular season,[9] when the Los Angeles Dodgers were hosting the Milwaukee Brewers. In the third inning, the

Brewers' Jace Peterson hit a slow roller toward the pitcher that was retrieved by Muncy's teammate, catcher Will Smith. Seeing that the play would be close, he may have intentionally thrown the ball at the runner's back. Intentional or not, that is where it went. Muncy attempted to catch the ball, but instead the runner collided with his glove and Muncy, much to the chagrin of all who watched, fell to the ground with an injured elbow, which was later determined to be dislocated.[10] [In this case, Max held onto his glove immediately after the collision and then released it because of the injury.] Is it not reasonable to believe that Muncy could have seen the runner approaching within his peripheral vision? What if he made the catch attempt for the sole purpose of influencing the umpire to call interference? Ultimately, the home plate umpire did call the runner out due to interference. Certainly, Peterson did what he always does when going from home plate to first base after a batted fair ball, except this time he was called out, neither from a force-out nor because he was tagged, but rather because the ball was thrown at his back, something that otherwise has not been permitted in more than 150 years. MLB Rule 5.09(a)(11) as currently stated may have contributed to Muncy's injury.

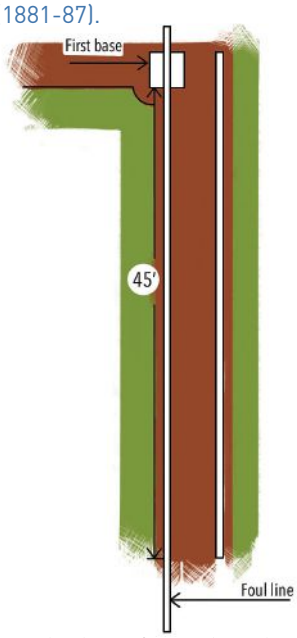
Consider the following hypothetical scenario: Bases are loaded. A slow roller is hit, retrieved by the fielder a couple of feet to the right of third base, and he will attempt to make a play at home. The catcher will be standing up with at least one foot on home plate since it is a potential force out. The runner who was on third base is running straight home, and there is no rule disallowing him from doing so. There is no running lane in foul territory in the last 45 feet before home plate. The runner does not have to slide, he may remain upright all the way home. He does not have to stop at home, he can keep running after stepping on home plate. The only difference between this scenario and an analogous one at first base is the frequency of incidents. Yet, in the latter case, all the fielder has to do to make the out is throw the ball at the runner as a school-yard kid who does not know any better might do and the former must do so as a professional.

According to author, Peter E. Meltzer, this running lane has been in use since 1881.[11] However, prior to 1887, half of each first and third bases were in foul territory (**Figure 4**).[12] At that time, it was logical to require the runner to stay in the running lane since he could remain there all the way to and touching first base. In 1887, those bases were moved to their current locations,[12] probably to make it easier for umpires to judge fair/foul balls. By solving one problem, another was created to what exists now: an impractical restriction for the runner approaching first base.

FINAL THOUGHTS

MLB has already made rule changes to protect player safety. For example, there was recently a rule added that does not allow the catcher to block home plate while a runner is attempting to score. This has greatly reduced the number of collisions that occur in that area. Hopefully, some serious analysis of Rule 5.09(a)(11) will be considered soon.

Figure 4: First Base Partly in Running Lane (1881-87).



MLB has also been focused on shortening the length of games. During that 2019 World Series game, there was a delay that lasted more than four and a half minutes debating the legitimacy of this rule's implementation. Although certainly not as long, other such incidents in regular season games have also caused delays.

MLB has also been focused on increasing offense. Modifying this rule as suggested will result in fewer called outs at first base. So, we will have improved player safety, shorter baseball games, and potentially more offense. This seems like a win for baseball and fans.

MICHAEL earned his B.S. in mechanical engineering from the University of Maryland in 1984 and worked at Lockheed Martin for 25 years, mostly as a software engineer. He is currently retired, lives in Summerville, SC, with his wife Marylou, and has four children and 14 grandchildren.

***The author would like to thank the following for providing valuable content and literary feedback: Wayne L. Elban, Ph.D.,* DE A '69, *Professor Emeritus at Loyola University Maryland; Ed Price, CAA baseball agent; and Marylou Chiarito, retired biology teacher and the author's wife.*

Works Cited

1. OFFICIAL BASEBALL RULES, 2021 Edition, p 43; https://img.mlbstatic.com/mlb-images/image/upload/mlb/atcjzj9j7wrgvsm-8wnjq.pdf (rule unchanged from the 2019 edition).
2. At least one other writer has done this in a delightfully candid article written from a player's perspective by Doug Glanville, posted the day after that World Series game, — "Glanville: I've despised the running lane rule since I was a player. Here's why it needs to change." https://theathletic.com/1336629/2019/10/30/glanville-ive-despised-the-running-lane-rule-since-i-was-a-player-heres-why-it-needs-to-change/
3. https://policedriver.com/reaction-time/
4. https://baseballsavant.mlb.com/sprint_speed_leaderboard
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6. https://www.cbssports.com/mlb/news/ronald-acuna-jr-suffers-ankle-injury-after-awkwardly-landing-on-first-base-braves-star-day-to-day/
7. https://www.mlb.com/news/statcast-looks-at-running-vs-slide-into-first-c251420158
8. https://www.youtube.com/watch?v=zI82sPn1Uj0
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10. https://www.truebluela.com/2021/10/5/22711568/max-muncy-dislocated-elbow-injury-no-ucl-damage-dodgers-wild-card-game
11. Meltzer, Peter, E. "So You Think You Know Baseball?: A Fan's Guide to the Official Rules," p 152. [Note: At the time of this publication, MLB Rule 5.09(a)(11) was referred to as Rule 6.05(k).]
12. Miklich, Eric. "The Rules of the Game A Compilation of the Rules of Baseball 1845 to 1900," pp 38 and 68; http://www.19cbaseball.com/baseball-rules-1845-1900.html

BRAIN TICKLERS

Results From Fall

Perfect Scores

Berthold, Kristopher D.	TX	B	'04
Bohdan, Timothy E.	IN	Γ	'85
*Couillard, J. Greg	IL	A	'89
*Gibbs, Kenneth P.	MO	Γ	'76
Gulian, Franklin J.	DE	A	'83
Gulian, Joseph D.	Son of member		
Johnson, Mark C.	IL	A	'00
*Kimsey, David B.	AL	A	'71
*Norris, Thomas G.	OK	A	'56
Norris Jr., Thomas G.	PA	Γ	'79
Scott, Darrell J.	NC	Δ	'82
Slegel, Timothy J.	PA	A	'80
Spong, Robert N.	UT	A	'58
Zison, Stanley W.	CA	Θ	'83

Other

Bannister, Kenneth A.	PA	B	'82
Bertrand, Richard M.	WI	B	'73
Capelli, Ronald B.	MI	Γ	'73
Chatcavage, Edward F.	PA	B	'80
Costantino, John T.	NJ	A	'79
Crouse, John M.	PA	B	'74
Gaston, Chuck A.	PA	B	'61
Grewal, Kalwant S.	TX	H	'73
Griggs Jr., James L.	OH	A	'56
Handley, Vernon K.	GA	A	'86
Janssen, Jim R.	CA	Γ	'81
Jordan, R. Jeffrey	OK	Γ	'00
Klaver, Naftali	Son of member		
Marks, Lawrence B.	NY	I	'81
Hertz, Caryn M.	NY	I	'81
Marks, Benjamin	Son of member		
McHenry, S. Dale	MO	B	'81
Parks, Christopher J.	NY	Γ	'82
Riedesel, Jeremy M.	OH	B	'96
Roggli, Victor L.	TX	Γ	'73
Schmidt, V. Hugo	WA	B	'51
Shamblin, G. Richard	FL	A	'72
Spring, Gary S.	MA	Z	'82
Spring, Mitchell G.	Son of member		
Summerfield, Steven L.	MO	Γ	'85
Voellinger, Edward J.	Non-member		

*Denotes correct bonus solution

Fall Review

The Fall puzzles were harder than usual. Less than 1/4 of the Bonus answers (space ship) submitted were correct. Only 2/3 of the answers about policy numbers (#2) were correct. The remaining problems had 84 percent or better correct answers.

Winter Answers

1: The solution to the cryptarithm is **12642325–9760233=2882092**. Writing the problem as CORNELL+ESSENCE=BERKELEY, it is obvious that B=1 and C=9, since C+E+c1=10+E only works if we have a carry and C=9. In the middle column, we have either N+E+c4=10+E or N+E+c4=E. The former will not work since N≠9, so N=c4=0. c5=1 because E≠L, so now 1+E=L. L+C+c6=10+E, and since C=9, c6=0. This implies that L+E<9, and the only viable (E,L) pairs are (3,4) and (2,3). If E=3 and L=4, then Y=7. From the third column, R+S=10+K or R+S=K, and with the numbers 2,5,6,8 available, only R=2, S=6, and K=8 work, which forces O=5. Since O+S=10+R implies 11=12, this is not a legal (E,L) pair. We choose E=2 and L=3, so Y=5. Again, R+S=10+K or R+S=K, this time with the numbers 4,6,7,8 available. Only R=6, S=8, and K=4 work, which forces O=7. O+S+c2=10+R implies c2=1 and we have a consistent solution.

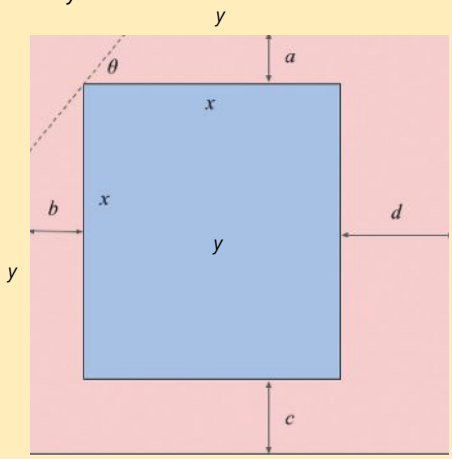
2: The smallest value in each expression for N is $\mathbf{2^{105}3^{70}5^{126}7^{120}}$. If we let $N/2=a^2$, $N/3=b^3$, $N/5=c^5$, and $N/7=d^7$, we want to find values of a, b, c, and d such that $2a^2=3b^3=5c^5=7d^7$. In each expression for N, there must be terms of $2^{3\cdot5\cdot7\cdot i}$, $3^{2\cdot5\cdot7\cdot j}$, $5^{2\cdot3\cdot7\cdot k}$, and $7^{2\cdot3\cdot5\cdot l}$, that is, 2^{105i}, 3^{70j}, 5^{42k}, and 7^{30l}, for the smallest possible integers i, j, k, and l such that one less than each of the exponent terms is divisible by the base. For i=1, 105–1=104 is divisible by 2. For j=1, 70–1=69 is divisible by 3. For k=1, 42–1=41 is not divisible by 5, so we must choose k=3. Similarly, we choose l=4, leading to an answer of $N=2^{105}3^{70}5^{126}7^{120}$.

3: Beth was Honduran, wore ivory, and left at 9AM; Carol was English, wore khaki, and left at 10AM; Ann was German, wore lavender, and left at 11AM; Doris was French, wore jade, and left at 12 noon. We are told that it must be Carol or Doris at 10AM, wearing khaki or lavender. So, this cannot be the time slot one hour after the girl (Ann or Beth) who was not wearing khaki and was not English or French left. The only possible time for this is 11AM, meaning that at 12 noon the girl was not wearing ivory or jade. At 12 noon, the girl must be Ann, Beth, or Doris, and on the tabulation, only the name of the girl at 9AM or 12 noon can be correct. If it is Ann at 9AM, then Beth and Doris must be at 11AM and 12 noon respectively, which is impossible. So, Doris is at 12 noon, Carol is at 10AM, Beth is at 9AM, and Ann is at 11AM. Beth is from Honduras, and Ann must be from Germany, which is correct on the tabulation. Then it follows that Carol and Doris are English and French, respectively. Since it is impossible for any of the final three times to have the correct color on the tabulation, Beth must wear ivory, and it follows that Doris wears jade, Carol wears khaki, and Ann wears lavender.

4: There are **703,098,107,712,000** unique passcodes. One approach is to consider the number of times a given digit 0-9 appears in the passcode, and break the problem into groups based on the patterns of the quantities of various digits. In this way, we can create 11 groups of passcodes. Those where 1 digit appears 7 times and the rest once, another group where 1 digit appears 6 times, another digit appears 2 times and the rest once, etc. For succinctness, if we

suppress digits which appear only once, the eleven groups can be expressed as (7), (6)(2), (5)(3), (4)(4), (5)(2)(2), (4)(3)(2), (3)(3)(3), (4)(2)(2)(2), (3)(3)(2)(2), (3)(2)(2)(2)(2), (2)(2)(2)(2)(2)(2). The first group has 16!/7! × C(10,1) passcodes. The second group has 16!/(6!2!) × C(10,1)C(9,1) passcodes. Continuing each subsequent group contributes 16!/(5!3!) × C(10,1)C(9,1), 16!/(4!4!) × C(10,2), 16!/(5!2!2!) × C(10,1)C(9,2), and so forth. Summing these 11 quantities together gives the desired result above.

5: The original rug measures **63 feet** on a side. For corner cuts (as exemplified by the attached diagram) at an angle θ from horizontal, the clipped area will be of the form ½(*b*+*a*cotθ)(*a*+*b*tanθ). Using calculus to minimize this area as a function of θ leads to the not-surprising result that tanθ = *a*/*b* and one corner's clipped area of 2*ab*; this can be extended to the other four corners with appropriate exchange of variables. The ratio of the total red area over the clipped red area will be 10, and is given by the expression (*x*(*a*+*b*+*c*+*d*)+*ab*+*ad*+*bc*+*bd*)/(2*ab*+2*ad*+2*bc*+2*bd*)=10. Noting that *a*+*c*=*b*+*d* allows us to see the total clipped area can be written as 2(*a*+*c*)² and simplifying the previous expression gives *x*/(*a*+*c*) + ½ = 10, or *x* = 9.5(*a*+*c*). If the clipped area is an integral number of square yards, then *a*+*c* must be a multiple of 3, so *x* = 28.5*k*. The smallest integer *k* which makes *x* (and also *y*) an integer is *k*=2, yielding dimensions of *x*=57 and *y*=63.



BONUS: It takes **(π/2)√(L/μg)** seconds to come to a stop at the desired position when the initial velocity is **√(Lμg)**. $F=\mu N=ma$ where we consider only the portion of the rod $x(t)$ above the rough surface to contribute to the equation, and assuming a uniform rod we have $\mu g(-x/L)m=ma$. Cancelling the masses gives a familiar differential equation $\ddot{x}=-x(\mu g/L)$. With the initial conditions that $x(0)=0$ and $\dot{x}(0)=v_0$, the solution is of the form $x(t) = v_0\sqrt{(L/\mu g)}\sin(t\sqrt{(\mu g/L)})$ and $\dot{x}(t)=v_0\cos(t\sqrt{(\mu g/L)})$. To stop with the end of the rod at the beginning of the rough patch requires $0 = v_0\cos(t\sqrt{(\mu g/L)})$ so $t=(\pi/2)\sqrt{(L/\mu g)}$ and $L = v_0\sqrt{(L/\mu g)}\sin(\pi/2) = v_0\sqrt{(L/\mu g)}$ so $v_0=\sqrt{(L\mu g)}$.

COMPUTER BONUS:

The first ten 6th cousins of Giuga are: **14, 21, 182, 1463, 14098, 18802, 24695930, 49305333, 55388487, and 1925224630**.

New Spring Problems

On September 3, 2021, friend and former judge **Don Dechman,** *TX A '57*, passed away. In Don's memory, the first and last puzzles of this issue are his.

1: Cable Length Dip

A flexible cable was hung across the Black Canyon between two points that were exactly 1 km apart at the same elevation. During the cool night, the cable length contracted by a small amount, causing the dip (the height difference between the highest and lowest points) to decrease by the same amount. What was the length of the cable?

—**Don A. Dechman,** *TX A '57*

2: Tricky Cryptarithm

In the following base 12 cryptic addition, what is the minimum number of TRICKYs that result in a solution? The usual rules of cryptic addition apply.

TRICKY + TRICKY + ... + TRICKY + BRAIN = TICKLERS

—**Howard G. McIlvried,** *PA Γ '53*

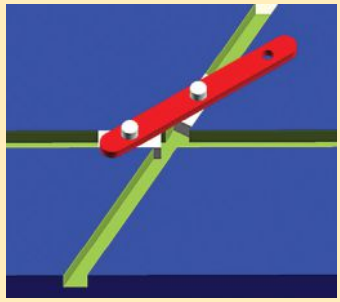
3: Find the Ace

Starting with a standard 52 card deck and drawing cards randomly, what is the expected number of cards that must be drawn to get an ace?

—*The Theory of Gambling and Statistical Logic* by Richard A. Epstein

4: Trammel Curve

In the trammel below, the holes in the red rod are spaced 10 cm apart, center to center. What is the equation of the curve traced by the unoccupied hole as the rod makes a complete orbit in the apparatus? Assume the x-axis is along the horizontal slot and that the origin is at the intersection of the two slots, which are separated by an angle of 60 degrees.



—Puzzle Corner by Allen Gottlieb in *Technology Review*

5: Toss the Twos & Fives

In the game "Drop Dead," you roll a number of six-sided dice. If a roll does not include any 2s or 5s, you add the sum of the dice to your score and roll all of the dice again. If your roll does include 2s or 5s, you receive no points for that roll, the dice with 2s or 5s are discarded, and the remaining dice are rolled again. You repeat this procedure until all dice have been discarded. If you start with five dice, what is your expected score by the time you have discarded all of your dice?

—*MathWithBadDrawings.com*

BONUS: Syzygy A solar system has three small coplanar planets orbiting in the same direction about a large central sun.

BTs continue on page 51

Alumni Giving

New Donor Recognition Clubs

The Donor Recognition Clubs are part of our effort to recognize a donor's total lifetime cumulative giving to Tau Beta Pi. **THANK YOU** to the 3,942 TAU BETA PI ALUMNI and others who made donations to the Association totaling $884,240 between November 1, 2021, and January 31, 2022. Gifts received after January 31 do not appear here but will be published in the Summer 2022 issue. These club names and amounts, recently updated by the ΤΒΠ Executive Council, are set at the following levels:

$1 MILLION+
Williams Club

Edward H. Williams Jr., Sc.D.
PA A 1875, Founder of Tau Beta Pi

$500,000+
Heikes Club

Irving A. Heikes, *PA A 1885*
1st student member

$250,000+
Harelson Club

Katharine C. Harelson, *KY A 1924*
1st Women's Badge (WB) recipient

$100,000+
Matthews Club

R.C. "Red" Matthews, *IL A 1902*
1st Sec.-Treasurer of ΤΒΠ

$50,000+
Franklin Club

Marjorie A.H. Franklin, *KS A 1957*
1st woman initiated into Sigma Tau

$25,000+
Nagel Club

Robert H. Nagel, P.E., *NY D 1939*
2nd Sec.-Treasurer of ΤΒΠ

$10,000+
Clarke Club

Edith Clarke, WB #95
Inventor of graphic calculator

$5,000+
Evans Club

Henry B. Evans, Ph.D., *PA A 1893*
1st president of Tau Beta Pi

$2,500+
Eaves Club

Elsie Eaves, *CO B 1920*, WB #24
Influential civil engineer

$1,000+
Downing Club

Lewis K. Downing, *MI G 1921*
1st Black HBCU engr. dean

$500+
Moore Club

A.D. Moore, *PA G 1915*, ΤΒΠ president, Fellowship Program founder

$250+
Forman Club

George W. Forman, *IL A 1941*
Led ΤΒΠ/Sigma Tau merger

NOTES:
1. Names preceded by SPEC denote gifts from non-members.
2. Names marked with a † symbol are of deceased members in whose memory donations were made either by relatives and friends or through bequests.

Evans Club
James M. Braden
AL Γ '76
Always pleased to contribute to the Tau Beta Pi Organization.

Evans Club
James S. Jarratt
TN Α '68
Inducted by Jim Froula, mentored by Bob Nagel.

Moore, Forman & Pre-Club Members Continue on website

Due to the number of alumni contributors, the Moore, Forman, and Pre-Club Members will be acknowledged on our website (PDF) at: *www.tbp.org/?AGP*. All donations are essential to the continued success of the Association, but due to rising print costs of each issue, these donors will be listed with all of the other contributors in a protected PDF document on the website. If you have questions or concerns, please contact **development@tbp.org**. Thank you for your understanding as we try to produce an enjoyable and cost effective magazine for our readers.

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No alumni gifts for this quarter

$500,000+ Heikes Club

No alumni gifts for this quarter

$250,000+ Harelson Club

No alumni gifts for this quarter

$100,000+ Matthews Club

CA Δ †Nelson, Thomas Adams '49
MI Γ Clark, Terry Blue '69
MI Z Lange, Harry William '75
OH E Pasadyn, Ronald Chester '70
RI Α Anonymous '72

$50,000+ Franklin Club

SPEC Zeigler-Lyons, Nancy '00
CA E Chow, Bob '83
Chow, HIlda C. '85
CA Z Grigsby, David A. '84
MI Γ †Albrecht, Terry Erwin '67
NJ Δ Lim, Yung Bong '87
OH H Merkle, Larry '92
TX Δ Rothrock, Ray Alan '77

$25,000+ Nagel Club

CA Α Kepler II, David Edwin '75
CA B †Jessen, Howard Ellsworth '46
CA E Goodin, William Rex '75
Anonymous '77
CA T Anonymous '96
CO Α Armentrout, Michael Lee '94
Pierce, Michael Craig '90
Pierce, Tin L. '89
CO B Anonymous '78
GA Α Gilliland, Clinton Redmond '59
IL Α Spitzer, Robert Edward '61
IN Α Ford, Steven Richard '80
Newcomb, Robert Wayne '55
Sarkisian, Nancy Louise '77
MD B Crane, Thomas Clemson '62
MI Α Colbry, Dirk J. '06
Colbry, Katy Luchini '99
MI E Gomulinski, Curt Dennis '01
Tillinger, Steven Jay '68
MI Z †Thebert, Alan Wilbert '57
MS Α Shackouls, Bobby Stone '72
NY Δ Jacobs, Irwin Mark '56
OH Α Ferencz, Robert Mark '80
OH Γ Beans, Bill '53
OH Δ †Robe, Richard '55
VA Α Benneche, Paul Eric '74
WI Α Anonymous '64

$10,000+ Clarke Club

SPEC Anonymous '00
AR Α Vratsinas, Gus M. '67
CA Α Masatani, Peter James '04
CA Δ Davis, John Leo '60
CA H Noble, Gary D. '96
CO B Harris, James Robert '68
Kidd, T. Wayland '44
CT B Hunziker, Robert Neal '83
DE Α Anonymous '70
FL B Crews, Renard Calvin '70
IN Γ Drnevich, Ronald James '63
Rice Jr., Donald Blessing '61
LA Α Comeaux, Keith A. '89
LA B Legendre III, Emile Joseph '60
LA E Champagne Jr., Pierre '76
MA Α Keogh, Brian James '84
MA Δ Coutts, Robert Bruce '72
Fenton, Harvey Albert '58
MI Γ Anonymous '82
Anonymous '78
Crouch, Dennis Eugene '62
†Simmons, Charles David '50
MI H Horldt, Henry Bessemer '47
MS Α Jerome, Dennis C. '67
MO Γ Kilert, Albert Harold '63
NH Α Sherman, John Lincoln '54
NJ B Mudie, Samuel Hunter '62
NJ Δ Bezos, Jeffrey Preston '86
NY B Leader, Jeffery James '85
NY Γ De Groot III, Ward Walton '54
NY Δ Kemp, Thomas Ward '59
NC Α Johnson Jr., Jim William '77
OH Α Rasbold, James Charles '83
OH Γ Ross, Elliot Bennett '69
OK Α Morris, Jay Kevin '81
OK Γ Wear, Steven Marcus '85
PA Γ Barrow, Bruce Barton '50
Spector, Scott Jay '74
PR Α Garcia, Carlos E. '77
TN Α Pih, Norm '82
Whitten, James Raymond '59
TX Α Anonymous '63
Mickelson, Kent Burdell '77
TX Γ O'Dell, Stewart Conn '78
TX Z Hambrick, Joanna Ruth '86
UT Α Morrison, Michael George '88
VA Α Pitzer, William Groh '75
WA Α Okita, Richard Y. '56
WV Α Baker, David Wesley '76

$5,000+ Evans Club

AL Α Bowers, Charles Judson '69
AL Γ Braden, James Michael '76
AZ Α Milan, John M. '67
Seabury, David G. '82
AZ B Story, Franklyn H. '81
Stout, Roger Paul '77
AR Α Jenkins, Lynn Page '61
CA B Lippey, Jerry '55
CA Γ Kwok, Munson Arthur '62
Tyson Jr., James J. '58
CA E Tozaki, Ronald Yuji '74
CA Θ Smith, Gregory W. '75
CA I Pickett, Stephen Euan '75
CA Λ Domning, Edward Ernest '84
Holl, Sue '76
CA M Sciacca, Joan Michelle '87
CA N Caddock Jr., Richard E. '72
CA O Treinen, James Patrick '85
Turhollow, Charles Bernard '81
CA Y Alexander, Joseph William '06
Alexander, Rachel Kristin '15
CA Φ Jenkins Jr., Lester Alfred '01
CO Α Knight, William James '79
CO Δ Laughlin II, George Thomas '75

Alumni Giving

Evans Club continued

CT B Chatfield, Larry Allen '71
Pressman, Roger Stewart '69
DC B Youssefmir, Paul '78
FL A Anonymous '99
Anonymous '00
Bolton, Charles Houston '62
Kalter, Howard Leo '66
Lewis, Becky Ann '04
Shacter, Philip '79
FL E Cowan Jr., David James '14
GA A Driggers, Herbert H. '63
Fawcett, Clinton Douglas '92
IL A Baits, Paul Gordon '79
Fue, Harold '57
Tracy, Mark Alfred '86
IL B Bernhardt, John Edward '89
IL Γ Herzing, Henry George '59
IN A Barker, Kenneth Dale '64
Carlson, Richard Alan '70
Ricks, Stephen Wayne '63
IN B Badger, Jerry Delon '62
IN Γ Buran Jr., Joseph Edward '75
IN Δ Stechholz, Jonathan M. '72
IA A Carlson, Mary Terese '78
IA B Smull, Warren Lindsey '57
KS B Patton, Robert Eugene '70
MD A Dackow, Paul Nicholas '76
MD B Ausherman, Donald Wayne '79
Schaefer Jr., William Joseph '70
MA A Duris, Robert Alan '74
MA B Evans, Lary Lewis '67
Freeman, Reed Harlow '61
Goldstein, Andrew Carl '69
Anonymous '58
MA Δ Patkin, Murray Solomon '64
MA E Sladek, John Richard '77
MA Z Cetti, Richard Phillip '70
Lewis, Nelson David '73
MA H Wotiz, Robert Paul '78
MI A Spindler, Jeffrey David '79
MI B Jenekhe, Samson A. '77
MI Γ Battel, Steven J. '79
Fay, John Edward '56
Halverson, Mark Wayne '72
Padzieski, Robert Joseph '70
Seidel, David Allen '81
MI Δ Dietrich, Robert William '57
MI H Pascany, Kenneth Michael '86
MI Λ Repke, Wesley Ryan '09
MO Γ Philipp, Patrick William '98
MT A Royer, Erlind George '61
NE A Hannon, Gregory Michael '86
Walcott, Gwen Sharyn '82
NJ Γ Petruch, Raymond A. '84
NJ Δ Mendelsohn, Andrew Jay '77
Yu, Jeffrey Chih-ping '89
NM B Slominski, Paul '78
NY Γ Luckett, Larry Wayne '83
NY H Butterman, Heidi Carol '79
NY I Judd, Robert Paul '78
NY Π Stalzer, Jeffrey '74
NC Γ Anapol, Edward '76
OH A Linsalata, Frank N. '63
OH Γ Riedel, Kimberly Sue '90
OK A Edwards, Paul Arnaud '87
Hall, Ralph Roy '64
OR A Lynch, Stanley Clark '73
PA A Wagner, Theodore Walter '71
PA B Hertneky, John A. '79
PA Θ Caramanico, Thomas A. '71
SC B Gibbons, Joseph Harrison '56
SC Γ Davis III, Emmett Irwin '79
TN A Froula, Jim DeWayne '67
Jarratt, James Stroud '68
TN B Layne, Peggy Edith '80
Skoglund, Paul Albert '89
TN Δ Chauvin, Wendy M. '89
TX A Smith, Matthew Thomas '93
TX Δ Porter, Larry Gene '64
TX H Lin, Frank Kuo-Chiang '80
Nooyi, Raj K. '78
TX Θ Barrett, Jerry George '70
UT A Eide, Eric Norman '89
VT A Ketcham, Kenneth James '68
VA A Brown, Lee Merry '88
WA A Pierce, Russ W. '70
WV B Ashman, Michael D. '84
WI A Yee, Paul Yuen-Po '70
WI Γ Hanson, David L. '86
WY A Steadman, John W. '65
Steadman, Sally J. '69

$2,500+ Eaves Club

AL A Smith, David Buck '70
Talbot, Thomas Fletcher '52
AL B Acree, Elaine '76
AL Δ Styles, Ellen S. '85
Styles, Robert Charles '76
AK A Braun, David Robert '74
Dombrowski, Roger Alan '69
AZ A Chen, Daniel J. '83
Erickson, Kenneth Lynn '68
AR A Hunt, Gary Wayne '84
Johnson, Mark Clayton '84
Newtown Jr., Glenford A. '69
CA A Fong, Kirby William '67
Hoe, Albert '92
CA B Lee, Roland Robert '75
CA Γ Dohner, John Walter '72
Hess, Kenneth Lafferty '74
Hetzel, Geoff Orin '82
Marks, Stuart Warren '84
Sansbury, James Douglas '66
†Trane, Frank Hood '53
Ullman, Marc Albert '83
CA Δ Moretti Jr., Vincent Carlos '78
Sekimura, Gerald Takashi '73
Slafer, Loren Ian '68
Zaatari, Mohammed Omar '88
CA E Dobbs, Michael Wayne '66
Gritton, Eugene Charles '63
Karagozian, Ann Renee '78
Simsarian, Gregory Garabed '82
Warner Jr., John Hilliard '63
Wenck, James Carl '77
CA H Akers, Joe Lee '69
Kruusmagi, Daniel Thomas '13
CA Θ Lawson, Wayne Alan '69
CA I Kuspa, Joseph Anthony '93
CA Λ Hafer, Edward Henry '70
Pickles, William Raymond '80
Yamamoto, Ko '84
CA M Keiser, Randy Jay '73
CA Ξ Hart, Laura Jean '82
CA P Andersen, Eric Kenneth '79
CA Y Grupse, Nancy T. '88
CO A Kranzler, Irvin '54
Peters, Richard Duane '80
CO B Aerstin, Franklyn George '64
Blackwelder, Ron F. '64
Colonell, Joseph Michael '58
CO Γ Pearson, Larry '64
CT A Fischer, Edward Michael '89
Livingston, Robert McLean '57
CT B Killingbeck, David R. '77
Klopfenstein, Rex Carter '59
Pitkin, Edward Thaddeus '52
Tylaska, Theodore Thomas '85
DE A Hyer, Frank Sidney '58
DC A Belcher, Wade D. '70
Engram, Robert Louis '69
Gathungu, Peter Maina '93
DC B King, David Alan '68
Maslen, Carrie J. '82
DC Γ Cooper, Reid Franklin '77
Haldeman, Paul Metz '70
FL A Layman, Robert William '68
Lewis, Lee Conley '91
Newlands, David Michael '62
FL B Jennings IV, Tipton Davis '54
Tilles, Arno William '85
FL Γ Copeland Jr., Edwin '73
Jones, William David '74
GA A Cooper Jr., Basil Pearson '65
Farr, Emory Warren '54
Henderson, Richard Dean '53
Mowrey, Dan B. '65
Rogers, Don Edwin '63
Snare, Daniel Marion '80
IL A McGinnis, Gerald Edward '58
Ostrodka, David Leon '70
Tirpak, Thomas Michael '87
IL B Gurney Jr., Donald P. '59
Hughes, Joseph L A '79
Jaras, Anthony A. '67
Plesniak, Michael W. '83
IL Δ Hachtel, Dale Arnold '68
IL Z Glait, Scott Steven '84
Woyna, Mark Anthony '87
IN A Reitz, Richard Alan '63
Teague, Stephen Michael '71
Thompson, Curtis Brooks '51
White, Stanley Archibald '57
IN Γ Boehnen, Daniel A. '72
McDonald, Patrick John '60
Richter, Richard Terrell '70
Schuster, Gregory Michael '77
IN Δ Luecke, Edgar Jacob '55
IA A Davenport, Delbert James '67
Derr, Curtis R. '85
Paris, Stephen Warren '75
Shepherd, Kevin John '83
IA B Schmidt, Charles Chris '73
KS A Knapp, Roy Marvin '63
Leamon, Rich Gaylord '67
Moore, Richard Arthur '51
KS Γ Bucher, William Alexander '76
KY A Dunning, William Edward '61
Howe, Richard Samuel '59
LA A Compton, Ronnie Ray '72
Williams, Colleen Daniel '82
LA B Buesinger, Robert Ford '78
Paul Jr., Howard Cochran '80
Perrin III, Shepard Francis '83
LA Γ Poole, Ronald Gene '69
ME A Jefts, Alan Robert '73
MD A Shinham Jr., Charles Robert '71
MD B Antony, Roger William '71
Jansen, Russell Onas '74
Lambrechts, James Russell '73
Perkins, Michael Joseph '95
Rowland, R. Wilson '51

Evans Club
Reed H. Freeman
MA B '61
Supporting ΤΒΠ is a way of affirming the best rising engineering talent.

Evans Club
Rachel K. Alexander
CA Y '15
I give because ΤΒΠ members' drive continues to inspire me daily.

Eaves Club continued

	Toense, Robert Earle '76	
	Trimble, Alan Roy '71	
	Valencia, Jaime Alfonso '74	
MA A	Descoteaux, Kenneth Gerard '89	
	Lescoe, James Terrence '05	
MA B	Chang, Nancy Tien-Tien '87	
	Clauss Jr., John Seebold '54	
	Hladik, Karen Jean '78	
	Kornafel, Peter Robert '65	
	McKim, Thomas Francis '75	
MA Δ	Harty Jr., Frederick Russel '61	
MA E	Bittner, Douglas E. '83	
	Brunetto, Thomas P. '74	
	Stevens, Janet Marie '72	
MA Z	Meurer Jr., Glenn William '86	
	Poulin, James Edward '66	
	Smith, Richard Gregory '78	
MI A	Griffin, Albert Walter '80	
MI B	Leven, Peter Johannes '93	
	Stromp, John Edward '78	
	Vukovich, Robert James '83	
	Wacker, Don Herbert '52	
MI Γ	Ardis, Robert Boyd '46	
	Bonfanti, Giovanni '62	
	Cameron, John Joseph '66	
	Engelhardt, Larry Norbert '77	
	Pendleton III, Winston Kent '62	
	Pepper, Julia Lynn '84	
	Poy, Alfred Lim '91	
	Reines, Jose '59	
	Stewart, Steve Russell '66	
	Subramanian, Suresh '88	
MI Δ	Wittman, Bernard A. '64	
MI E	Boileau, James Maurice '87	
	Chudd, Richard Alan '66	
	Thompson, George W. '55	
MI Z	Pettiford, Steven Douglas '72	
	Slovesko, Shawn Michael '97	
MI H	Grupp, Jeffry Bernard '74	
	Hill, Scott S. '83	
	Johncox, Robert Allen '83	
MI Θ	Garrity, William Edwards '70	
MN A	Duscha, Lloyd Arthur '45	
	Hanson, Henry Arthur '66	
	Tucker, Randolph Lewis '83	
MO A	Currie, Wayne Lee '59	
	Oehrke, Timothy Chris '75	
	Sandfort, Robert Melvin '64	
	Weary, Franklin Grimm '70	
MO B	Ash Jr., Richard Lawrence '70	
	Eldred, Benjamin Todd '96	
	Peat, Robert James '79	
MO Γ	Byrne, Clare Theresa '78	
	Chambers, David Hugh '80	
	Anonymous '99	
	Rossetti, David Joseph '74	
MT A	Collins, Douglas Macnab '71	
	Pearce, Mary Ann '76	
NE A	Kaminski, Wayne Alan '79	
	Steube, Milan Ray '74	
NJ B	Blasi, Michael G. '68	
	Cohen, Robert Bruce '77	
	Fletcher, Leroy Stevenson '58	
	Kaufman, Peter Andrew '84	
NJ Γ	Angyal, Stephen '63	
	Kunyz Jr., Joseph John '73	
	Mauermeyer, Henry A. '72	
	Pecca Jr., John Anthony '87	
	Raia, Lawrence A. '65	
	Sharon, Anthony Peter '74	
NJ Δ	Kline, Donald R. '55	
	Meyer, John Edward '81	
NM A	Peace, Jeffrey Howard '76	
	Smith, Jeffrey A. '84	
NY A	Kofman, Boris B. '86	
NY B	Carr, Donald Joseph '77	
NY Γ	Gray, Robin Bryant '46	
	Hartung, Edward Clinton '63	
	Lequar, James Kay '87	
	Schultz, Stephen Parker '70	
	Thal Jr., Herbert Ludwig '53	
NY Δ	McCloskey III, Charles C. '71	
NY E	Martin, Kent Richard '66	
	Rubin, Lowell '61	
NY Z	Frohman, John E. '72	
	Mendel, Jerry M. L. '59	
NY H	Pasquarelli, Louis Ralph '73	
NY Θ	Beckeman, William Jerauld '79	
	Kaylor, James M. '88	
NY I	Dujmich, Louis Charles '78	
	Neuschaefer, Howard E. '65	
NY Λ	Abrardo, Joseph M. '72	
	Moon, Monte Lee '75	
NY M	Czuba, John Stanley '78	
	Meader, Lyla Rebecca '86	
NY Π	Cole, David Michael '88	
NY P	Calfa Jr., Frank Salvatore '81	
	Solaski, Thomas P. '85	
	Vebeliunas, Rimas V. '74	
NY T	Olenik, Anthony Michael '08	
NC A	Deitrick, Kurt Frederick '78	
	Hunter, J. Stuart '47	
	Vercaemert, Carol Starnes '76	
	Walker, Gary Kenneth '70	
NC Γ	Ando, Robert Ryoichi '73	
	Franks, Marla Jane '79	
	Hovis, John Garrison '78	
	Linker, Edward Markham '47	
	Vadnais, Paul A. '73	
NC Δ	Jones, Luellen Barnett '83	
NC E	Allen, James A. '88	
OH A	Goralski, Christian Thomas '64	
	Hamilton, Joshua J. '09	
OH B	Hamilton, Edward L. '73	
	Pollock, Flavil Martin '77	
OH Γ	Becher, Charles David '72	
	Condit, Dale O. '66	
	Cowan II, Robert Lee '66	
	Dietz, James Francis '69	
	Feltz, John Francis '61	
	Guins, Thomas Sergei '69	
	Hagenlocker, Edward E. '62	
	Howland, Smith Eugene '69	
	Orkins, James E. '66	
	Anonymous '86	
	Robinette Jr., William Henry '68	
	Shelley, Bill Raymond '74	
OH Δ	Brown III, Claude M. '74	
OH Z	Panning, Daniel Wayne '79	
	Zelms, Charles Michael '73	
OH I	Strausbaugh, Patrick D. '86	
OH K	Maki, Luke Richard '78	
OH Λ	Nicalek, Richard Allan '76	
OH M	Bowers, Keith Allen '91	
	Kovacs II, William '74	
OK A	Blakeburn II, Dave Lowry '83	
	Markland, Ralph John '88	
OK B	Royce, Robert Michael '73	
OK Γ	Basore, Paul Alan '78	
OR A	Beard, James Lewis '61	
	Hansen, Steven William '69	
	McCormick, Gary Allen '74	
	Milton, Stuart W. '84	
PA A	Hernjak, James Gregory '96	
	Lybas, John M. '70	
	Sherman, William Joseph '60	
PA B	Kolivosky Jr., John Edward '92	
	Laverty, Bruce Andrew '82	
	Magnus, John C. '48	
	Slocum, Helene Zuber '85	
	Smyth, John '61	
	Thompson Jr., A. '63	
PA Γ	Kavoulakis, Alexandra M. '84	
	Robb, Frank Jay '73	
	Wisman, Craig Burton '75	
PA E	Mansfield, Brian David '91	
PA Z	Kasoff, David '55	
	Talecki, Stephen A. '76	
PA H	Hotchkiss, Jeffrey R. '69	
	McDonnell, Robert William '48	
	Price, Russell William '72	
PA Θ	Daniels Jr., Harold E. '66	
PA Λ	Janocko, David Jeffrey '81	
	Reedy, Herman E. '75	
PR A	Blasini, Francois Rene '82	
	Hilerio Sanchez, Josuan '07	
	Merle-Ramirez, Luis F. '93	
	Sanchez, Hector Luis '76	
RI A	Fleming, Read T. '77	
RI B	Luz, James J. '80	
SC A	Dalrymple, Gerald Andrew '83	
	Doss, Thomas Glenn '71	
	Jones, Walter Fleming '78	
	Rushton, Floyd Robert '63	
SC B	Endler, Elizabeth Elaine '98	
	Harris, Raymond E. '87	
	Husband, D. Mark '83	
	Thomas Jr., Cunningham P. '58	
SC Γ	Lowndes III, William '51	
	Reed III, Henry McDavid '85	
TN A	Hueser, David Lee '76	
	Jennings-King, Sherry D. '93	
	Moore, Robert Monroe '66	
	Riggs, Donna R.H. '87	
	Vandenbulck, Charles Franz '56	
TN B	Marianelli, Walter David '75	
TN Γ	Steelman, James Taylor '71	
TX A	Clark, Glynn A. '48	
	Glasow, Brian Scott '99	
	Klump, D. Craig '77	
	Kuenemann, Wesley Ben '59	
	Reese, Francis Edward '75	
	Wilson, Randy Wayne '97	
TX B	Gilmer, Tracy F. '80	
	Stinson, John Michael '66	
TX Γ	Hunter, David George '79	
	Pieper, Wylie Bernard '53	
TX Δ	Barger, David Carl '71	
	Goodson Jr., Alfred Wesley '70	
	Knowles, David Wayne '80	
	Latham, Raymond Edgar '56	
	Weisinger Jr., William S. '62	
	Zimmerman, Keith Donald '89	
TX E	Hon, Richard Wai-Leung '67	
TX H	Fairchild, Jack Elmer '53	
	Hoffman, Heather Brunn '92	
	Nicholson, James Eric '75	
	Thompson, James A. '72	
	Worden, Sue Janine '78	
TX Θ	Foster, Ottis Charles '82	
UT A	Davidson, Stuart Wayne '83	
	Lyman, George Randall '79	
VT A	Cimonetti, William James '59	

Alumni Giving

Eaves Club continued

Scribner, Charles Franklin '70
VT B Cobb, Eben Charles '77
VA A Garner, Patrick Lynn '72
Hardy Jr., Edward Ira '69
VA B Adams III, George Bunch '78
Harras, Edgar Daehn '67
Jones, John Hamilton '73
Marcus, Larry Allen '72
WA A Confer, Peggy Jean '81
WA B Opfer, Neil David '76
Ray, Edworth Lillard '48
WV A McClung Jr., William D. '88
WV B Dehart II, Robert Elwood '72
Raines, Linda N. '83
WI A Delucca, Gregory James '59
Lee, Jun Wai '68
WI B Dschida, Linda Maria '82
Jaye, Deborah Ann '03
McMorrow, Daniel Patrick '98
Mooney, Thomas Joseph '79
WI Γ Formella, John Patrick '81
WI Δ Whalen, David Alan '91
WY A Cavalli, Matthew N. '98
Cook, Norman L. '79
Gallensky, Neil Ellis '82

$1,000+ Downing Club

AL A Anderson, Pete Lawrence '75
Carey, George Walter '69
Cowles, Gary Dreaper E. '87
Hill, Gregory John '74
Vollberg, Walter Karl '73
AL B Bell III, Willis Vincent '78
Hopper, Jeffrey Clark '78
Shields, Clark Richard '71
AL Γ Haggard, Warren O. '94
Jacobs, Bryan Keith '81
AL E Mincy, John Wayne '70
Zozulin, Alexander Joseph '91
AK A Darrow, Margaret Marie '02
LaBelle-Hamer, Brendan T. '83
Leonard, Leroy Edward '72
AZ A Berg, Jeffrey Roy '93
de Shazo Jr., Thomas E. '62
Krisa, Kenneth Charles '82
McLaughlin, Dennis Patrick '80
Peterson, Marla A. '83
Robidoux, Phillip Henri '80
Smith, William G. '78
AZ B Forster, Karl David '86
Leach, David Robert '76
AZ Γ Bruening, Brenda I. '82
Bruening, Gregory Wilfred '80
AR A Gunderman, Stacy Linda '88
Sharp, Steven Harold '76
CA A Feldsher, Theodore Baker '85
Leung, Cissy S. '80
McCown, Donald Philip '62
Morihiro, Steve '79
Secor, Kenneth Eugene '55
Selna, Michael William '70
Van Dyke, Korbin S. '80
Wilhoite, W. Clinton '85
CA B Creutz, Michael John '66
Hill, Roger Calvert '63
Young, Lawrence Renwick '71
CA Γ Edmundson, Bruce James '71
Elliott, Dennis M. '62
Hamilton, Willard Ellis '48
Inouye, Lance Masao '68
Likins, Peter William '57
Love Jr., Ralph Edwin '57
Madden, Christopher J. '85
Muscha, Leslie Catherine '95
Palmer III, Everett Arthur '65
Richardson, John Lloyd '56
Rodriguez, David Albert '58
CA Δ Agajanian, Shooshanig D. '79
Brooks, James Ray '72
Griffith, Glen Arthur '72
Hamilton III, Edsel Poston '72
Moulton, James Ritchie '54
Rey, Daniel '66
Roof Sr., Dwight Ellis '57
CA E Beguwala, Moiz '67
Goodkin, Mitchell Arthur '68
Hardy, Frederick Walter '65
Kriguer, Marc Yared '88
Masumura, Robert A. '62
Miller, Wendell Roger '80
Quan, Alan Chung '00
Reichert, Ralph Jeffrey '67
Woo, Raymond '72
Yoshizumi, Steven Akira '88
CA Z Downey, James Bryant '62
Lampe, Fred Paul '79
Mathews, Steven Matt '69
Viano, David Charles '68
Wagner, J. Arthur '61
CA H Broadston, Robert Dean '94
Khalili, Azita M. '83
Rossow, Terry Lynn '66
CA Θ Bach, David P. '69
Brandt-Robuck, Patricia '75
Brewsaugh, Gregory Scott '78
Gerwien, Phillip Harvey '77
Hoekstra, Gerben N. '66
Kolderup, Nils Petter '60
Sedlak Jr., William Lee '81
Smith, John Mervin '70
CA I Hanna, Hugh Allen '60
Oei, Paul C. '87
Schluer, David Wesley '82
CA K Kern, Jack Clayton '71
Treinen, Donald Joseph '83
CA Λ Chargin, David Anthony '97
Snyder Jr., Roland Curtis '74
Stanley, Richard Loren '79
Young, Jeffrey W. '69
CA M Chang, Fu-Lien '74
Clark, David James '99
Johnson, Bruce William '78
Lee, Steven Yang-Sien '86
CA N Harmeyer, Michael Allen '90
Michelson, Gregory J. '88
Ortiz, Janet M. '82
Reukauf, Paul James '70
Ruud, John Emil '73
Schmitt, Thomas G. '74
Smith, Michael P. '84
CA Ξ Baxley, Paul Alma '81
Doeing, Brian James '81
Hawkins II, John Colman '79
Nicoloff, Louise Therese '82
Nicoloff, Nicholas '83
Schroeder, Steven Albert '78
St Clair, Christine Marie '81
CA O Caballero, Ross Charles '72
Fiedler, James Michael '78
Fitzsimons, Michael Joseph '79
Page, John Arnold '61
CA Π Nieraeth, Donald George '77
Steinberg, Dennis Philip '72
CA P Costello, Vincent J. '08
Hoffmann, Kevin Von '80
Motogawa, Bruce Joji '75
Stillmaker, Aaron Thomas '08
Stillmaker, Kim Rose '08
CA Σ Black, Stephen H. '85
Frankel, Craig Alan '86
CA Y Intagliata, John David '95
CO A Miks, Kathryn Fink '87
Trembly, Steven Alan '93
CO B Austin, Stephen Coe '74
Cormack, Christopher W. '82
Davis, Gregg Randal '77
Eason, Ernest Day '71
Frey, Bryce Alfred '56
Herhold, Mark Kenneth '80
Knapp, Barry Goodwin '81
Luppens, John Christian '76
Sorensen, Chris David '79
Strange, Lynn M. '81
Watry, Michael Owen '86
Wood, John Everett '71
CO Δ Fisher, James Ebberly '78
Mehring, James Warren '72
CT A Bugel, Robert Harry '45
Cooper, Richard Craig '63
Ljung, Michael Allen '92
McLeod, Christopher Kevin '77
Troutman, John Leo '65
CT B Altschuler, Stephen '54
Conklin, James Charles '70
Devin, Maurice Roger '73
Ezzio, Louis A. '77
Fappiano, Michael D. '87
Follette, Jean Marie '73
Kane, Martin Paul '86
Pollitt, Julie Anne '87
Whittlesey, Richard Allen '64
Zajac, Gerald Edward '68
DE A Buehler, John Henry '68
Packard, Lawrence Bruce '88
Winer, Harley Stanford '81
DC A Hull, Wayne Kenneth '59
Long, Michael Edward '72
DC B Gaffney, Joseph M. '83
Maggio, John Joseph '81
Ratto, Christopher R. '07
DC Γ Adams, Ann Halstead '83
Kee, Orron Eugene '57
Wilhelm, Eugene Bailey '86
FL A Evans Jr., Andrew Joseph '75
Frazier, Lori Marie '77
Glass, John Dorrance '73
Hayden, James George '69
Noden, David Keith '83
Perrygo, Charles Maurice '75
Schoppman, Gregg M. '08
Townsend, Frank Charles '62
Vande Walle, Robert John '72
Vargas, Clark '71
FL B Ault, Richard Harold '64
Dauer, Edward A. '72
Elnaggar, Suzanne '93
Gonzalez, Cristina Maria '79
FL Γ Anderson II, Shannon R. '75
Chenkin, Joseph Alan '82
Dip, Anthony '86
Giovannelli, Ronald Frank '76
Houmis, Nicholas James '74
Paugh, Wayne Bruce '93

Downing Club
Nicholas J. Caggiano
PA Θ '78
It was an honor to join ΤΒΠ. *I give to support excellence in engineering education for future generations.*

Downing Club
Lt. Col. Jerry J. Rij, USAF (Ret)
NJ Γ '72
ΤΒΠ *rewards outstanding scholarly achievements, portending exceptional engineering careers benefiting humanity.*

Downing Club continued

Preslar, Daniel Alton '91
Stagner, Ralph Scott '82
FL Ι Passarelli, Brian L. '10
GA Α Backhaus, George Peter '83
Burgess, John Milton '61
Coons, Louis Whatley '81
Drawdy, Jean Elizabeth '78
Faulkinberry, David Laws '77
Hilton, Joanne Louise '80
Malone, Thomas Joseph '63
Menges, Thomas Abel '78
Monk, Robert Franklin '63
Oslick, Rochelle '83
Shurbutt, J. Steven '75
Stuber, Donald Robelyn '71
Tundermann, John Hayes '63
Ware Jr., Clyde Lee '59
ID Α Ahlschlager, Alan Douglas '87
IL Α Anderson, Donald Denton '80
Bein, Robert Walter '56
Benzinger, Leonora Ann '86
Boehm, Ronald Jack '81
Brown, Harold Thomas '68
Buboltz, Lisa Ann '01
Campbell, Larry Milton '64
Davison, Brian C. '87
Ellis, Paul David '66
Fenves, Steven Joseph '57
Flitman, Jeff Edward '82
Gromala, Edward Joseph '79
Hanus, Daniel Joseph '86
Herning, Joel Gregory '69
Jonas, Steven Geza '66
Jones, Douglas Warren '80
Kent, Michael Edwin '64
Kuske Jr., John Anthony '61
Lenzini, Peter Arnold '75
Michlovich, Michael Samuel '81
Olson, Robert David '88
Saltzman, Jay Adam '90
Schoenberg, Kurt Francis '72
Smith, Leslie Garrett '48
Splitt, Frank George '52
Wilhelm, Dale R. '80
Williams, Allan Richard '71
Zielinski, Edward Lee '74
IL Β Kaplan, Edward '65
Kinast, John Arthur '79
Knorovsky, Gerald Albert '70
Lewis, Burton A. '48
Thomas Jr., Stanley Robert '72
Underys, Algirdas Antanas '78
Ziomek, Arkadiusz '10
IL Γ Barnett, Eric Renner '94
Bickes Jr., Robert William '63
Christopher, James Mosko '84
Fenton, Suzanne A. '79
Guest, Howard Brandon '81
Zimmerman, Jerald Robert '76
IL Δ Klasing, Wayne Gill '65
Kobiella, Anthony Robert '93
IL Ε Hopkins, Mark Alan '82
IN Α Amaya, Mark Anthony '85
Brinson, Robert James '60
Bullions III, Robert Jackson '64
Carter, Eric Lee '72
Cheesman, Mark William '81
Clodfelter, Donald Glen '55
Cripe, Duane Byron '82
Danner, David Lee '70
Dries, David James A. '76
Edwards, Deborah Jane '85
Egilsrud, Richard Leslie '81
Eykamp, G. Richard '56
Hall, Thomas Wayne '67
Hanover, Marilyn Kay '78
Hendryx, Kevin Scott '81
Herendeen, Robert Oliver '65
Hibbard, George Lewis '65
Lambert, Ralph Edward '68
Lee, Robert Edward '67
Lin, Jeffrey Eugene '97
Paniaguas, John Steven '73
Pickett, Leroy Kenneth '68
Rea, David Richard '62
Rushworth, James Lynn '58
Shulaker, Edward Ray '72
Tveter, Steven Elliot '74
Ward, John B. '58
Woosnam, Thomas Jay '65
IN Β Cary, Jeffrey Mark '77
Graham, James Henry '72
Nichelson, Scott Michael '84
Osburn, Richard Kimmell '67
Rosenbarger, Donald Glenn '78
Ruddick, Everett Lindley '64
Waterman, Robert Carl '70
Yee, Stuart '89
IN Γ Fitzgerald, Edward John '86
Fleckenstein, John Thomas '64
Galeziewski, Thomas M. '78
Hawes, William Michael '78
Hutchins, Robert Leon '62
Kast, Steven James '69
Kukla, James Alfred '72
Lombard, Michael Gerard '76
Springer, Denis Eugene '67
IN Δ Brems, Robert Ronald '63
Hessler, Glenn Brian '61
Ilten, Mark Owen '72
Schmalz, Peter B. '69
Valenti, Paul M. '01
IN Ε Lund, Stephen R. '80
IA Α Bartlett, Roger James '64
Bosshart, David John '80
Coffey, Leo Frederick '64
Coffman, Vance Dean '67
Cowles, Harold Andrews '49
Hicks, Roger Dale '57
Kuivanen, David Paul '78
Liu, Lee '57
Maifield, Christopher James '95
Mankowski, Alan Thomas '68
Matheson, Harold Moffat '55
Puffett, George E. '83
Sellew, Roger Franklin '59
Van Zante, Dale Eugene '90
Veenstra Jr., Henry Robert '71
Wolfmeyer, Paul Albert '66
Zwiebel, Jeffrey Lee '82
IA Β Coe, Roger Norman '57
Fortney, Kathleen Elizabeth '92
Gozali, Paul '85
Kruse, Dennis Ray '79
McSwiggin, Thomas G. '61
Snyder, Max Duane '63
Stevens, Stephen Arthur '77
KS Α Black, Arthur Geiger '70
Burkes, Robert Thomas '71
Carvell, Lee Arthur '84
Hinton, Robert Allan '61
Johnson, Lee Samuel '77
Pack, Garrett Edwin '60
Suelter, Leonard George '58
KS Β Howe, Donald Craig '78
KS Γ McKinnis, Steve Ray '74
KY Α Cook, Robert Henry '74
Rhoads, Harold Spencer '68
Wells, William Lochridge '62
KY Β Hundley, John Smith '87
Hundley, Theresa E. '87
Raderer, Thomas Kerry '73
Thornton, Patrick Joseph '82
LA Α Angelo Jr., Ernest '56
Crawford Jr., Richard H. '82
Levert Jr., Freddie Joseph '62
Millar, John S. '68
LA Β Bourgeois, Brian Steven '82
Bourgeois, Edit J. '91
Boyle Jr., William Milnor '62
Rickman, Philip Mark '83
LA Γ Ball Jr., Pete Gordon '61
Bertsch, Paul Jeffery '79
Bertsch, Susan A. '80
Cochran, Gregory George '81
Giering III, Edmund Jacob '80
Hogan, Harry A. '79
Owen, Mark Enos '92
Randall, James Benjamin '79
Schuller, Hans E. '77
LA Δ Garber, James Daniel '66
Young, Ronald Dale '66
ME Α Degon, Robert John '66
Johnson, Philip Martin '55
Jones Sr., Jeffrey A. '75
Larson, Reginald E. '55
Musk, Jeffrey Hill '86
Ouellette, Alfred David '76
Plesset, Robert Jordan '81
MD Α DiGiorgio, Joseph Brun '54
Gitomer, Steven Joel '64
Hall, H. Thomas '56
LaBerge, Chuck Charles '74
Lu, Stanley '95
Reynolds Jr., Joseph R. '69
Scheinin, Warren M. '74
Sniegowski, Gary Howard '78
Wiseman Jr., William J. '64
MD Β Birkmire, John Christopher '95
Bohse, Michael Edward '85
Cook, Gordon Douglas '81
Dinkle, Ralph Edward '65
Gaske, Thomas Paul '76
Greville, Edgar Murdock '67
Hardesty, Donald Roy '64
Himes, Doug Lamar '82
Iacangelo, Gerard Felix '80
Jochum, Thomas Andrew '77
Kirschbaum, Alan Ira '71
McCracken, Richard Paul '70
McMican, Donald Gregory '76
Poulter, Harry David '88
Tregoning, Robert Lee '87
MD Γ Lipscomb Jr., George A. '87
MA Α Auclair, Jared Robert '01
Burgarella, John Paul '50
Lancey, Roderic Charles '51
Mitschang, George W. '65
MA Β Bennett, Kenneth Harold '89
Charpie, David Wayne '82
Ciaramaglia, Frederick J. '69
Ditmeyer, Steven Roland '63
Dodson, John Orville '68
Goldman, Barry '76
Guppy Jr., John Warren '53

Continues on page 48.

IN THE COLLEGES

Tau Bates having an impact at institutions of higher learning.

Bjorn Birgisson Ph.D.

North Dakota Beta '86

Bjorn was named chair of the school of environmental, civil, agricultural & mechanical engineering at the University of Georgia. He was previously a professor at Texas A&M University with experience leading programs in the U.S., U.K., and Sweden. He is also the inaugural director of Texas A&M's Center for Infrastructure Renewal.

Zachary R. Doerzaph Ph.D.

Idaho Alpha '01

Zachary was appointed Virginia Tech Transportation Institute's Executive Director. He is a nationally recognized transportation researcher with a focus on measuring and improving the performance of next generation vehicle systems. In addition, he will take on the role of president of VTT LLC and serve as an associate professor of biomedical eng'g and mechanics.

Samuel Graham Jr. Ph.D.

Florida Eta '93

Samuel was named dean of the school of engineering at the University of Maryland. He previously served as chair of the school of mechanical engineering at Georgia Institute of Technology, holds a joint appointment with the National Renewable Energy Laboratory, is a Fellow of ASME, and was a recipient of a National Science Foundation CAREER Award.

SPOTLIGHT: Professors Receive ARPA-E Program Award — Three Stony Brook University professors have been awarded $2.4 million from the U.S. DOE Advanced Research Projects Agency-Energy program to develop the next generation of cost-effective nuclear energy. **Jason R. Trelewicz, Ph.D.,** *NY O '04,* is a co-principal investigator and associate professor in the department of materials science and chemical engineering at Stony Brook. The award is part of a grant program focused on the development of fusion energy science and technologies. The project, ENHANCED Shield: A Critical Materials Technology Enabling Compact Superconducting Tokamaks, addresses a key issue facing the next generation of small, high-field fusion reactors.

2021 NCEES Engineering Education Award winners — The National Council of Examiners for Engineering and Surveying (NCEES) awarded a team from the Milwaukee School of Engineering with the 2021 grand prize of $25,000 for their project "Sustainable Improvements for Guatemalan Cardamom Spice Dryers." Participants on the team include Tau Bates **Jess A. Ryan, Ph.D.,** *WI D '20,* former student, and **Michael C. Sevier, Ph.D.,** *CA S '01,* MSOE assistant professor. Seven other programs received awards of $10,000 each including: Cal State LA, Lawrence Technological Univ. (MI), Seattle Univ. (WA), Univ. of Nebraska-Lincoln, and Univ. of Wisconsin-Madison. The profiles, project descriptions, and media for each team is available on the NCEES website.

Eric G. Paterson Ph.D.

Iowa Beta '87

Eric was appointed Virginia Tech National Security Institute's Inaugural Executive Director. A world-renowned expert in computational fluid dynamics and hydrodynamics, he's been serving as interim director of the Hume Center for National Security and Technology for more than two years. He previously led the department of aerospace and ocean engineering for ten years at Tech.

Edward Pines Ph.D., P.E.

New Mexico Alpha '79

Edward received the Donald C. Roush Award for Teaching Excellence at New Mexico State University (NMSU). The award is highly valued as it is based on student input. A professor of industrial engineering, he has won the award four times — 1997, 2005, 2010 & 2021 at NMSU, and was cited for his sense of humor and willingness to be available. Since 2003, he has served as NM Apha Chapter Advisor.

Charles "C.J." Riley Ph.D., P.E.

Oregon Delta '01

C.J. was selected as recipient of the 2021 American Society of Civil Engineers Oregon Section Government Engineer of the Year Award and is also recipient of the 2021 Outstanding Teaching Award from the Pacific Northwest Section of ASEE. He is a professor of civil engineering at Oregon Tech and was recently granted Fellow status in ASCE.

Martin A. Schmidt Ph.D.

New York Gamma '81

Martin has been named the 19th president of Rensselaer Polytechnic Institute (RPI) by the Rensselaer Board of Trustees. Since 2013, he served as provost at Massachusetts Institute of Technology, earning S.M. and Ph.D. degrees, and is an RPI alumnus, having earned a B.S. degree in 1981. Martin is an IEEE Fellow for contributions to microelectromechanical systems.

Natasha D. Sheybani Ph.D.

Virginia Epsilon '16

Natasha is recipient of the prestigious National Institutes of Health Director's Early Independence Award. She is an assistant professor at the University of Virginia, started a postdoctoral fellowship at Stanford Univ. last year, and is returning to UVA this fall with her own research lab and a new role on the faculty. She is the first- ever UVA recipient of this award.

Tarek M. Sobh Ph.D., P.E.

Utah Alpha '93

Tarek has been appointed as the 8th president of Lawrence Technological University (MI). He served as VP of academic affairs and provost at Lawrence Tech since 2020. He is a noted scholar, author of more than 250 referenced journal and conference papers, and presented 150+ keynote speeches. He began his career at the Univ. of Utah.

FACILITIES: Renaming of Building Inspired by Professor— A University of Cincinnati (UC) campus building has been named the Mantei Center in honor of Emeritus Professor **Thomas D. Mantei, Ph.D.,** *OH B '62*. An award-winning teacher, researcher, and patent holder (plasma technology), Dr. Mantei lives by the philosophy of "students first." **Jim Goetz,** *OH B '88,* a former student, was inspired by his mentor (Dr. Mantei) to make a $25 million gift that led to the building being renamed. Goetz is a partner at Sequoia Capital and earned his B.S. degree in electrical engineering from UC. In addition, Goetz's gift will establish the Marian Spencer Scholars Program to provide awards to high-achieving students from Cincinnati Public Schools.

New Home for ISME Builds for the Future— Iowa State University (ISU) has announced the Therkildsen Industrial Engineering Building project, which will be led by **Gül E. Kremer, Ph.D.,** *IA A '92*, ISU interdisciplinary engineering professor and former department chair. She will have a three-year appointment as senior director of presidential projects. The center will be the new home for the department of industrial and manufacturing systems engineering, which dates back to 1919 at ISU, will offer 50,000+ square feet of space, and include an advanced manufacturing laboratory. This project is possible thanks to a $42 million gift commitment from C.G. "Turk" and Joyce A. McEwen Therkildsen; both ISU alumni.

Cristiane Q. Surbeck Ph.D., P.E.

Maryland Beta '95

Cristiane has been named Engineer of the Year by the Mississippi section of American Society of Civil Engineers. She is chair and professor of civil engineering at the University of Mississippi (UM) and was nominated for the award by a former student. In addition, she serves as faculty adviser of the UM chapters of Chi Epsilon and Engineers Without Borders.

Steve E. Watkins Ph.D.

Missouri Beta '83

Steve received the 2021 Distinguished Service Award from IEEE-Eta Kappa Nu, honor society of the Institute for Electrical and Electronic Engineers. He is an engineering professor at Missouri University of Science & Technology (Rolla, MO), serves as Chief Advisor to the MO Beta Chapter (since 2014), and received his Ph.D. from The University of Texas at Austin.

Abigail R. Wooldridge Ph.D.

Kentucky Beta '11

Abigail was presented the inaugural Robert L. Wears Early Career Award by Health Care Technical Group of The Human Factors and Ergonomics Society for outstanding research contributions. She is an assistant professor of industrial engineering at the University of Illinois at Urbana-Champaign. Her goal has always been "to use engineering to make health care better and safer."

Tau Beta Pi Families

Do you have a spouse, sibling, parent, son/daughter, or grandparent, who is a member of Tau Beta Pi? If so, we would like to recognize you in a future Tau Beta Pi Families. Send your information, and even a family photo, to media@tbp.org.

CENTENARIANS:

Pier A. Abetti, *IL B '45*
b. February 7, 1921

Arthur W. Cooper, *AL A '39*
b. March 3, 1918
d. October 26, 2018

Rudolph A. Dehn, *NJ Γ '41*
b. August 12, 1919
d. February 24, 2021

Robert S. Hahn, *OH B '40*
b. November 1, 1916
d. January 5, 2021

Robert E. Hall, *IN A '40*
b. December 27, 1919
d. April 3, 2020

William W. Penn Jr., *AL A '46*
b. October 2, 1920

Michael D. Pollock, *OH E '40*
b. December 22, 1917
d. October 30, 2020

Frank C. Toy, *IN A '39*
b. 1915
d. February 2, 2020

Pier Abetti, Ph.D.

Meg and Jeffery Leader both graduated from Syracuse University in 1985 with civil and electrical engineering degrees, respectively.

BI-SPOUSAL:

Chetan G. Date, *AZ B '84*
Shobhna Nigam, *AZ B '82*

Kevin L. Haehl, *IN A '89*
Moira G. McClymont, *TN B '89*

Katie J. Hogan, *LA A '16*
Kevin M. O'Sullivan, *LA A '16*

Nick L. Krisch, *OH E '81*
Kelley M. Krisch, *OH E '87*

Jeffery J. Leader, *NY B '85*
Margaret E. Leader, *NY B '85*

Diane L.F. Manlove, *SD B '84*
Keith C. Manlove, *AZ A '88*

Eric S. Petersen, *TN B '84*
Stephanie A. Petersen, *TN B '84*

Jaclyn Leverett Wasson, *TX A '12*
Zachariah L. Wasson, *TX A '11*

TOP: Eric Holzman and son Dirk Holzman.

RIGHT: Cecilia Fugaro and her mother Paula Fugaro during Tau Beta *Pi Day* 2021.

RIGHT NEXT PAGE: Bob Anthes and son Scott Anthes.

Carol Leverett and Jaclyn (her daughter), who is married to Zachariah Wasson, all Tau Bates!

Kyle Kleinberg, 2020 graduate, with his mother, Leigh A. Zarra Kleinberg.

SIBLINGS:

The Ajisegiri Siblings
Desayo O. Ajisegiri, *DC Α '12*
Oluwasijibomi Ajisegiri, *DC Α '19*

The Briasco-Stewart Siblings
Andrew S. Briasco-Stewart, *MA Ε '23*
Samantha M. Briasco-Stewart, *MA Β '17*

The Dunn Brothers
DeRome O. Dunn, *NC Ε '84*
Derrell S. Dunn, *NC Ε '84*

The Ellingrod Brothers
†**Robert J. Ellingrod,** *IA Α '58*
†**William W. Ellingrod,** *IA Α '54*

The Fatjo Sisters
Cristina F. Gallagher, *NJ Γ '86*
†**Alicia F. Samuel,** *NJ Γ '83*

The Hemmelgarn Twins
Bruce A. Hemmelgarn, *OH Β '84*
Robert J. Hemmelgarn, *OH Β '84*

The Hemminger Twins
Robert J. Hemminger, *PA Μ '22*
William T. Hemminger, *PA Μ '22*

The Hillard Sisters
Wendy A. Harper, *WV Β '00*
Katie K. Hastings, *WV Β '12*
Andrea L. White, *WV Β '07*
Sarah E. Winter, *KY Α '03*

The Metzloff Siblings
Ann E. Metzloff, *NY Δ '21*
Matt R. Metzloff, *NY Δ '22*

The Mohan Sisters
Anne E. Mohan, *NY Ξ '09*
Marguerite A. Mohan, *NY Ξ '04*

The Moon Twins
Sung Jin Moon, *NY Γ '00*
Sung-Joon Moon, *NY Γ '00*

The Rentschler Brothers
Carl N. Rentschler, *PA Β '71*
Glenn P. Rentschler, *PA Β '69*
Randy B. Rentschler, *PA Β '75*

The Shuster Brothers
Adam M. Shuster, *OH Γ '04*
Jerad R. Shuster, *OH Λ '00*

The Tagliaferri Twins
Daniella M. Tagliaferri, *PA Θ '23*
Maria T. Tagliaferri, *PA Θ '23*

The Thedens Brothers
Peter J. Thedens, *IA Α '18*
Ross C. Thedens, *IA Α '20*

The Vargas Sisters
Ana L. Tatoris, *NJ Β '89*
Cecilia Vargas, *NJ Β '86*

MULTI-GENERATION:

The Anthes Family
Bob J., *NJ Γ '82* (father)
Scott R., *NY Β '13* (son)

The Bloom Family
†**Joseph M.,** *IN Α '59* (father)
David F. Wolf-Bloom, *OH Γ '92* (son)

The Bonin Family
†**James A.,** *WI Β '56* (father)
David J., *WI Β '82* (son)

The Bronstad Family
Bette L., *TX Η '78* (mother)
Embrey L.S., *TX Α '02* (daughter)

The Caruthers Family
†**Robert M.,** *LA Γ '61* (father)
Shelton D., *LA Γ '89* (son)

The Coco Family
Elizabeth H., *NJ Δ '87* (mother)
Julia, *TX Γ '21* (daughter)

MULTI-GENERATION:

The Cunningham Family
†**Albert H.,** *IA A 1909* (grandfather)
Roger C. Obye, *MS A '71* (grandson)

The De Young Family
†**Lance G.,** *MO A '65* (father)
Craig A., *NY Γ '92* (son)

The DiGiorgio Family
Joseph B., *MD A '54* (father)
Kathleen Wright, *CA Y '86* (daughter)

The Drager Family
John A., *MD B '64* (grandfather)
Elaine A., *PA A '89* (mother)
Shannon C. Smith, *NC Γ '22* (daughter)

The Faust Family
Carlon E. Jr., *MO Γ '57* (father)
Carlon E. III, *MO B '79* (son)

The Fugaro Family
Paula S. (Aqui), *MA B '89* (mother)
Cecilia P., *MO B '22* (daughter)

The Gross Family
Meyer A., *NY Δ '59* (great uncle)
Evan S. Hymanson, *NE A '20* (great nephew)

The Grushka Family
Jon L., *FL E '85* (father)
Tom, *CO E '18* (son)

The Haehl Family
Clayton W., *MI Z '69* (grandfather)
Kevin L., *IN A '89* (father)
Moira G. McClymont, *TN B '89* (wife/mother)
Kristin E., *IN A '17* (daughter)

The Hemminger Family
Thomas L., *OH E '85* (father)
Robert J., *PA M '22* (son/twin)
William T., *PA M '22* (son/twin)

The Holzman Family
Eric L., *CA E '84* (father)
Dirk M., *MD B '20* (son)

The Jessop Family
Robert J., *MA A '94* (father)
Katy E., *MA A '21* (daughter)

The Keller Family
Heather M. (Herod), *MI A '91* (mother)
Justin R., *PA H '21* (son)

The Kerstetter Family
John H. Jr., *OH Γ '49* (grandfather)
David R., *MO A '84* (father)
Bryan D., *NV B '20* (son)

The King Family
Sherry D. Jennings-King, *TN A '93* (mother)
Christina M. Harrison, *TN A '93* (twin sister)
Gregory T., *TN A '93* (husband/father)
Nicholas M., *WI A '23* (son)

The Kleinberg Family
Leigh A. Zarra, *PA H '85* (mother)
Kyle A., *PA Θ '20* (son)

The Leverett Family
Carol (Cooper), *TX Θ '81* (mother)
Jaclyn L. Wasson, *TX A '12* (daughter)
Zachariah L. Wasson, *TX A '11* (husband/son-in-law)

The Margolese Family
Kate (Erf), *MI Γ '84* (mother)
Liana, *NY Δ '19* (daughter)

The Marrone Family
James I., *IN A '61* (father)
James D., *IN A '87* (son)

The Masterman Family
†**Roscoe C.,** *ME A '32* (father)
Gail Plummer, *ME A '60* (daughter)

The McCaleb Family
†**Jesse B.,** *AR A 1921* (father)
Neal A., *OK Γ '57* (son)

The McPherson Family
†**James I.,** *OK A '52* (father)
Darryl J., *TX B '80* (son)

The Meister Family
†**Robert,** *DC B '49* (grandfather)
Mark, *DC B '82* (father)
Leo P., *TX Γ '16* (son)

The Meixner Family
†**Henry N.,** *PA Γ '31* (father)
Henry M., *PA I '67* (son)

LEFT: John Drager shared this image of three generations of Tau Bates with his daughter Elaine Drager (left) and granddaughter Shannon Smith (middle).

MIDDLE: Liz Coco with her daughter on the Rice University campus celebrating Julia's 2021 graduation with a B.S. in chemical engineering.

RIGHT: (left to right) Ally, Jason, and proud mother Amy Rosenthal.

MULTI-GENERATION:

The Messmer Family
†**Walter J. Jr.,** *PA Z '56* (father)
Walter J., *CA M '84* (son)

The Mills Family
Denver L., *TX A '57* (grandfather)
Erin L. Miller Warner, *TX A '03* (granddaughter)

The Monk Family
David H., *IA B '60* (father)
David J., *IA B '89* (son)

The Moore Family
Jesus S. Jr., *TX Θ '13* (father)
Jesus A., *TX Θ '21* (son)

The Murray Family
Kevin N., *OH Γ '76* (father)
Terry D., *OH Γ '64* (brother)
Michael E., *KY A '19* (son)

The Novak Family
Eugene C., *OH Z '59* (grandfather)
Michael S. Sloma, *OH Z '20* (grandson)

The Olejniczak Family
Kraig J., *AR A '87* (father)
Ben T., *IN Δ '13* (son)
Katie E. Sieman, *IN Δ '14* (daughter)

The Padgett Family
†**Joseph E. Jr.,** *MD A '48* (father)
Joseph E. III, *VA A '76* (son)

The Parker Family
Anne P., *TN A '83* (mother)
Kenny R., *TN A '83* (father/husband)
Shelley E., *TN A '11* (daughter)
Mary E., *TN A '11* (daughter)
Seth T., *TN A '19* (son)

The Peterson Family
Michael L., *IA A '89* (father)
Luke M., *MI Γ '19* (son)
Zach A., *MI Γ '19* (son)
Angela L., *MI Γ '23* (daughter)

The Rosenthal Family
Amy S., *NY N '89* (mother)
Jason, *NJ B '19* (son)
Ally L., *GA A '22* (daughter)
Jordan C., *NY N '95* (uncle)

The Rozema Family
Arthur L., *IL B '54* (grandfather)
Brian A., *IN A '82* (father)
Maxwell E., *IN Z '21* (son)

The Schlautman Family
Mark A., *NE A '84* (father)
Denise C., *MI Γ '23* (daughter)

The Schneider Family
†**Carol F.,** *IA A '42* (grandfather)
Greg R., *OH H '80* (father)
Elizabeth I., *IL Δ '14* (daughter)
Michael F., *OH H '20* (son)

The Serafini Family
†**Tito T.,** *OH A '55* (father)
Tito A., *OH A '85* (son)
Andrew T., *OH A '86* (son)

The Silva Family
Frank D., *FL Θ '15* (father)
Frank A., *FL Θ '12* (son)

The Skootsky Family
Samuel A., *CA A '75* (father)
Justin J., *CA A '13* (son)

The Steptoe Family
William J., *PA Γ '87* (father)
Ian B., *OH N '21* (son)

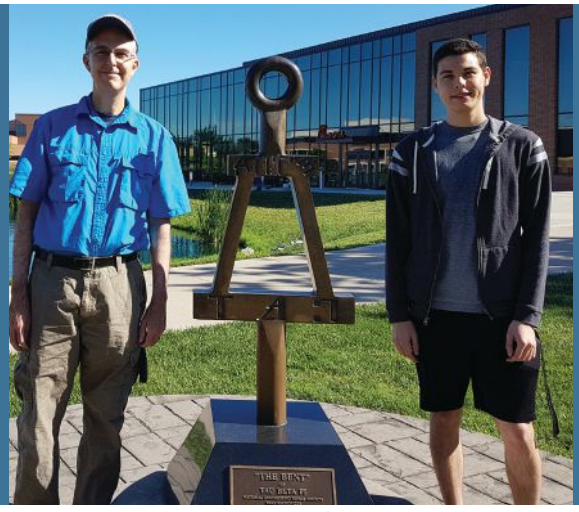
The Steudel Family
Mark F., *PA H '83* (father)
Kristen L., *PA E '22* (daughter)

The White Family
†**Warren N. Sr.,** *LA B '45* (father)
†**Warren N. Jr.,** *LA B '74* (son)

The Willis Family
Robert A., *WY A '84* (father)
Ben A., *WY A '22* (son)

The Witherell Family
Dawn W. Zuidema, *MI Λ '04* (mother)
Ciana, *MI Λ '22* (daughter)

BELOW: William Steptoe and son Ian together with the Bent monument on the campus of Cedarville University.



CHAPTER ETERNAL

Our fellow Tau Bates who are gone, but never forgotten.

IN MEMORIAM

Indiana Gamma '65
Jack D. Mattingly, Ph.D.
September 26, 2021
He was a founding father of propulsion education, author of several textbooks on gas turbine engines, and past U.S. Air Force branch chief, Aero Propulsion Lab.

The condensed style of these notices is made necessary by the Association's large membership and space limitations in *The Bent*. You may contact the Editor for additional facts (if available) concerning the following deceased members. The assistance of all is earnestly sought in reporting the deaths of Tau Bates, including full name and date of death. You may report the death of a member by sending an email to ***chapter.eternal@tbp.org.*** Members that were 100+ years when passing are identified with "***Cent.***"

ALABAMA

ALPHA AL Α
Brakeman Jr., Roy Edgar, *'44*, May 18, 2021.
Yarbrough, James Thomas, *'49*, Aug. 1, 2005.
Mathews, Charles B., *'58*, October 11, 2021.
Weidenbach Jr., William H., *'58*, July 22, 2010.
O'Brien, John Michael, *'60*, Dec. 2, 2000.
Shabo, Benjamin G., *'64*, August 22, 2008.
Vorel, Lavene Lynell, *'66*, January 14, 2005.

BETA AL Β
Brady Jr., Everett P., *'49*, October 8, 2008.
Martin, Jack, *'49*, July 23, 2008.
Searcy, John Sidney, *'49*, March 22, 2021.
Jernigan, Eric Cooper, *'54*, October 21, 2021.
Lovingood, Judson A., *'58*, April 29, 2021.
Marlow, Donald Richard, *'59*, Sept. 27, 2004.
Holliman, Harry Hill, *'63*, July 7, 2020.
Arrington, Paul Allen, *'82*, no details.

ARIZONA

ALPHA AZ Α
Henderson, Robert Lewis, *'50*, no details.
Daveau, John E., *'59*, September 24, 2000.
Darrow, Marion Anthony, *'61*, May 21, 2021.

BETA AZ Β
Gould, Harry Joe, *'66*, March 12, 2010.
Rustenburg, Conrad Martin, *'68*, no details.
Hanson, Andrea Sue, *'91*, Sept. 23, 2021.

ARKANSAS

ALPHA AR Α
Nutt, Donald R., *'60*, October 27, 2021.
Searcy, William Beville, *'66*, October 7, 2002.
Baker, James W., *'72*, January 14, 1998.

CALIFORNIA

ALPHA CA Α
Meyer, John Henry, *'42*, October 14, 2007.
Plummer, James Walter, *'42*, Jan. 16, 2013.
Anton, Walter Foster, *'57*, no details.
Litwin, Roger Wayne, *'64*, May 15, 2012.
Cukr, Dennis Michael, *'81*, June 27, 2009.

BETA CA Β
Jessen, Howard E., *'46*, Sept. 29, 2021.
Iwan, Wilfred Dean, *'57*, October 29, 2020.
Bowman, Thomas Eugene, *'60*, Nov. 8, 2018.

GAMMA CA Γ
Rapp Jr., Howard B., *'43*, Oct. 18, 2014.
Burns, Joseph Isadore, *'48*, Sept. 3, 2021.
Miller, William Charles, *'50*, July 23, 2021.
Binkley, Peter Donald, *'53*, Sept. 28, 2012.
Austin, Lyman Douglas, *'61*, no details.
Meisel, Jacob Aaron, *'20*, August 2, 2021.

DELTA CA Δ
Gerstein, Melvin, *'42*, September 5, 2012.
Reed, Irving S., *'44*, September 11, 2012.
Casey, Arthur Francis, *'49*, no details.
Minner, Lester A., *'52*, November 11, 2020.
Clark, Paul Alfred, *'55*, July 4, 2017.

EPSILON CA Ε
Coleman Jr., William E., *'51*, Nov. 12, 2020.
Aoki, Masanao, *'53*, November 7, 2021.
Endo, Frederick Y., *'57*, no details.
Nishinaga, Ronald Giken, *'61*, Feb. 27, 2012.

ZETA CA Ζ
Biglieri, Natale Joseph, *'51*, March 24, 2020.
Henschke, Bernhard F., *'58*, March 26, 2019.

XI CA Ξ
Allington, Steven Proctor, *'91*, Dec. 16, 2005.

OMICRON CA Ο
Callinan, Joseph Patrick, *'57*, Feb. 24, 2014.
Thieriot, Frances T., *'91*, February 13, 2007.

PI CA Π
Moran, H. Dana, *'60*, July 21, 2021.

UPSILON CA Υ
Mariner, Erik Damian, *'06*, Nov. 11, 2021.

COLORADO

ALPHA CO Α
Gill, Frank Alfred, *'62*, February 14, 2010.
Dowsett, Frederick R., *'69*, Sept. 4, 2020.

BETA CO Β
Look, Alfred Thomas, *'44*, October 20, 2005.
Hurt Jr., Nathan H., *'47*, August 1, 2021. ***Cent.***
Smith, Gordon Myers, *'47*, May 20, 2004.
Thayer, Gordon David, *'57*, no details.
Vinych, Victor S., *'58*, October 23, 2010.
Girardo, Robert Thomas, *'61*, Jan. 17, 2014.
Turner, Stephen Edward, *'62*, Oct. 7, 2021.
Lindberg, William R., *'64*, July 10, 2021.

GAMMA CO Γ
Anderson, Floyd Reinhold, *'54*, no details.

DELTA CO Δ
Lile, Derek Lawrence, *'64*, July 25, 2008.
Freeman, Albert M., *'75*, Sept. 26, 2006.

CONNECTICUT

ALPHA CT Α
Wiltsee, George A., *'43*, October 3, 2021.
Elwell, Robert Harvey, *'46*, February 2, 2009.
Choate Jr., Donald H., *'50*, no details.

BETA CT Β
Thompson, Robert, *'65*, October 30, 2008.
Tuthill, Bruce Allan, *'74*, August 29, 2021.

DELAWARE

ALPHA DE Α
Simon, Robert Herbert M., *'48*, July 3, 2021.
Moore IV, Harry Herbert, *'77*, no details.

DISTRICT OF COLUMBIA

ALPHA DC Α
Harris Jr., Sydney W., *'49*, October 5, 2005.
Taliaferro, Will Cedric, *'51*, no details.
Dean, Jefferson Louis, *'65*, April 25, 2002.
Frontin, Carl Vincent, *'65*, Sept. 27, 2001.
Abrol, Kharaiti Lal, *'66*, April 24, 2010.
Keiller, Peter Audley, *'72*, Sept. 13, 2021.

BETA DC Β
Shah, Bhupendra P., *'68*, no details.
Whang, Ruth, *'81*, no details.

FLORIDA

ALPHA FL Α
Haslam, Ernest George, *'67*, July 5, 2019.
Kain, Bernard Lawrence, *'68*, June 15, 2010.
Thompson Jr., John Purdy, *'77*, Aug. 9, 2021.
Morris, David Glenn, *'78*, August 6, 2000.
Lacerva, Anthony Arthur, *'83*, no details.
Villaroman, Michael Paul, *'92*, April 14, 2013.

BETA FL Β
Davis Jr., William L., *'66*, April 1, 2012.

GAMMA FL Γ
Sizemore, Kenneth J., *'79*, August 31, 2008.
Worrall, Gary Gerard, *'84*, Dec. 19, 2008.

DELTA FL Δ
Halpern, Peter Hughes, *'56*, no details.
Douglas, Sallie Layton, *'86*, July 2, 2021.

GEORGIA

ALPHA GA Α
Moscrip, Robert, *'48*, no details.
Pardue Jr., George Henry, *'48*, Jan. 9, 2003.
Morris Jr., Otto Marucci, *'49*, June 14, 2006.
Patton, Walter Lenair, *'49*, July 5, 2000.
Taylor, Paul, *'49*, October 31, 2015.
Anderson, Joseph Clyde, *'50*, June 16, 2001.
Bennett, Donald F., *'52*, no details.
Petry, Stanley Frederick, *'52*, June 24, 2004.
Ward, Edward Forrest, *'53*, no details.
Sharp, Robert McKinlock, *'54*, June 17, 2010.
Wardell, Anthony Wentworth, *'54*, no details.
Heard, Joseph Harold, *'55*, April 26, 2004.
Judd, Donald Keith, *'58*, June 12, 2010.
Vick, Ralph E., *'62*, no details.
Hudson Jr., James Alphus, *'65*, Dec. 3, 2013.
Hardy, Stephen Gregg, *'84*, August 24, 2020.

IDAHO

ALPHA ID Α
Zeller, Lavern Dwight, *'76*, May 30, 2021.

ILLINOIS

ALPHA IL Α
Devorkin, Ray Arnold, *'42*, Dec. 17, 2017.
Schutz, Gerald Charles, *'42*, no details.
Millett, Norman Charles, *'43*, no details.
Tuell, Robert Gerry, *'43*, November 1, 2011.
Albert, Raymond John, *'45*, Nov. 4, 2020.
Carlson, Robert Baker, *'49*, May 22, 2006.
Eyman, Earl Duane, *'49*, August 29, 2018.
Kramp, Robert Henry, *'54*, May 1, 2000.
Jackson Jr., Edwin George, *'55*, Dec. 12, 2006.
Kuhlman, George Carl, *'60*, no details.
Bradley, William C., *'61*, May 26, 2021.
Fitzgerald, Arthur Griffin, *'61*, Oct. 21, 2021.
Weinstein, Franklin Sherman, *'61*, no details.
Weinmann, Klaus J., *'62*, November 3, 2010.
Brown, David Stanley, *'69*, March 30, 2021.

ALPHA IL Α
Bloemer, Robert William, *'72*, April 18, 2021.
Chaddock, Robert Dale, *'77*, Nov. 15, 2005.

BETA IL Β
Lind, Ronald Harold, *'44*, no details.
Haglund, Everett John, *'53*, March 26, 2009.
Rollins Sr., James W., *'61*, June 20, 2013.

GAMMA IL Γ
Diekman, Robert Charles, *'44*, Feb. 25, 2005.
Matthews, Thomas A., *'45*, May 7, 2005.
Struck, Roger Toline, *'51*, August 9, 2016.
Angle, Stacy Lotham, *'53*, February 19, 2021.
Rawson, Norman Elroy, *'58*, Dec. 8, 2020.
Volz, Richard Arthur, *'60*, June 19, 2013.
Waldmann, Frederick A., *'61*, July 17, 2001.
Schumacher, Rex, *'70*, March 27, 2003.

DELTA IL Δ
Hoerber, Melissa M., *'17*, October 15, 2020.

INDIANA

ALPHA IN Α
Zintel, Harry John, *'41*, June 3, 2000.
Beebe, Robert Lyon, *'43*, February 27, 2019.
Roquemore, Kenneth G., *'43*, Sept. 28, 1992.
Rossen, Henry Randall, *'43*, March 29, 2000.
Von Behren, Robert A., *'43*, April 25, 2017.
Reese, Bruce Alan, *'44*, June 30, 2016.
Walley, James Arthur, *'44*, Sept. 20, 2011.
Galle, Kurt Robert, *'46*, December 12, 2020.
MacCalla Jr., Thomas C., *'47*, May 8, 2004.
Adams, Robert Charles, *'48*, no details.
Wolters, Robert M., *'48*, October 25, 2009.
Anderson, Charles T., *'49*, July 16, 2021.
Gillman, Cletus Jerome, *'49*, no details.
Harris, Ben Alan, *'49*, November 3, 2005.
Hayes, Dwight Richard, *'49*, April 1, 2011.
Kuendig, John McKee, *'49*, no details.
Lesem, Louis Bernard, *'49*, no details.
Smith, Edward Merrill, *'49*, May 29, 2006.
Baumgarten, Joseph R., *'50*, March 4, 2021.
Tate, Lawrence Allen, *'50*, no details.
Wanta, John Anthony, *'50*, no details.
Marke, Ralph Alex, *'51*, August 25, 2003.
Newman, Rodger Jay, *'51*, no details.
Malangoni, Roland G., *'52*, Nov. 22, 2006.
Cowlishaw, Wayne Arnold, *'53*, Nov. 17, 2020.
Harding, Ronald Hugh, *'53*, August 23, 2021.
Armington, James Phillip, *'54*, Feb. 6, 2001.
Kievit, David Hamlin, *'54*, March 3, 2018.
Sanders, William Thomas, *'54*, Nov. 1, 2001.
Stettler, Richard James, *'55*, Oct. 15, 2013.
Weakley, Thomas Lionel, *'55*, no details.
Floyd, Richard Lee, *'57*, May 25, 2005.
Reinecke, William Gerald, *'57*, May 31, 2021.
Gearan, William K., *'58*, March 25, 2019.
Tabata, William Kenji, *'58*, Nov. 15, 2003.
Whipp, Richard Barry, *'58*, no details.
Notestein, John N., *'59*, November 5, 2021.
Quigley, John Joseph, *'59*, no details.
Heeren, Robert Gene, *'60*, Jan. 31, 2021.
Peralta, Eduardo Jose, *'60*, July 31, 2021.
Strack, William Carl, *'60*, Dec. 31, 2019.
Verette, Ralph Marland, *'60*, no details.
Stein, Arland Thomas, *'61*, Aug. 14, 2021.
Genung Jr., Edward N., *'62*, no details.
Groves Jr., Richard N., *'63*, March 6, 2006.
Jaques, Robert Arthur, *'64*, Dec. 2, 2005.
Matthews, Charles C., *'70*, March 18, 2002.
Kruyer, Joseph F., *'82*, June 24, 2005.
Johnson II, Jerrold E., *'83*, April 4, 2011.
Sweeney, Joseph Patrick, *'17*, Dec. 9, 2020

BETA IN Β
Berghoefer, Fred G., *'43*, July 10, 2021. ***Cent***.
Elliott, Paul Charles, *'55*, March 25, 2020.

GAMMA IN Γ
Mattingly, Jack Denton, *'65*, Sept. 26, 2021.
Resnik, Mary Elizabeth, *'76*, Dec. 22, 2018.

DELTA IN Δ
Spring, Bradford Hall, *'59*, Nov. 9, 2020.
Ikert, Peter Lawrence, *'67*, Sept. 20, 2007.

IOWA

ALPHA IA Α
Cutler, Frank Ross, *'42*, August 14, 1979.
Campbell, Cleveland L., *'47*, June 27, 2021.
Jansson, John Edward, *'49*, March 12, 2001.
Wilder, David R., *'51*, August 18, 2021.
Liittschwager, John Milton, *'55*, Feb. 25, 2021.
Danhakl, Thomas Charles, *'57*, Feb. 2, 2009.
Zirkelbach, Ralph Randall, *'64*, Oct.16, 2005.
Hampe, Clark C., *'66*, July 2, 2021.
Gustafson, Everett A., *'71*, June 15, 2012.
Burkland, William Andrew, *'84*, no details.

BETA IA Β
Wood, Dellos Leland, *'57*, January 30, 2010.
Scott, Richard Thomas, *'61*, no details.
Hagen, Scott Charles, *'93*, July 24, 2021.

KANSAS

ALPHA KS Α
Brockett, Robert Miller, *'41*, no details.
Harkness, John Loomis, *'42*, no details.
Mishou, Edward Clark, *'43*, no details.
Maurer, Robert Francis, *'44*, no details.
Farber, Jack Daily, *'45*, November 20, 2000.
Maiden, Elmo E., *'48*, no details.
Reed, Harry DuMont, *'48*, Sept. 12, 2021.
Fitch, George Elmer, *'49*, November 7, 2001.
Luffel, Donald Leroy, *'49*, January 24, 2017.
Sturgeon, Charles Edwin, *'51*, Aug. 25, 2001.
Bartlett, David Charles, *'55*, Oct. 16, 2006.
Mayberry, George William, *'56*, no details.
Wildin, Maurice Wilbert, *'58*, March 22, 2021.
Shonyo, Michael James, *'68*, no details.

BETA KS Β
MacKay, Mark Alan, *'83*, August 20, 2021.

KENTUCKY

ALPHA KY Α
Smith, Richard William, *'59*, no details.
Wheeler, James Maurice, *'65*, Feb. 11, 2016.

BETA KY Β
Norris, John Robert, *'47*, April 29, 2001.
Sandy Jr., Grant Ferrell, *'47*, January 1, 2012.

LOUISIANA

ALPHA LA Α
Blanchard, Fred Ayres, *'44*, June 28, 2021.
Rosser, David Carl, *'47*, July 26, 2008.
Boardman, Grant Clinton, *'49*, Aug. 13, 2010.
Smith, Edgar Judson, *'50*, no details.
Cochran, Robert Joseph, *'55*, Aug. 21, 2021.
Cooper Jr., James Bobby, *'56*, Aug. 29, 2002.
Pittman, Houston Larry, *'58*, April 15, 2015.
Shankle, Arthur T., *'62*, November 21, 2008.
Hurst, Raymond, *'66*, July 26, 2021.
Mosley, Tammy Ruth, *'94*, August 4, 2021.

BETA LA Β
Prendergast, John Luke, *'44*, no details.
Evans, Frederick Aurelius, *'50*, May 17, 2021.
Hoy, Eugene Chin, *'53*, May 19, 2021.
Morgan, Ralph Clifton, *'54*, May 8, 2001.
Schinetsky, Norman Anton, *'56*, Jan. 5, 2010.
Katzeff, Michael D., *'66*, September 29, 2021.

GAMMA LA Γ
Elioff, Robert, *'44*, May 22, 2001.
Huckabay, Houston Keller, *'54*, no details.
Caruthers, Robert Mack, *'61*, Oct. 3, 2016.
Spillers, Ronald Charles, *'61*, June 10, 2010.
Benson, Kenneth Glen, *'83*, May 12, 1989.

MAINE

ALPHA ME Α
Clark, Harold Eugene, *'50*, no details.
Connell, Herbert John, *'50*, Feb. 14, 2019.
Laskey, Henry Lindon, *'51*, October 1, 2021.
Smith, Wayne Tyrell, *'70*, January 2, 2017.

MARYLAND

ALPHA MD Α
Crites, George Jewett, *'42*, no details.
Ericksen, Jerald Laverne, *'47*, June 11, 2021.
Padgett Jr., Joseph E., *'48*, Dec. 13, 2017.
Burgan, Harold Charles, *'49*, May 12, 2012.
Keigler, John Edward, *'50*, no details.
Pent, David, *'50*, February 19, 2002.
Worth, Newton Lee, *'52*, June 17, 2008.
Kondner, Robert Louis, *'54*, March 4, 2020.

BETA MD Β
Rosenfeld, Sidney Nathan, *'51*, May 15, 2004.
Anderson, Stuart Curtis, *'57*, Aug. 25, 2021.
Pascoe, Frank, *'66*, September 28, 2021.
Sauer, Earl Salvadore, *'68*, August 16, 2020.
Chalkley, Anthony Joseph, *'71*, Jan. 8, 2003.

MASSACHUSETTS

ALPHA MA Α
Backer, Kenneth Alan, *'63*, April 26, 2007.
La Pierre, Rene Bernard, *'67*, April 30, 2006.
Dabkowski, Michael J., *'76*, March 8, 2021.

BETA MA Β
Mar, James Wah, *'41*, March 4, 2017.
Holland, Edward Peck, *'42*, July 19, 2002.
Townsend, Edward Melick, *'47*, no details.
Baring, John Arnold, *'48*, January 13, 2005.
Watson Jr., Ross Oliver, *'49*, Nov. 19, 2016.
Stockel, Ivar Howard, *'50*, May 20, 2005.
Manning, Irwin, *'51*, December 9, 2005.
Rust, Christian Lewis, *'51*, February 8, 2005.
Silveston, Peter Lewis, *'51*, January 7, 2018.
Bethel Jr., Charles E., *'52*, March 30, 2009.
Kerwin, Justin Elliot, *'53*, May 23, 2021.
Stern, Howard Sheldon, *'53*, Dec. 29, 2005.
Klein, George Ernest, *'54*, January 28, 2001.
Sierer Jr., Payson Dwight, *'58*, Dec. 13, 2008.
Roberge, James Kerr, *'60*, January 10, 2014.
Cox Jr., Paul Milton, *'61*, August 30, 2002.
Gregg, H. Reed, *'63*, April 13, 1993.
Reeve, William Francis, *'67*, Feb. 13, 2011.
Lagace, Paul Alfred, *'78*, July 16, 2021.
Kim, Annabelle Jean Y., *'86*, Sept. 4, 2021.

DELTA MA Δ
Ringer, Hayden Newell, *'44*, March 13, 2002.
Sherburne, Arthur Eugene, *'50*, Dec. 6, 2010.
Rafuse, Robert Pendleton, *'54*, Nov. 3, 2006.

EPSILON MA Ε
Bonia, Walter Joseph, *'43*, April 7, 2016.
Dahlstrom, Harry William, *'47*, June 5, 2003.
Stuart, Robert Dennis, *'47*, Feb. 22, 2007.
Goolkasian, John Thomas, *'56*, June 4, 2021.
Osborn III, Daniel Cargill, *'62*, April 11, 2002.
Johnson, David Richard, *'70*, Jan. 10, 2013.
Currier, Richard Frank, *'71*, August 21, 1992.

ZETA MA Ζ
Nelson, Carl Walter, *'56*, May 12, 2011.
McCormick, Daniel J., *'61*, Aug. 18, 2001.
Robare, David John, *'63*, October 15, 2011.
Whiteford, Jon Cory, *'85*, no details.

MICHIGAN

ALPHA MI Α
Kurtz, Donald Russell, *'44*, January 2, 2019.
Nothstine, Jack Ray, *'50*, December 1, 2017.
Pence, George Edward, *'54*, March 12, 2021.
Hudson, Clarence Dean, *'58*, Oct. 28, 2021.
Kuzma, Dennis Charles, *'58*, no details.

CHAPTER ETERNAL

Continued

MI D

Michigan Delta '63
Salvatore A. LaBella, P.E.
September 3, 2021
Founder of LaBella Associates, civil engineering firm, that employs 1200+ professionals. Inducted into the Rochester Business Hall of Fame in 2016.

BETA MI B
Brule, John Dosithe, *'49*, August 6, 2018.
Donley, Raymond Junior, *'49*, Feb. 14, 2015.
Mercer, William Robert, *'52*, Sept. 3, 2010.
Wescott, Jack Edward, *'52*, no details.
Peckham, Burton Jay, *'54*, April 4, 2007.
Hodges, Edward Leon, *'56*, October 27, 2005.
Wieber, Robert H., *'60*, November 27, 2021.
Schlukebir, Joel R., *'70*, June 10, 2021.

GAMMA MI Γ
Davoli, James Edward, *'41*, Dec. 21, 2003.
Hurlich, Abraham, *'41*, no details.
Merz, Edmund Herman, *'44*, Sept. 19, 2002.
Milnor, Robert Cox, *'44*, March 1, 2021.
Purdy, Francis William, *'49*, Nov. 1, 2001.
Heruth, Richard Edward, *'50*, April 20, 2004.
Hellwarth, Robert Willis, *'52*, Jan. 20, 2021.
Woodward, Gary Floyd, *'55*, June 21, 2006.
Flory, John Arthur, *'60*, no details.
McVay, Ted Evan, *'61*, no details.
Dec, Kenneth Adam, *'62*, December 6, 2020.
MacKlin, Robert Bruno, *'64*, July 31, 2007.
Werbel, Jerome, *'64*, April 15, 2000.
Goldsmith, Leonard S., *'75*, July 29, 2005.
Polasky, Alexander T., *'78*, January 7, 2021.

DELTA MI Δ
Smith, Charles O., *'41*, no details.
Jenny, Raymond K., *'48*, no details.
Williams, William Brown, *'55*, Aug. 8, 2021.
LaBella, Salvatore Anthony, *'63*, Sept. 3, 2021.

EPSILON MI E
Hanuscak, Paul Albert, *'63*, April 17, 2002.

ZETA MI Z
Frederiksen, Gerald Aden, *'58*, Nov. 15, 2010.
Harry, David H., *'61*, August 15, 2001.

ETA MI H
Veraldi, Lewis C., *'68*, October 13, 1990.
Suter II, Herbert Wallace, *'80*, Aug. 18, 2010.

MINNESOTA

ALPHA MN A
Messing, Richard Francis, *'43*, no details.
Monroe, Frank Merrill, *'47*, no details.
Boehmler, James Herbert, *'48*, May 30, 2019.
Kuehn III, Andrew, *'50*, February 24, 2007.
Hegg, George L., *'52*, no details.
Clarke, Richard William, *'53*, Oct. 11, 2020.
Boll, Harry Joseph, *'56*, December 27, 2015.
Keer, Leon Morris, *'56*, January 12, 2021.
Goth, Gary Joseph, *'62*, July 18, 2016.

MISSISSIPPI

ALPHA MS A
Herring, James Carl, *'51*, no details.
Hester Jr., Leslie R., *'52*, April 14, 2021.
Paulk, John Irvine, *'52*, February 2, 2021.
Youngblood Jr., Enoch L., *'52*, July 18, 2021.
Koelling, Harold Alfred, *'54*, Feb. 4, 2015.
Ball, Billie Joe, *'56*, November 1, 2018.

BETA MS B
Moss Jr., Hal Chase, *'70*, August 12, 2021.

MISSOURI

ALPHA MO A
Magee, Thomas Henry, *'51*, January 2, 2020.
Jostes, Marvin Joseph, *'62*, Dec. 25, 2000.
Reeves, Roger Keith, *'74*, no details.
Parmeter, Richard John, *'90*, June 22, 2021.
Murphy, Thomas Joseph, *'93*, Feb. 6, 2013.

BETA MO B
Kloeris Jr., Paul William, *'42*, Feb. 15, 2009.
Drago, William Albert, *'49*, January 2, 2010.
Schweder, Henry Peter, *'49*, Feb. 27, 2006.
Barnett, Benjamin Junior, *'50*, July 14, 2008.
Sliger, Arlen Glenn, *'50*, September 18, 2021.
Oliphant Jr., Edgar, *'52*, August 28, 2021.
Dye, Clifford William, *'53*, October 28, 2006.
Feldmiller, William H., *'54*, Dec. 14, 2004.
Fowler Jr., Thomas Rex, *'54*, Feb. 7, 2006.
Cleary, John Dale, *'59*, June 16, 2007.
Taylor, James Gilbert, *'59*, no details.
Spalding, Theodore Joseph, *'69*, May 8, 2011.
Sidelnik, Richard David, *'71*, no details.
Owens Jr., Malachi, *'87*, June 21, 2021.

GAMMA MO Γ
McCarthy, Robert Allen, *'42*, March 6, 2009.
Hanneken, Henry Peter, *'48*, Jan. 25, 2004.
Newton, James Frederick, *'49*, Nov. 26, 2021.
Saunders III, William F., *'51*, no details.
Grafues Jr., Josef Harold, *'62*, Jan. 20, 2004.

MONTANA

ALPHA MT A
Sherman, Roger Hugh, *'50*, Jan. 31, 2018.
Nobles, Ray Alan, *'65*, June 28, 2006.
Thera, John Martin, *'72*, April 1, 2021.

NEW HAMPSHIRE

ALPHA NH A
Ormsbee, William Benton, *'47*, no details.
Meredith Jr., Francis, *'48*, July 18, 2015.
Dutton, John Mason, *'52*, December 1, 2007.
Read, Donald Barrett, *'60*, Sept. 1, 2000.

NEW JERSEY

ALPHA NJ A
Hennig, Harvey, *'41*, August 31, 2010.
Kellenbence, Henry C., *'49*, May 12, 2021.
Luzzi Jr., Theodore Ernest, *'51*, July 1, 2019.
Ratner, A. Mark, *'71*, no details.

BETA NJ B
Wcislo, Chester Robert, *'44*, no details.
Troy, Edward Martin, *'48*, April 13, 2007.
Lawn, Francis, *'49*, no details.
Magnani, Peter L., *'49*, October 30, 2001.
Reuter, Robert Manning, *'56*, May 20, 2005.
Gowen, Richard J., *'57*, November 12, 2021.
Klug Jr., Harold Henry, *'61*, July 11, 2004.
Santora, Milton Bruce, *'67*, May 28, 2021.

GAMMA NJ Γ
Perkins, Herbert Morris, *'50*, May 18, 2000.
Carrea, Frank Vincent, *'58*, May 18, 2003.
Gartner, George William, *'58*, Aug. 10, 2006.
French, Laurence Eugene, *'65*, May 6, 2021.
Trubelhorn, Philip Robert, *'66*, July 5, 2002.
Nawy, Albert A., *'67*, February 7, 2009.
Gomez, Carlos, *'74*, February 12, 2013.
Hydro, Joseph Eugene, *'84*, June 29, 2005.

DELTA NJ Δ
Woods, Robert Octavius, *'62*, no details.

NEW MEXICO

ALPHA NM A
Golden, Robert Leon, *'63*, April 7, 1995.
Rakow, Allen Leslie, *'64*, no details.
Hitt, Raymond Thomas, *'78*, June 21, 2017.

BETA NM B
Miles, Lonnie L., *'62*, no details.
Simpson, James Edward, *'70*, no details.
Miller, Terry A., *'79*, October 31, 2021.

NEW YORK

ALPHA NY A
Feurstein, Daniela N., *'82*, no details.

BETA NY B
Bridgeman, Theodore H., *'49*, May 7, 2011.
Wyckoff, Robert Oscar, *'49*, May 28, 2005.
McGovern, Terrance G., *'50*, no details.
Brown, Gerald John, *'51*, no details.
Kelley, David Benjamin, *'51*, Sept. 1, 2021.
Haverly, George Clifford, *'53*, Aug. 27, 2010.
Mahoney, Dennis Michael, *'71*, Aug. 22, 2012.

GAMMA NY Γ
Webb Jr., Henry George, *'42*, Aug. 10, 2007.
Connolly Jr., Martin John, *'49*, no details.
Fuller, Frank Marcus, *'49*, May 9, 2009.
Bernard Jr., William, *'51*, July 28, 2016.
Donovan, John Francis, *'51*, Sept. 23, 2021.
Fajans, Kenneth M., *'51*, no details.
Misare, Donald Otto, *'51*, March 11, 2000.
Desmond, William Harold, *'53*, Oct. 26, 2001.
Bowman, Robert Marcus, *'56*, Aug. 22, 2013.
Shrady, Lewis Browning, *'59*, June 16, 2011.
Weitzenkorn, Lee Rennie, *'61*, no details.
Figgie, Harry Edward, *'75*, Dec. 21, 1999.

DELTA NY Δ
Bennett, Robert Alan, *'45*, no details.
Harnett, Robert Thomas, *'48*, Sept. 6, 2021.
Turner Jr., Edward T., *'48*, October 11, 2021.
Siff, Elliott Justin, *'52*, July 7, 2021.
Sutton, George Walter, *'52*, Feb. 13, 2021.

EPSILON NY E
Dubey, Michael Bruce, *'47*, no details.
Lofredo, Antony, *'52*, August 25, 2021.
Sandberg, Clifford William, *'55*, no details.
Von Urff, Charles Adam, *'56*, July 1, 2018.
Hollering, Leroy Karl, *'57*, December 9, 1994.
Grumman Jr., Frederick W., *'58*, May 24, 2021.
Beeck, William Fredrick, *'65*, May 14, 2015.
Green, Douglas F., *'72*, June 3, 2003.

ZETA NY Z
Belmuth, Harold M., *'48*, January 12, 2007.
Linquiti, Albert Anthony, *'49*, Aug. 28, 2021.
Whalen, Robert J., *'54*, November 1, 2021.
Friend, William L., *'56*, January 27, 2021.
Fasullo, Eugene, *'57*, October 30, 2020.
Jacobsen, Sigurd Stanley, *'59*, no details.

THETA NY Θ
Avalear, John Theodore, *'48*, June 27, 2007.
Barshied, Robert David, *'70*, Feb. 23, 2018.

IOTA NY I
Ragozzino, Anthony B., *'55*, May 24, 2014.
Fischetti, Michael Frank, *'57*, July 23, 2007.
Temps, Alfred James, *'58*, Sept. 2, 2002.

IOTA NY Ι
Meldon, Jerry Harris, *'68*, July 18, 2017.
Kalsky, Thomas Robert, *'70*, Feb. 16, 2004.
KAPPA NY Κ
Whiting, Carlyle F., *'49*, no details.
LAMBDA NY Λ
Cutrone, Martin Bernard, *'57*, May 12, 2018.
Ostrowski Jr., Edward A., *'57*, Oct. 26, 2021.
MU NY Μ
Charlton, John William, *'62*, Nov. 1, 2020.
NU NY Ν
Bell, Adam Carr, *'61*, September 29, 2021.
Hammond, Paul Gordon, *'72*, June 14, 2016.
Drago, Gary Arnold, *'75*, no details.
XI NY Ξ
Marrie, Thomas Phillip, *'60*, no details.
PI NY Π
Johnson, Timothy Lee, *'72*, no details.
RHO NY Ρ
Parsons, Thomas Whitney, *'59*, Aug. 20, 2004.
Silverman, Norman I., *'75,* January 30, 2010.
Young, Rod Gregory, *'94*, no details.

NORTH CAROLINA

ALPHA NC Α
Uyanik, Mehmet Ensar, *'42*, no details.
Middleton, George W., *'47*, no details.
Whitfield, John Kerr, *'47*, July 27, 2005.
Cline, Arthur Austin, *'49*, no details.
Winchester Jr., Dewey H., *'51*, July 3, 2011.
Brantly, Eugene Paschal, *'55*, Nov. 30, 2000.
Dickens, Alton Keith, *'56*, Sept. 24, 2020.
Ferrell, Charles Stanley, *'56*, July 26, 2021.
Fisher Jr., Henry Lee, *'60*, Nov. 13, 2006.
Smith, Larry Baxter, *'60*, April 5, 2006.
Mustafa, Mohammed B.M., *'86*, Aug. 5, 2001.
GAMMA NC Γ
Hollett Jr., Grant T., *'64*, no details.
EPSILON NC Ε
Stalter, Maynard Raymond, *'87*, Oct. 8, 2004.

NORTH DAKOTA

ALPHA ND Α
Mutchler, Lynn Dale, *'50*, no details.
Komrosky, Gerald Lee, *'57*, March 13, 2002.
Zurn, Merlen Richard, *'60*, January 21, 2015.
Rauer, William Hans, *'61*, May 1, 2004.
Beistad, Rodney Dennis, *'62*, Jan. 8, 2017.
Stroup, Stephen B., *'74*, April 15, 2012.
Larson, Roger Keith, *'75*, June 5, 2009.

OHIO

ALPHA OH Α
Shaw, William Wayne, *'44*, no details.
Lindahl, Charles Ellis, *'52*, March 9, 2021.
Metzger Jr., Edward John, *'57*, Sept. 10, 2021.
Spero, Samuel William, *'59*, Oct. 26, 2009.
Gayle, David Malcom, *'65*, May 27, 2021.
BETA OH Β
Lockwood, George Corbin, *'50*, Jan. 30, 2005.
Clausing, Robert Eugene, *'54*, July 13, 2021.
Bruggeman, Jeffrey Mark, *'66*, Aug. 14, 2020.
GAMMA OH Γ
Brophy, Jere Edward, *'44*, Sept. 23, 2001.
Miele, Anthony Alfonsi, *'45*, May 13, 2017.
Krauter, Kenneth E., *'48*, June 13, 2003.
Kochendorfer, Donald P., *'49*, June 27, 2021.
Favret, Louis Martin, *'51*, April 11, 2006.
Williams, Floyd Justus, *'52*, July 30, 2003.
Schuh, Frank Joseph, *'56*, Dec. 24, 2020.
Groskopf, Frank Edwin, *'58*, no details.
Mills, Frank Schriver, *'69*, no details.
Snyder, Richard Franklin, *'71*, no details.
Conkel, Michelle Lynn, *'87*, Nov. 7, 1992.
DELTA OH Δ
Stoutenburg, Donn Van, *'51*, August 14, 2021.
EPSILON OH Ε
Russell, John Gaetan, *'49*, no details.
Amacher, Harold Charles, *'50*, no details.
Bobula, Alex Joseph, *'59*, August 24, 2005.
Odar, Fred, *'64*, July 8, 2007.
Calver, Gregory Lavern, *'72*, August 31, 2001.
Vatovec, Steven J., *'84*, December 6, 2001.
ZETA OH Ζ
Driftmyer, Richard Timothy, *'58*, Feb. 6, 2010.
Marleau, Richard, *'58*, August 31, 2021.
Farison, James Blair, *'60*, January 19, 2017.
Krajcik, Richard Allen, *'66*, March 5, 2020.
Brown Jr., Robert Keith, *'70*, Nov. 15, 2021.
Schmidt, William Lee, *'70*, no details.
ETA OH Η
Hitchcock, James Edward, *'54*, Dec. 28, 2005.
Osburn, Leland Antone, *'61*, July 17, 2020.
Lady Jr., Richard Holland, *'66*, Jan. 23, 2007.
THETA OH Θ
Pernik, John Francis, *'50*, no details.
Allison Jr., John Herbert, *'61*, Nov. 19, 2014.
IOTA OH Ι
Lehnert, Andrew B., *'63*, August 2, 2021.

OKLAHOMA

ALPHA OK Α
Pool, Richard Boykin, *'42*, January 14, 2018.
Elliott, Cecil D., *'44*, June 13, 2003.
Bond Jr., Lewis Honyman, *'47*, no details.
Schriever, William W., *'47*, March 1, 2019.
Anderson, Ralph Gordon, *'48*, June 19, 2021.
Walkley, Warren W., *'48*, March 19, 2021.
Allen Jr., Forrest James, *'49*, Sept. 26, 2019.
Sole Jr., William Grover, *'49*, April 16, 2015.
Fowler, Darrell Leon, *'59*, no details.
Harry, Arthur Steele, *'62*, March 15, 2010.
Blinn, Donald Everett, *'66*, April 20, 1981.
Hicks Jr., Pershing, *'66*, June 4, 2021.
Purinton, Bob James, *'76*, August 2, 2009.
BETA OK Β
Flint, Charles William, *'43*, no details.
McKee, Calvin Charles, *'48*, Nov. 30, 2019.
GAMMA OK Γ
Lindbergh, Charles, *'67*, May 12, 2002.

OREGON

ALPHA OR Α
Hampton, Robert S., *'41*, April 14, 2006.
Minear, Robert Charles, *'41*, August 9, 2003.
Johnson, Delmar C., *'50*, October 7, 2004.
Marquis, Malcolm, *'53*, February 15, 2021.
Pote, Robert Glenn, *'54*, August 20, 2021.
Hayner, Charles Truman, *'55*, no details.
Riesland, Edward Ernest, *'57*, no details.
Fandrem, Richard Lee, *'61*, April 8, 2003.
Johns, Eugene Kenneth, *'61*, no details.
Boyd, Scott Wilson, *'78*, May 20, 2021.

PENNSYLVANIA

ALPHA PA Α
Ockelmann, Howard H., *'46*, Sept. 12, 2010.
Eagleson, Peter Sturges, *'49*, Jan. 6, 2021.
Langer, David Brian, *'79*, April 19, 2019.
BETA PA Β
Oren III, Jess William, *'45*, June 30, 2016.
Kessler, John Robert, *'47*, March 27, 2018.
Hayes, Lawrence Richard, *'57*, no details.
Driscoll, Wade Carl, *'63*, Sept. 15, 2021.
Keller, James Albert, *'63*, April 11, 2007.
Aughenbaugh, Gregg Warner, *'67*, no details.
Shulock, Franklin Peter, *'68*, Nov. 19, 2021.
Austin, Vaughn Gene, *'69*, February 25, 2005.
GAMMA PA Γ
Dorsheimer, Wesley True, *'41*, Dec. 30, 2003.
Sonnenberg, Chas F., *'53*, August 5, 2011.
Clement, David E., *'57*, March 17, 2013.
Costanza, Charles Peter, *'63*, Sept. 16, 2021.
Fitzpatrick, Donald W., *'67*, March 1, 2003.
Martin, Charles Edwin, *'86*, Nov. 7, 2006.
DELTA PA Δ
Fegley, Kenn Allen, *'44*, January 15, 2018.
Kanefsky, Morton, *'57*, May 6, 2001.
EPSILON PA Ε
Smith, Marvin Lewis, *'39*, no details.
Winkler, Lewis Alden, *'44*, Dec. 16, 2005.
Scheuermann, Robert L., *'52*, March 23, 2017.
Ziegler, Donald Allen, *'52*, January 18, 2021.
Kotzmann, Roland L.S., *'68*, no details.
ZETA PA Ζ
Kavasch, William Ellis, *'41*, no details.
Lawless Jr., John J., *'48*, March 14, 2008.
Howland, Ira Reid, *'49*, no details.
Obrien Jr., Joseph Francis, *'50*, no details.
Gosewisch, William, *'51*, November 6, 2001.
Coleman, William H., *'53*, Dec. 22, 2020.
Cebula, Francis Joseph, *'56*, Feb. 5, 2020.
Jenofsky, Jack, *'61*, July 24, 2004.
Mortimer, Richard Walter, *'62*, July 2, 2013.
Serafino, Vincent John, *'64*, no details.
ETA PA Η
Maurer, John Franklin, *'49*, Feb. 20, 2012.
Mizma, Edward John, *'55*, July 17, 2007.
THETA PA Θ
Nary, Thomas John, *'48*, no details.
McAssey Jr., Edward V., *'56*, Oct. 16, 2021.
Watson, John Paul, *'66*, May 1, 1999.

PUERTO RICO

ALPHA PR Α
Morell, Lueny, *'74*, September 19, 2020.
Luna, Jerry, *'91*, January 1, 2014.

RHODE ISLAND

BETA RI Β
Hill, Richard Felix, *'55*, no details.
Levy, Stanley Burton, *'60*, January 5, 2021.
Gong, Kai Fee, *'67*, November 29, 2012.

SOUTH CAROLINA

ALPHA SC Α
Parks Jr., William Herbert, *'43*, Oct. 19, 2019.
McCormac, Jack C., *'48*, March 6, 2021.
Shaw, Joseph Edward, *'56*, October 23, 2015.
Godfrey Jr., Thomas G., *'57*, Sept. 10, 2003.
Ohlman, Elton M., *'59*, June 5, 2002.
Ramsey Jr., Francis David, *'73*, Aug. 20, 1993.
BETA SC Β
Rohe Jr., William David, *'51*, June 25, 2019.
Allison, H. Barden, *'53*, September 17, 2021.
Grzybowski, Stanislaw, *'54*, July 15, 2018.
GAMMA SC Γ
Suitt, Thomas Howard, *'48*, June 7, 2021.
Roy, Della M., *'47*, March 27, 2021.
Guenther Jr., Edwin L., *'50*, March 2, 2020.
Jones Jr., Howell C., *'50*, March 11, 2017.
Stephens Jr., Wacon L., *'50*, Jan. 27, 2007.
Roe, Robert Kenton, *'52*, June 10, 2020.
Cauthen Jr., Lewis J., *'54*, Feb. 17, 2020.
Edge, Charles Franklin, *'55*, Nov. 19, 2020.
Tyner, Hugh L., *'59*, January 18, 2021.
Seefried Jr., Kenneth Joseph, *'65*, no details.
L'Eplattenier, Alfred, *'69*, July 19, 2021.

SOUTH DAKOTA

BETA SD Β
Kasuske, Corey Alvin, *'90*, February 18, 2008.

CHAPTER ETERNAL

Continued

WI A

Wisconsin Alpha '60

Frederick A. Frey, Ph.D.

September 13, 2021

MIT Professor Emeritus, he was a pioneer of trace element geochemistry, a leader in the instrumentation "revolution" in geochemical research, and published 200+ papers.

TENNESSEE

ALPHA TN Α

Turner, Charles A., *'50*, May 30, 2010.
Farmer, Ray Herman, *'53*, April 30, 2016.
Davidson, William S., *'57*, March 13, 2005.
Davis, Paul Wayne, *'58*, March 20, 2020.
Ashley, James Clinton, *'59*, June 25, 2021.
Huddleston, Roy Lee, *'59*, April 10, 2004.
Kress, Phil Randolph, *'60*, Nov. 13, 2003.
Broome, Joseph Carroll, *'65*, Nov. 26, 2021.
Sharpe, Charles Lillard, *'66*, Jan. 28, 2003.
Olebe, Solomon Nathaniel, *'69*, no details.
Hargis, Larry Jackson, *'70*, October 23, 2009.
Turpin, Peggy Ballard, *'84*, August 14, 2005.

BETA TN Β

Horn, Lawrence Harrison, *'48*, no details.
Harrawood, Paul, *'51*, October 3, 2021.
Hall, John Richard, *'55*, November 25, 2021.
Phelps, Alva Weaver, *'77*, October 28, 2021.
Elissa, Qi-Chao Jean, *'85*, Dec. 22, 2000.

GAMMA TN Γ

Ingraham, Edward Russell, *'68*, May 1, 2013.

TEXAS

ALPHA TX Α

Sponberg, Raymond Lindell, *'42*, no details.
Blend, Harvey, *'43*, September 5, 2014.
Curci, Raymond Lewis, *'46*, April 12, 2002.
Krizov, Paul Charles, *'48*, March 30, 2000.
Eschman, Kenneth A., *'49*, March 11, 2009.
Burnette, James Eugene, *'50*, no details.
Wilkes, Chester Peyton, *'50*, Sept. 6, 2021.
Hall, James Duncan, *'51*, Dec. 22, 2003.
McQuown Jr., Albert N., *'52*, Feb. 20, 2008.
Dechman, Don Arthur, *'57*, Sept. 3, 2021.
Morrow, Ross Edward, *'57*, March 6, 2014.
McWilliams, Hobart F., *'59*, August 22, 2021.
Beynon Jr., Eugene T., *'61*, April 6, 2006.
Bosse, Gene Raymond, *'67*, Nov. 11, 2010.
Wells, Roger Murray, *'71*, August 30, 2021.
Turner, James Wimberley, *'72*, Aug. 6, 2001.
Feibusch, Keith E., *'85*, no details.
Truong, Richard Thanh, *'17*, April 13, 2016.

BETA TX Β

Moore, Bruce Franklin, *'47*, June 26, 2021.
Young, Carl Junius, *'48*, no details.
Donahue, Frank Joseph, *'50*, no details.
James, Byrd Ores, *'52*, January 17, 2003.
Kranz, Phillip Clark, *'58*, February 18, 2005.
Range, Jesse Lon, *'61*, May 25, 2003.
Goodwin, Walter Earl, *'62*, Feb. 12, 2000.
Rahe, John James, *'69*, October 1, 2021.
Das, Nirmal Kumar, *'85*, no details.

GAMMA TX Γ

Saunders, Clarence L., *'42*, Nov. 30, 2007.

DELTA TX Δ

Hoover, Joseph Renick, *'47*, no details.
Oliver, Howard Ross, *'49*, July 23, 2021.
Burns, Ross Jerome, *'50*, no details.
Drozd, Deonys Henry, *'50*, Nov. 24, 2012.
Butler, Harry LaRue, *'51*, April 4, 2021.
Edgar, Gordon Clifford, *'51*, July 6, 2002.
Haraldson, Harold Lloyd, *'51*, Dec. 28, 2011.
Oliver, Wade Hampton, *'51*, July 5, 2015.
Hirsch, Teddy J., *'52*, November 10, 2021.
Gray, Foster Lee, *'53*, October 6, 2021.
Killian, Robert Burgher, *'53*, July 25, 2005.
Atkinson, Daniel Olin, *'54*, Sept. 27, 2014.
Palmer, George Dan, *'54*, June 2, 2003.
Osborn, William F., *'57*, April 11, 2010.
Swearingen Jr., Charles, *'58*, June 7, 2020.
Malone, William, *'59*, August 1, 2020.
Rudd, Weldon Eugene, *'59*, August 7, 2019.
Tuck, Noel Wayne, *'60*, August 17, 2009.
Thompson, Tommie N., *'68*, July 10, 2021.
Dodson, David A., *'79*, November 30, 2008.

EPSILON TX Ε

Shifflett, Michael Brett, *'89*, May 16, 2003.

ETA TX Η

Trent, Dan Stephen, *'69*, September 5, 2020.
Vandiver, Larry Gene, *'70*, March 24, 2006.
Sorgee, Vernon Hyliard, *'78*, June 24, 2021.
Goodwin Jr., Marshal, *'79*, May 19, 2007.

THETA TX Θ

Sambrano, Humberto F., *'58*, June 20, 2007.
Garland, Michael Dwight, *'82*, no details.
Clardy, Jerry L., *'96*, December 23, 2005.

IOTA TX Ι

Lukner, Hans Dieter, *'94*, August 27, 2021.

UTAH

ALPHA UT Α

Nibley Jr., James W., *'43*, March 21, 2016.
Gilson, Vervin R., *'47*, December 16, 2015.
Jorgensen, Leland Howard, *'48*, Dec. 4, 2013.
Allen Jr., Stanley Leroy, *'49*, Feb. 4, 2017.
Forbes, Charles Robins, *'49*, Feb. 19, 2019.
Lesser, Richard, *'51*, December 23, 2014.
Smith, G. Gilbert, *'52*, October 3, 2016.
Seegmiller, Henry L.B., *'54*, Jan. 30, 2018.

BETA UT Β

Hilton Jr., Joseph Roy, *'68*, no details.

GAMMA UT Γ

Flammer, Gordon Hans, *'52*, June 14, 2020.

VERMONT

ALPHA VT Α

Coyle, Donald Frederick, *'53*, no details.
Romer, Harry Edward, *'54*, no details.
Raymond, James Charles, *'64*, Aug. 30, 2020.

BETA VT Β

Tuozzolo, Vito James, *'61*, November 2, 2007.

VIRGINIA

ALPHA VA Α

Dudley, Sidney Armour, *'40*, Feb. 21, 2017.
Munford, Leslie Modin, *'49*, Nov. 30, 2003.
Wexler, Palmer Douglas, *'49*, Aug. 23, 2021.
Hutchings, Barry Willis, *'54*, Dec. 3, 2010.
Wharton, Weir Edward, *'60*, Dec. 25, 2008.
Baker, William Edgar, *'61*, August 3, 2021.
Mason III, William Thomas, *'63*, Nov. 1, 2010.

BETA VA Β

Jones, Catesby, *'42*, October 28, 2006.
Nolte Jr., William Joseph, *'44*, Nov. 17, 2002.
Fischer, Julian E., *'46*, no details.
Critzer, Ernest Leonard, *'50*, July 28, 2008.
Klich, George Frank, *'61*, no details.
De Young, Ronald Michael, *'65*, Dec. 21, 2009.
Nothnagel, Kerry Alan, *'66*, March 8, 2017.
Riggs, Ronald Dean, *'66*, December 4, 2008.

GAMMA VA Γ

Whesdos, William Austin, *'87*, Oct. 12, 2007.

WASHINGTON

ALPHA WA Α

Guilford, Edward Charles, *'42*, Nov. 1, 2011.
Mattock, Alan Hanson, *'45*, June 6, 2014.
Osberg, Allan Frederick, *'45*, March 14, 2019.
Johnstone, Kenneth E., *'66*, July 11, 1999.

BETA WA Β

Daniel, Ray Milton, *'43*, February 7, 2004.
Hazelwood, John Nathan, *'50*, no details.
Gibbs, Edward Eugene, *'51*, June 30, 2020.
Clinton Jr., Menzo Arthur, *'53*, June 21, 2009.
Krazynski, Leonard M., *'57*, March 28, 2011.
Guyer, Freddie Richard, *'59*, August 30, 2021.
Purgalis, Janis, *'60*, no details.

GAMMA WA Γ

Tseng, Raphael I., *'84*, no details.

WEST VIRGINIA

ALPHA WV Α

Cather, Harold Dotson, *'49*, April 2, 2016.
Mann Jr., Otho Karl, *'73*, February 1, 2006.

WISCONSIN

ALPHA WI Α

Barker, Curtiss Robert, *'48*, June 8, 2004.
Tausche, Paul Everett, *'48*, April 24, 2020.
Fuchiek, Robert James, *'50*, Sept. 23, 2018.
Pitt, Charles Horace, *'51*, August 25, 2021.
Sprague, Clarence George, *'55*, May 5, 2021.
Pike, Rodney Gene, *'56*, August 21, 2021.
Frey, Frederick A., *'60*, September 13, 2021.
Howe, John Conrad, *'60*, no details.
Kalmon, Dennis Harlan, *'62*, Feb. 29, 2008.

BETA WI Β

Heath, Benjamin W., *'38*, August 11, 2012.
Redle, Austin Thomas, *'44*, no details.
Delgado, José Manuel, *'69*, no details.

GAMMA WI Γ

Fredrichs, Thomas Lo, *'78*, Sept. 21, 2013.
Funk, Gregory Gordon, *'79*, October 13, 2011.

DECARBONIZING —
CONTINUED FROM PAGE 11

AT THIS LATE DATE, HOWEVER, NATIONAL ACADEMIES OBSERVED THAT EVEN HOLDING WARMING TO 2°C IS "EXCEEDINGLY CHALLENGING."

materials necessary for electric vehicle batteries, such as lithium, antimony, and nickel.[19]

Upshot: to achieve the climate goals outlined by the White House in November of reducing net emissions of greenhouse gases at least 50 percent below 2005 levels by 2030, the New York-based research and consulting firm Rhodium Group estimated that the U.S. would need to cut emissions by about 5 percent per year over the next eight years. That is much faster than was being achieved pre-pandemic.

Preliminary figures for 2021, however, indicate that the nation's greenhouse gas emissions ***rose*** 6.2 percent after having plummeted by 10 percent in 2020 following the global economic shutdowns during the initial coronavirus outbreak. That sharp rebound to business as usual has put "the U.S. even further off track from achieving its 2025 and 2030 climate targets," the Rhodium Group warned. "…[A]ll must act quickly in order to put the U.S. on track."[17]

"The harsh arithmetic of climate change demands ambition and extraordinary response," stated one author in *Frontiers in Climate*, "demanding innovation, research, and investment in whole new fields of knowledge…," as well as designing and financing major projects at the multitrillion dollar scale, and ensuring societal acceptance. "These additional dimensions should prompt humility and (ideally) additional ambition, given the scope of the work."[23]

TRUDY E. BELL, M.A. (t.e.bell@ieee.org), former editor for *Scientific American* and *IEEE Spectrum* magazines and former senior writer for the University of California High-Performance AstroComputing Center, is author or co-author of a dozen books and 600+ articles. Most recently, she was co-editor (along with William Sheehan, Robert W. Smith, and Carolyn Kennett) of *Neptune: From Grand Discovery to A World Revealed* (Springer, 2021). This article is her 31st feature for *The Bent*.

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CEI PROFILES
CONTINUED
FROM PAGE 15

Ken Jinkerson
MO Beta '75

The Beverly and Kenneth R. Jinkerson Endowment for the Missouri Beta Chapter at the Missouri University of Science and Technology.

Born in Bonne Terre, MO, Ken Jinkerson saw first-hand the importance of dedication to a task by his father's example. His father, a Korean War veteran, had an aptitude for electronics and served as a technician for the military in Japan. After the war, he worked night shift at McDonnell Douglas to support his family and went to school full-time during the day in order to obtain his electrical engineering degree from Washington University. Ken was five years old when his father began this undertaking and noted they saw little of each other for the next six years.

Nearing graduation from Ritenour High School in St. Louis and seeking a profession, Ken turned to the card catalog in his high school's library. He excelled at chemistry and math and the card catalog listed chemical engineering as a profession for someone with those attributes which, now, after 44 years as an engineer, Ken noted was the perfect choice. While his father hoped he would consider attending his alma mater, the lower cost and promise of a scholarship led Ken to the Missouri University of Science and Technology (formerly University of Missouri-Rolla).

Ken received a scholarship from the U.S. Air Force to become a pilot and graduated from Rolla with a degree and as a commissioned Air Force Lieutenant. The Vietnam War ended fortuitously, so Ken and the Air Force parted. He quickly found a job at Shell Oil and ended up making a friendship with Steve Hunkus in the first five days of employment that would last a lifetime. Ken jokes that the two of them either worked together or one of them reported to the other for virtually their entire careers. This began his sojourn through 26 different oil refineries in 7 countries for 9 different companies. Ken notes, "I was always looking for the more challenging role and was often considered the radical guy who wanted to upend processes in pursuit of making things better/faster/cheaper/safer."

In response to a boss who thrived amidst bureaucracy, Ken once said, "I'm built for war, and you're built for peacetime." This can-do attitude and drive as a change agent got Ken noticed in his industry.

Ken's next major move was to work for his friend Steve in Lithuania. The country was attempting to modernize a former Russian refinery that needed massive investment — Ken could not get on a plane fast enough. His grandfather inspired in him a love of reading resulting in Ken catching the travel bug early to visit the places he read about. Ken soaked up the cultural differences and learned conversational Lithuanian, endearing him to his colleagues. While some aspects of the cultures seemed to contrast, Ken saw how Americans do not necessarily have all the right ways of doing things and that it is important to keep an open mind. On returning to the U.S., Ken became a refinery manager in El Paso, TX, but years later took Steve up on another offer to work abroad — this time in Wales for five years. Ken wrapped up his career working for HollyFrontier in Dallas, TX, developing a corporate process engineering group and retired in 2020.

On the concept of noblesse oblige, Ken states, "It means a lot more now than when I was a student, particularly as one progresses in a career. If you do things right, you might end up with a plaque — but on the downside, an engineer who makes a mistake can potentially cause significant human and economic loss. One cannot take shortcuts and one must have a responsibility to safety."

Ken further shares this advice with students, "As long as it is safe, try something. Do not let pursuing perfection leave you in a rut — the important thing is to start, try something different, prepare to change, and be open to advice from others who have different perspectives. Humans make mistakes and those mistakes help us all grow." He adds, "I have found a great career by physically moving — if I would have stayed in one place, my career would not have been nearly as exciting or fulfilling. My success is due in no small part to the support of my wife (almost five decades) and two daughters. Without that support during moves and change, this career would not have happened."

Ken has now traveled to over 70 different countries. He has seen Paris covered with snow, participated in conferences in Madrid, and has visited locations he once read about in mystery books such as the Metropol Hotel near Red Square. Several years ago, he began reading the history of the Ottoman Empire and has traveled much of the Silk Road. On his journeys, he has ventured through Istanbul, visited sites of the Orient Express, stood at the base of Mt. Everest, and walked in Marco Polo's steps through the Jade Gate in China.

Regarding his gift to the Chapter Endowment Initiative in support of MO Beta, Ken shared, "I've been blessed so much and wanted to give back. It's important to continue to support the best students, recognize their efforts, and help develop the next generation of engineers."

Larry Merkle
OH Eta '92

The Douglas H. and Laurence D. Merkle Endowment for the Colorado Zeta Chapter at the United States Air Force Academy in Colorado Springs.

Dr. Laurence "Larry" Merkle knew from an early age that he would someday pursue a STEM career, (though it wasn't called that at the time). He recalls being inspired while learning about Albert Einstein and set theory in second grade in Ithaca, NY. His father, Dr. Douglas H. Merkle, was serving as a U.S. Air Force civil engineer in Thailand. The family soon relocated to Albuquerque, NM, where they planted roots during his father's final assignment.

As a teenager, Larry took advantage of all the advanced placement courses available (mathematics and English), as well as the many other enhanced STEM offerings of the Albuquerque Public Schools. As a sophomore, he took an intensive physics course, followed by programming his last two years. Larry's hard work, in the latter, paid off when he won New Mexico's high school programming contest. Excelling in mathematics, he also placed highly in the state mathematics contest and finished his high school career as a National Merit semi-finalist. Larry shares, "As a high school student, my dream job was to be a computer science professor — I have always loved helping people, shedding light on math homework and seeing the light go on in [the students'] eyes."

When it came time for postsecondary education, there were many options. Fourteen of his relatives attended Cornell, including both parents and his older brother. His grandfather had also been a mechanical engineering professor there. Larry wanted a different campus experience, though. He applied to MIT, Carnegie Mellon, and Caltech, but was not accepted at any of those schools because he did not take the time to write quality essays. Larry is now embarrassed to admit that he implicitly chose not to take a second stab at the essays that MIT offered him, and laughs at his teenage-self for being somewhat bent

out of shape when he did not receive an offer letter. Instead, he attended Rensselaer Polytechnic Institute due to their competitive nature, prestige, and his father's stamp of approval.

Larry received an Air Force ROTC scholarship and majored in computers & systems engineering — a field he continues to work in today. Upon graduation, he was commissioned as a second lieutenant and sent to Wright-Patterson Air Force Base. His first assignment was to teach others about expert systems. Next, he was assigned as a graduate student at the Air Force Institute of Technology (AFIT), from which he received his master's and Ph.D. in computer engineering. Following graduate school, he was assigned to the Air Force Research Laboratory at Kirtland Air Force Base working in computational plasma physics. He taught computer science at the Air Force Academy in Colorado Springs, from 1999-2002. Larry eventually left active duty but continued in the reserves working for the Air Force Office of Scientific Research while teaching full-time at Rose-Hulman Institute of Technology.

When his family decided to move back to Dayton, OH, he worked at Wright State University as the assistant department chair for computer science and engineering. Years later working as a consultant, he enjoyed his time as a stay-at-home dad and spending time writing a young adult mystery novel with the ulterior motive of encouraging more women to pursue careers in STEM fields. Larry joined the faculty at AFIT in 2015 and currently teaches theoretical courses in computer science and continues research in quantum computing.

Larry's immediate and extended family continues to have a healthy number of mathematicians, engineers, and Air Force officers among them. His son is in his senior year of physics at the University of Dayton and is a third-generation Eagle Scout.

Reflecting on important lessons during his teenage years, he notes that it takes a long time to earn trust and not long to lose it. Larry's advice to engineering students of today is, "Engineering is a team sport so get to know your strengths and weaknesses. Don't be afraid to reach out to your teammates when you need help."

Reflecting on his decision to support the Colorado Zeta Chapter through the Chapter Endowment Initiative, Larry mentioned that both he and his father started investing early and referred to the magic of compounding interest. Ultimately, he desired to make a gift somewhere in-line with his father's ideals and passions and Tau Beta Pi stood out among the rest. "I believe I can best honor his life by supporting the education and character development of the cadets at the ΤΒΠ Air Force Academy Chapter."

SUBMIT 2022 AWARD NOMINATIONS

The following Association award nominations are due by **April 1, 2022:**

The **Laureate Program** recognizes members who excel in areas outside of engineering (arts, athletics, service, and diverse achievements). Nomination reference letters must be emailed to HQ. Selections will be made in June by a committee of District Directors appointed by the Executive Council. Winners will be announced in July, and each will receive $2,500, a recognition plaque, and is invited to the annual Convention.

The **McDonald Mentor Award** celebrates excellence in mentoring. The winner receives an engraved medallion, pin, and $1,000, and the nominating chapter receives $1,000.

The **Outstanding Advisor Award** recognizes exceptional performance among the TBP Chapter Advisors. The winner receives a plaque and $1,000, and the nominating chapter's dean receives $1,000 for its discretionary fund.

Information and nomination instructions are available for all three awards on the ΤΒΠ website: *www.tbp.org/memb/awards.cfm*.

2019 LAUREATE
Rose Ridder, *PA K '20*

2012 MENTOR
Derrick Rollins, *IA A '79*

2015 ADVISOR
Elizabeth Stephan, *OH K '93*

2020 LAUREATE
Kevin Ptak, *SD A '19*

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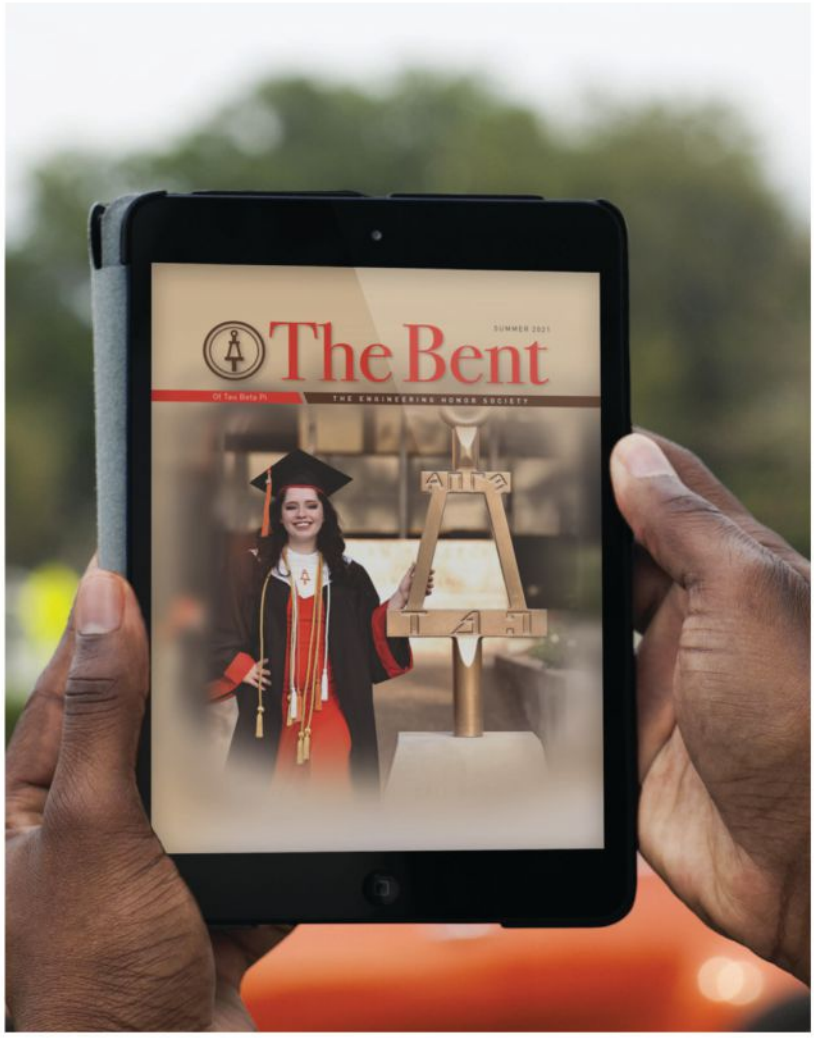

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Executive Council MEETING MINUTES

These are summaries from Executive Council (EC) Meetings — May 2021 through August 2021.

May 17, 2021
Virtual

Councillor Pierce moved to ratify the actions taken without quorum at the April 30, 2021, Executive Council Meeting. The Council voted to confirm each of the actions.

The EC approved on a voice vote the following: Diversity, Equity, and Inclusion Committee Charter Preparation, Third-tier Governance Documentation Workflow, Executive Director Performance Evaluation, Governance Committee (revision), Executive Council Meeting Standing Rules (revision), and Executive Council Committees (revision).

Rescind the Interactive Chapter Exchange (ICE) Committee Charter and recognize the following members with Resolutions of Appreciation: **Allen D. Erickson,** *NM Γ '14*, 1 year of service; **Ian J. Frank,** *NY Π '09*, 4 years of service; **Thomas A. Pinkham IV,** *MA Ε '88*, 4 years of service; **Haley H. Smestad,** *MA Α '15*, 3 years of service; and **Tonya J. Whitehead, Ph.D.,** *MI Ε '17*, 2 years of service.

Executive Director Gomulinski provided an update to the Council: The transition from PNC to Vanguard is ongoing; the AMS selection process is moving forward with three vendor interviews in the coming weeks; the Fund Transfer project is nearing completion; and the Council is invited to attend the upcoming June Meeting with topics to be determined.

Councillor M. Youssef reported on the work of the Convention Program Planning Committee: A preliminary schedule is available for Council to review; the Petitions Committee will not be meeting due to lack of inspections; the committee would like Council to fund 10-15 advisors to attend Convention based on chapter health; Council discussed the potential effects of COVID-19 on an in-person Convention's logistics. Councillor M. Youssef moved to approve an Advisors' Committee, Alumni Chapter Committee, Image and Marketing Committee, and Program Review Committee as *ad hoc* committees at the 2021 Convention. The Council approved on a voice vote.

Mr. Gomulinski presented the following: Details of the Headquarters Operations Fund and Councillor Pierce moved to create the Headquarters Operation Fund and Council approved. Approve Constitution Amendment on EC Election Process and publish to all chapters for ratification. Mr. Gomulinski presented the proposed amendment and discussed rationale for immediately sending out for ratification by the chapters. The Council discussed logistics of the proposed voting system and Councillor Pierce moved to approve the Constitution Amendment and the Council approved on a voice vote. Approve General Revision Phase 2 of the Constitution & Bylaws. Councillor Pierce discussed the proposed documents and the plan for their review by the 2021 Convention. The EC Election policy was pulled due to the conflict with the proposed amendment of the EC Election Process. Secretary Alexander asked about disseminating the documents to the C&B Committee members prior to Convention and Councillor Pierce noted it will be done. Councillor Peterson moved to approve the General Revision Phase 2 of the C&B with exception of the EC Election policy proposal and send it to the 2021 Committee on C&B. After discussion, the Council approved: Proposed General Revision Phase 2 Document; Initiating Alumni Members of Sigma Tau Policy; and New Member Elections Policy.

June 21, 2021
Virtual

Councillor Pierce moved to approve the consent items and Council approved on a voice vote: Fellowship Board Reappointments to a term expiring 6/30/2024: **Solange Dao Fantozzi, P.E.,** *FL Α '95*, and **Abigail M. Richards, Ph.D.,** *WA Β '99*.

Councillor M. Youssef reported that the Convention Program Planning Committee is monitoring the continuing effects of COVID-19 on the planned in-person Convention.

The Council approved an in-person EC meeting on August 21-22, 2021, in Detroit, MI.

July 19, 2021
Virtual

Tonya J. Whitehead, *MI Ε '17*, presented the proposed Diversity, Equity, and Inclusion Committee Charter and discussed the process the Task Force followed to prepare the document. The Governance Committee will review the charter for final comments prior to the next EC meeting.

Daniel T. Kruusmagi, *CA Η '13*, presented recommendations for the 2021 alumnus Recognition Awards, the Council discussed, and they recommended a comparison to previous years' recommendations. Councillor Pierce moved to accept the 2021 Alumnus Award recommendations and Council approved on a voice vote. Distinguished Alumnus Award: **Neal A. McCaleb, P.E.,** *OK Γ '57*; **James A. Momoh, Ph.D.,** *DC Α '75*; **Richard J. Spontak, Ph.D.,** *PA Β '83*; **Martin C. Jischke, Ph.D.,** *IA Α '63*; and **Edward Kaplan,** *IL Β '65*. McDonald Mentor Award: **James C. Williams, Ph.D., P.E.,** *NM Β '76*, for the McDonald Mentor Award. Councillor Sciacca moved to create a procedure for the Alumnus Recognition Selection Committee taking the recommendations presented in the subcommittee report, and Council approved on a voice vote. The Governance Committee will prepare the new procedures.

Melissa M. Morris, Ph.D., *WV Α '06*, presented recommendations for the 2021 Laureate Awards and moved to accept the recommendations and the Council approved on a voice vote. **Kara L. Combs,** *OH Μ '21* (Service); **Carissa G. Dopman,** *NY Σ '21* (Art); **Tyler A. Kleinsasser,** *SD Α '19* (Diverse Achievements), and **Michael Ustes,** *MI Ι '22* (Diverse Achievements).

Abigail M. Richards, *WA Β '99*, presented recommendations for the 2021 Outstanding Advisor Award and Councillor Pierce moved to accept the nomination of **Susan L.R. Holl, Ph.D.,** *CA Λ '76* for the 2021 Outstanding Advisor Award and Council approved on a voice vote.

The following appointments and reappointments were approved: District Director: **Sophie E. Soueid,** *TX Η '20*, as a D10 Director to a term beginning 7/1/21 and ending 6/20/22.

Editorial Board: **Lyle D. Feisel, Ph.D., P.E. (ret),** *IA Α '61*, to a term expiring 6/30/24.Convention Officials: **George K. Miyata,** *WA Δ '10*, Permanent Chair; **Rachel K. Alexander,** *CA Υ '15*, Secretary; **Ronald M. Hickling,** *CA Ε '80*, Parliamentarian; and **Christopher J. (Kiffer) Creveling,***UT Α '13*, photographer.

Councillor M. Youssef provided a general update on Convention planning. Assistant Director of Member Services, A. Cross, presented a proposal to fund 15 non-voting delegates to attend the 2021 Convention and the Council approved funding.

The Council reviewed the preliminary petition from Lipscomb University and accompanying checklist. Councillor Pierce moved

to approve the preliminary petition and schedule an inspection, when appropriate. After discussion, the Council approved.

Mr. Gomulinski presented the list of pending inspections and one pending installation. Councillor Pierce moved to appoint Secretary Alexander as the installing deputy and Councillor Peterson as the backup for Georgia Southern University's installation and the Council approved on a voice vote.

Mr. Gomulinski presented the FY22 Continuing Budget Resolution which extends the FY21 budget through August 31, 2021, and Council approved on a voice vote.

August 21-22, 2021 Virtual

The following District Directors were reappointed for a term length of 3 years ending 6/2024: **Anthony M. Olenik,** *NY T '08* (D2); **Mary Ann Susavidge, P.E.,** *PA Z '89* (D3); **Russ L. Werneth,** *MD B '64* (D4); **David J. Cowan Jr., P.E.,** *FL E '14* (D5); **Caden J. Moore,** *AL E '16* (D6); **Lauren H. Logan, Ph.D.,** *OH Δ '10* (D7); **Warren C. Roos, Ph.D.,** *OH A '99* (D7); **Matt V. Romero,** *MS A '20* (D9); and **Chris Stemple,** *AZ A '10* (D13).

Bridget A. Moorman, USAF (ret) *AZ B '85*, was appointed to the Editorial Board to a term starting 9/1/21 and ending 6/30/24. **Elson Y. Liu,** *AZ A '01*, was appointed as chair of the Teller's Committee.

The following policies and charters were approved: Advisor's Committee; Membership Committee; Donor Recognition; New Chapter Installations; Petitioning Institution Inspections; Chapters at Satellite Campuses; Association Officer Elections; Use of Social Media; Diversity, Equity, and Inclusion Committee; and Revision to the Governance Committee Charter.

President G. Morales delivered his report to the Council and noted that he recently conducted reviews with each of the program directors and presented a summary of his findings and the EC shall provide more proactive information to each of the directors.

Mr. Gomulinski discussed the status of the AMS selection process and the Council discussed the potential costs of the finalists and means to fund their implementation.

Councillor M. Youssef provided a general update on the Convention planning to the Council and the Council discussed various strategies to limit the spread of COVID-19 at Convention. Councillor M. Youssef moved that, for the 2021 Convention, all attendees be required to present at check in a) proof of vaccination or b) results of a negative COVID-19 test taken less than 72 hours before on-site registration at Convention. The Council discussed the feasibility and costs of pivoting to a virtual event.

Director of Development, Ms. Jennings-King delivered her prepared report to the Council. Ms. Jennings-King discussed the impacts of COVID-19 on major gifts and overall development revenue. Mr. Gomulinski and Ms. Jennings-King noted their satisfaction with the shift to Allegiance Fundraising. Councillor M. Youssef inquired about AI implementation in targeting donors; Ms. Jennings-King confirmed this is not presently happening and also noted that she does not wish to publish annual goals as to not give off the perception that she is aiming for a yearly quota.

Councillor Sciacca presented the Strategic Planning Update and Discussion. The Governance Committee will revise the monthly tracking chart, annual unrestricted revenue realized was 1.89M rather than the goal of $2.1M. This was primarily attributed to not meeting goals from initiations and sales due to the pandemic. Annual membership data is incomplete as many chapters have not finished reporting; applying logical filters, chapters initiated a median of 13 percent of eligible candidates. Councillor M. Youssef suggested sending all committees an email with a form to fill out regarding goals for the upcoming year. An email will be distributed for the interest of Champions.

Mr. Gomulinski reminded the Council of the question regarding asset classification from a few years ago. After working with the auditors, Mr. Gomulinski led a review of all established funds to confirm and reclassify as restricted and unrestricted. Several funds that have small amounts of EC designated funds, upcoming recommendations would remove the EC designated funds. General fund will go up and general fellowship fund will go down. Recommendations will come to the Council. An update was provided to the Finance Committee: The audit is incomplete from 2019-20 as auditors need to review the information regarding funds that took 8 months to complete. He noted the error had been there for 20 years but was not caught until this year by investigating the restricted funds.

Mr. Gomulinski reported to the Council four proposals and C&B revisions and is presently seeking input to endorse or not to endorse. Convention has the ultimate authority, but action determines where the Council stands.

Councillor Peterson moved that the EC recommends to the C&B Committee the Director of the District Program. Councillor M. Youssef noted that results of the trial program were not received due to COVID-19 and after discussion the Council approved the recommendation.

Call for Council Nominations

The 2022 ΤΒΠ Convention will elect three members to serve on the Executive Council (EC). Members interested in serving on the EC must be nominated by a collegiate or alumni chapter by July 1. The Executive Director can work with candidates needing a formal nomination.

Candidates with experience in a variety of functions—management, finance, teaching, business, research, etc. and those with knowledge in the areas of image enhancement, branding, fundraising/development, alumni relations, and advising collegiate chapters are strongly encouraged to consider running. Read the position description and letter for more information at: www.tbp.org/?ECjob. If you know of a qualified candidate or are interested in learning more, review the letter and send nominations to ΤΒΠ HQ.

Councillor M. Youssef moved to recommend that the trust advisor be authorized to invest in alternative investments and after discussion the Council approved on a voice vote.

Councillor M. Youssef discussed use of Google Chat or Communication software for better communication and noted that software can be used to improve the Council's committees.

The Convention Planning Committee discussion continued and Councillor M. Youssef moved that all 2021 Convention attendees be required to present or have proof available at Convention check in either a) proof of vaccination or b) the results of a negative COVID-19 test taken less than 72 hours before on-site registration at Convention and the Council approved on a voice vote.

The Strategic Planning Discussion continued and Councillor Sciacca presented the EC Champions volunteers by the EC. She requested a date to return with goals and milestones per quarters. Councillor M. Youssef presented links for all the boards and task forces and that some groups were not included and Councillor Sciacca noted the Council could proceed with the ones listed and goals and milestones need to be in by September 15.

Mr. Gomulinski presented the proposed 2021-22 budget and fielded questions from the Council. He noted the year-to-year changes in expenses, revenues, and developments that may have significant effects on each other. After extensive discussion, Councillor Pierce moved to approve the budget as presented for FY22 and the Council approved on a voice vote.

Alumni Giving

Downing Club continued from page 29

MA B Hilbing, James Henry '86
Osterberg, Peter Maynard '78
Patterson, John Bryan '68
Rogers, Peter Todd '82
Smallwood, Richard Dale '57
Spradlin, Louis Woodson '57
Walsh, Eamon Francis '03

MA Δ Bloch, Frederick Hersh '68
Colen, Frederick Haas '69
Flaherty, Joseph C. '84
Gunn, John F. '64
Lada, Douglas James '79
Milauskas, Ronald Joseph '62
Raisler, Richard Allen '72
Savage, Paul David '77
Simon, Henry John '60
White, Edward A. '47

MA E Chiodo, Richard Anthony '71
Engler, Harold Frank '75
Levesque Jr., George Emile '70
Lichtig, John Forrest '83
Marini, Robert Charles '54
McEachern, James Francis '70
Payne, Robert Joseph '86
Vesce, Paul James '64
Williams, Charles Robert '53

MA Z Benwood, Bruce Robert '69
Cooper, Perry A. '62
Gusciora, Kenneth Henry '69
Koch, Robert F. '79
Lynch, David Peter '82
Philbrook, T. Varnum '73
Seus, John D. '84
Walsh, James Edward '76

MA H Whitley, Norman Lyle '75

MA Θ Allen, Karen Leonard '89
Burns, Nancy E. '84
Gregg, John Edward '84

MI A Beck, Maureen E. '03
Chaffee, Stanley Wendell '74
Houthoofd, Janet Marie '76
McIntosh, Carl L. '70
Mueller, James Michael '70
†Ryckman, Jim James '38
Santoro Jr., Thomas Vincent '66
Tscharner, Christopher G. '83

MI B Edquist, Carl F. '77
Glidden Jr., Harry James '65
Groeneveld, Gerald Anthony '63
Hammar, Richard Harry '65
Link, Barbara Ann '77
Mattson, James Arthur '70
Pearson, Walter Claydon '62
Plutchak, Raoul Edward '62
Rom, David Bruce '56
Sandretto Jr., Peter Patrick '64
Saul, William Edward '55
Skaugen, Borg '63
Whitman, Brian Edward '92
Wilden, Helmuth '65

MI Γ Anderson, Richard Walter '66
Barr, William Robert '70
Baxter, John Edward '57
Davies, John Richard '50
Duncan, T. Michael '75
Earl, George Clayton '66
Fertel, Howard Kevin '79
Friess, John George '57
Gray, Jeffrey James '94
Hand III, Mike J. '11
Hickcox, Timothy Earl '65
Lisiecki, Gayle Barill '79
Lisiecki, Robert Joseph '78
Maier Jr., Edward Louis '77
Martin, Edward Arthur '68
Meilinger, Robert B. '94
Prescott, Thomas J. '69
Sanguinetti, John Winston '70
Smith, Thomas Murray '72
Taylor, Mark Edward '74
Toliver, Christopher M. '74
Washburn, John Robert '69
Weber, Michael Frederick '78
Ye, Eric Thomas '84
Zuk, David Michael '70

MI Δ Caste, Richard Alan '68
Dauerer, Walter Peter '60
Elward, Bob M. '75
Kaunelis, Pranciskus S. '69
Marino, Joseph Anthony '72
Minnich, Katherine Patricia '78
Rutkowski, Paul John '69
Zinger, David Francis '71

MI E Durisin, Michael John '81
King, James Bartholomew '65
Mertz Jr., Harold J. '61
Mutzelburg, Ronald Edward '68
Pogats, Russel Jay '92
Siepierski, Michael Anthony '80
Zickafoose, Michael Wayne '97

MI Z Foraker Jr., David Ernest '58
Haines, John Gregory '72
Lachele, Roger Eric '75
McEwen, Stephen N. '54
Reardon, Robert Warren '74
Scarlatelli, Michael George '76
Wozniak, Curtis Steven '78

MI H Harder, Shawn Jay '80
Johnston, Richard '78

MI K Seymour Jr., Richard L. '97
Sikkenga, Chad Douglas '98

MN A Bakke, Mark Alan '88
Braaten, David Laverne '75
Halladay, Henry Earnest '64
Holm, John David '62
Larson, Michael Lane '59
McLeod, Gary Wayne '70
Petrich, Gale Sean '86
Schwantz, Gary Lynn '73
Severson, John Albert '72

MS A Barnett, Kerney Luther '71
Gelman, Stephen '73
Hibbard, Janet C. '86
Hibbard, Michael Joseph '78
Linder, Richard A. '57
McKay Jr., Frank Fay '60
Mills, Marvin Leon '65
Siler, Raymond David '83
Tyner, Fred Mack '93
Yates, Karen '73

MS B Miles Jr., John Hubert '71

MO A Crabbe, Emmanuel F. '81
Donaldson, Albert L. '75
Gardner, Roger William '63
Haferkamp, Jeffrey John '76
Hamblin, Steven Hugh '71
Henderson, Betsy Anderson '84
Hibner, Dale Vern '74
Hutchinson, Darrell Byrd '74
Myles, Thomas Daniel '82
Stiefermann, Michael C. '86
Younker, Ronald Lee '71

MO B Arnoldy, Richard Raymond '69
Bodenhamer, Steven D. '75
Bondi, James Oliver '71
Boston, Lawrence Allan '60
Ernest, Terry Lee '82
Feurer, John Alphanse '70
Hardebeck, Harry Elmer '57
Jenkins, Glenn Willard '59
McJimsey, Edward Clair '71
Myers, Kenneth Raymond '72
Stevens II, Oramel Dale '72

MO Γ Dyson, Karen Anne '80
Dyson, Peter Bernard '80
Fisher, John William '56
Gatley, William Stuart '56
Salman, Naif Diab '56

MT A Courville, George Eugene '59
Egeland, Monte Dean '81
Jellison, Gabe Lee '98
Kolb, Robert C. '61
MacKin, Peter '81
Sen, Banasri '81
Whitcomb, David L. '64

MT B McDonnell, Kathleen Gayel '83

NE A Claar, Stephen Beryl '73
Criswell, Marvin Eugene '65
Langford, Susan Kathleen '90
Paxton, William Glenn '87
Shanmugam, Alagappan '83
Stransky, David Wayne '92

NV A Jones, Keith Alan '85

NH A Charron, Ronald Harvey '64
Scharfe, Alan Charles '78

NH B Price, Alexander Daniel '05

NJ A Allen, Samuel Miller '70
Denzer Jr., George Charles '61
Ehrhardt, William C. '68
Hoyt III, John George '76
MacMillan Jr., Duncan J.S. '66
Murphy, Kevin Jay '78
Schell, Robert Dallas '74
Sussmann, Kenneth Philip '72
Tensfeldt, Thomas George '81
Tompetrini, Kenneth Frank '65
Waricka, Peter Thomas '71

NJ B Babb, John Everett '71
Herrmann, Eric Peter '69
Palko, John Raymond '69
Pu, Chaohui Andrew '90
Renkart, Brandon M. '08
Tanner, Bob Brand '64
Wollmann, Norman P. '81
York, Brian J. '82

NJ Γ Andrus, James '02
Castaldi, Frank James '69
Cordes, Robert Gerhardt '48
De Caprio, Vincent '72
DeWaal, Johannes '70
Gagliardo, Reginald Saverio '70
Gittes, Marvin Steven '63
Goodrich Jr., Robert R. '70
Husson III, Matthew A. '66
Kobylarz, Thaddeus John '58
Morgan, Dennis Ross '68
Padgett, Richard J. '72
Rij, Jerry Jerome '72
Vandemeulebroeke, Leon C. '89
Zygo, John Peter '70

NJ Δ Lisle Jr., Thomas K. '69
Stern, Hal Lawrence '84

Downing Club
Eamon F. Walsh
MA Β '03
Excellence in engineering is needed now more than ever, glad to support the organization.

Downing Club
Marla A. Peterson
AZ Α '83
It is a privilege to give back to ΤΒΠ a piece of what it has done for my life. What a great way to honor an amazing organization and engineers.

Downing Club continued

Whitesides Jr., Lawson E. '68
Wolff, Richard John '72

NM Α
Bradt, David Jay '81
James, Jonathan C. '97

NM Β
Andrews, Mark Jay '91
Busch, Robert Douglas '72
Farber, Martin John '75

NM Γ
Bonjorni, Daniel Louis '90
Gollmer, Nicholas Alan '95

NY Α
Morgan, Thomas Arthur '78
Silbert, Glenn Richard '75

NY Β
Bickley, Thomas Duane '78
Leader, Margaret Ellen '85
Monson, John Arthur '58
Smolowitz, Matthew Michael '80
Spearot, James Anthony '67

NY Γ
Blakeman II, Robert Denis '89
Brown Jr., Alfred Winsor '66
Bruch, Charles Gregory '59
Diefenbacher, Robert Henry '59
Dupier, Dennis George '61
Hirschman, Gordon Bradley '78
Husmann, Donald '52
Ives, Jon Robert '61
Joyce, Michael Edward '82
Lewandowski, Michael '96
Lyden, Michael Joseph '78
Natale, Michael Robert '02
Staudinger, James Robert '77
Walczak, Dennis James '76
Walter, Buff Arthur '60
Weader II, Richard Jerome '64
Weinberg, Richard Sheldon '81

NY Δ
Carino, Nicholas Joseph '69
Elko, Michael Joseph '89
Funke, Richard Harrison '71
Heineman, Duane Thayer '58
Hodgson Jr., Edward W. '68
Hui, Eric C. '90
Kahn, Mindy S. '89
Lampell, David Mark '73
Logan, Joseph Skinner '56
Reth, Thomas Bernard '64
Sasso, Joseph Allen '70
Thomson Jr., James Bruce '68
Winkle, Roger Allan '67

NY Ε
Febesh, Melvin '47
Hendrickson, John Laurence '71
Koehler, George Richard '63
McConnell, Donald Patrick '71
Niebanck, Charles F. '54
Pinnes, Edward Lawrence '71
Rosen, Fredric Kenneth '62
Weinig, Shelly '51

NY Ζ
Choma, Peter '73
Gersten, Marvin Charles '60
Labianca, Frank M. '61
Parisse, Richard F. '61
Sindel, Fred Hans '59
Young, Raymond Joseph '74

NY Η
Beron, Michael '71
Kern, Frank John '70
Lauer, Spencer David '67
Minton, Evelyn Ann '73
Valcourt, Jean-Mary K. '85

NY Θ
Godlove, Katie Ann '02
Grubb, Michael Alan '78
Lester, John Welch '52
McKenney, John Lee '62
Meyer, Bruce George '69
Newman, Mitchell James '81

NY Ι
Cassella, Judith Ann '71
Schwartz, Richard '57
Weinberg, Aaron '69

NY Κ
Ablowitz, Mark Jay '67
Alcaro, Domenic John '87
Hinshaw, David John '86
Hutchings, Donald Whitney '61
Isaacson, Morton Sanford '66

NY Λ
Fillo, John Paul '74
Killeen, Michael James '73
Silverman, Joel Stuart '74
Widmann, Bradley Howard '69

NY Μ
Hansen, Jean Marshall '77
Rest, George B. '75
Wilcox, Robert E. '73

NY Ν
Darroch, Michael Edward '84
Davis, James Steven '70
Feldman, Scott '75
Gluszak, Timothy John '88
Havas, Donald William '67
MacNeil, Randall Lewis '69
Mann, Michael '77
Morris, George Craig '63
Tabaczynski, Rodney John '66
Theoclitus, David Thomas '86

NY Ξ
Defelice, Nicholas James '77
Deierlein, Charles '82
Glynn, Sean Francis '97
Haller, Marc Frederick '85
Machuca, Luis Arthur '69
Mathews, Joseph Raymond '81
Mohan, Anne Elizabeth '09
Mohan, Marguerite Anne '04
Snyder, William Joseph '81
Steinle, Kathleen Susan '77
Storch, Florian Joseph '61

NY Ο
Imbrogno, Christina '14
Imbrogno, Joseph Michael '12
Putnims, Zigmunds Andis '78
Venezia, Frank Bennett '90

NY Π
DeVoe, Charles George '76
Drexel, Peter George '69
Howles, Douglas '76
Kaemmerlen III, John T. '76
Shakshober, Douglas John '85

NY Ρ
Abreo, Leslie Anthony '97
McBrien, William J. '87
Roldan, Mark Joseph '85
Wong, Wai Kin '85

NY Τ
Chacko, Vinny James '09
Torres, Peter '02

NC Α
Bailey Jr., Charles Richards '73
Burkart, Alex Raymond '72
Capps, Dickson Michael '75
Karesh, Lewis James '81
MacHnik, Nicholas Jan '76
Poindexter, Richard Clinton '64
Redano, Richard '78
Shelton, Monty Lee '84
Skinner, James Orville '73
White, Samuel Ernest '69
Wynegar, Kathleen M. '86
Younts III, William Ernest '79

NC Γ
Bullard, John Carson '47
Chambers, William Forrest '60
Farst, Douglas Edson '79
Moulton, Paul Rush '80
Powell, Bayard Lowery '76

NC Δ
Huneycutt, Horace Glenn '82

ND Α
Jacobsen, John W. '69
McLaughlin, Jenny Louise '84
Mittelsteadt, Steven James '81
Sauvageau, Donald Richard '70
Unzelman, Louis Richard '69

ND Β
Dehen Jr., James John '80
Jesh, Mark Steven '86

OH Α
Fernbacher, John Matthew '62
Honious, Robert Todd '89
Kirkland, Earl J. '75
Koch, Carl Conrad '59
Schuerger, Thomas Robert '50
Weddell, James Kenneth '76
Zeis, John Frederick '62

OH Β
Bulcher, Thomas J. '76
Burger III, George Dean '68
Dobashi, Harry Hideo '68
Fazzoni, Gregory Francis '76
McCarthy, Martin David '70
McCune, Larry Clinton '63
Nair, Suresh Neelakantan '83
Ruebusch, Robert Joseph '70
Shields, John L. '75
Smelser, Ronald Eugene '71

OH Γ
Au, Ralph Daniel '71
Bouman, Robert William '60
Carr, Stephen J. '70
Del Tosto Jr., Joseph J. '87
Del Tosto, Judith M. '87
Frey, Mary Ellen '89
Hohman, Charles Maurice '67
Kirner-Pribe, Susan M. '85
Magee, John V. '81
Mendelsohn, Richard H. '71
Nodes, Scott Everett '84
O'Neal, Joe Edward '55
Pierce, William Sellers '55
Riedel, Nelson Andrew '67
Stephenoff, Mark Stephens '79
Verner, William James '58
Zeller, Hugh James '66

OH Δ
Felice, Conrad William '79
†Hild Jr., Wilbur Henry '64
Nussbaum, Lael Edward '68

OH Ε
Cull, Ronald Carl '70
Derkaschenko, Alex '74
Egger, Robert Allen '85
Kubinec, William Richard '67
Nock, Jeffrey Edward '80

OH Ζ
Allman, Susan Jane '85
Babula, Maria '89
Busbey, Bruce C. '84
Herman, Madison Rachelle '13
Johnston, David Allen '79
Spicer, Alvin L. '67

OH Η
Breuder, Andrew Joseph '70
Duvall, David John '88
Hager, Douglas Scot '85
Kohlhaas, Richard L. '62
Menna, Richard Joseph '62
Nelson, James Ralph '65
Schmoll, Joseph Herman '81
Van Veldhuizen, David Allen '99
Wolfe, Stephen A. '85

OH Θ
Luhan, John Bernard '70
McEldowney, Ralph A. '87
Sink Jr., Robert Dean '87
Unverferth, R. S. '74
Usleman, Robert T. '71
Walter, Kenneth Leo '63

OH Ι
Johnson, Scott D. '76
Schilling Jr., Walter William '97

Alumni Giving

Downing Club continued

OH Κ Brattoli, Mark A. '79
Dudek, Scott Andrew '90
Duffy, Stephen Francis '78
Krause, Leonard Edward '76
Paridon, Charles Albert '81
OH Λ Gwin, Russel Willis '85
Hallochak, Andrew John '77
Murphy, Charles James '77
OK Α Bastron, Victor Christian '66
Brown, Leslie Wray '70
Lampl, Maurice Bernard '89
Norris, Thomas Gilbert '56
OK Β Blais, Roger N. '66
Perrault Jr., John Edward '75
Schmude, Donald Jude '86
OK Γ Dean, Philip Maxwell '74
Diggs, Robert Allen '74
Sneed Jr., Elbert Lee '79
OR Α Anderson, Joseph Russell '66
Andresen, Kenneth Wayne '53
King, Warren Edward '69
Marsa, Arnold Ray '49
Miller, Mark Wade '89
Stranahan, Chapman Arthur '65
Wilt, Jay N. '74
OR Β Buchanan, Marlowe James '92
PA Α Barndt, Ronald LaMar '58
Brownlie, Thomas John '71
Clegg Jr., Lee Milton '59
Fowler Jr., W. Beall '59
Galella, Nancy Marie '85
Greer, Carl Crawford '62
Haist, Randall Matthew '80
Hjorth, Beverly Ellen '79
Hopkins, Richard Henry '63
†Parks, William Frank '60
Parsons Jr., Donald Francis '70
Ring, Robert Brex '55
Talhelm, Donald Lee '59
Vogel, Stephen Martin '61
Vosseller, Kenneth Franklyn '62
Wentzel, Alan Ray '75
PA Β Andrichak, Stephen Michael '58
Best, William Joseph '80
Bradt, Andrea '76
Ciuca, James Allen '72
Gasda, David Charles '70
Matthias, Tracey Dawn '89
Mayers, Douglas L. '74
McNair Jr., Irving Maxwell '54
Olinick, Stephen Andrew '71
Orosz, Matthew P. '02
Ross, David Stanley '69
Weston, Matthew Wayne '93
PA Γ Helfer Jr., Arleigh Pritchard '67
Kuhr, Tina Michelle '81
PA Δ Hoffer, Norman K A '81
Sheker, Robert E. '91
Sokal, Allen M. '68
Turner, Michael Bryan '89
PA Ε Batdorf, Harold Ansel '70
Boyles, Bruce William '76
Guest, Frederick Charles '59
Hagadorn, Hubert William '59
Smith, Richard Phillip '77
Stephens, David G. '59
Stratton, Carl William '81
PA Ζ Anderson, John A. '79
Chatman, William Charles '52
Hill Jr., Albert Meredith '67
Marks, Maury Ivan '57
Anonymous '84
PA Η Brouse, Eric Logan '67
Gilman, Thomas Carter '66
Stiger, David Laverne '83
Swartz, William Ewing '54
PA Θ Braun, James Francis '84
Caggiano, Nicholas Joseph '78
Corradino, Joseph Carmen '65
Lombardi, Charles G. '65
Reitmeier, Glenn Arthur '77
Ryan III, Arthur Peter '65
Salvo, John P. '56
PA Ι Dehoff, Gregg Alan '86
Haigh, Bruce Whittemore '71
Schoenberger, Lewis Robert '84
PA Κ Beseler, Jan W. '88
PA Λ Blackburn, Thomas Andrew '82
Fitzpatrick, Anthony Ryan '03
Hovanec, Andrew Stephen '58
Kulik, David Benedict '83
Musselman, Thomas Andrew '73
Schurko, Robert John '78
RI Α Biddle, Justin Miller '56
Campbell, Neal Stone '68
RI Β Adamedes, Zoe '84
Brady III, William James '80
Fletcher, Gilbert Alan '68
Hurdis, David Albert '62
James, Charles Franklin '58
Karnes, Jeffrey S. '80
Newman Jr., David B. '70
Smith, Robert Alan '83
Verrier, Donald Charles '54
SC Α Brown, David A. '66
Curlee III, Thomas Oscar '64
Davenport Jr., Charles F. '79
Harmon, Leon Carroll '71
Hunter, James Richard '85
Prothro, Joseph E. '63
Scherer, John Harry '65
Snider, Eric H. '75
SC Β Bradey, Jeffery Ervin '85
Feldmann, Andrew Russell '89
Haggerty, N. Kent '72
Hidlay, Charlene Marie '96
Pappas, Alexandros A. '71
Skvoretz, Jonathan Maxwell '95
Van Zee, John William '75
Wilson, Samuel Scott '91
SC Γ Gooley, Thomas Joseph '55
Kelly, Robert Thomas '86
SD Α Beacom, E. Kevin '82
Berggren, Mark Harry '76
Brass, Lorin Lee '75
Byg, Jerald Norman '72
Koistinen, Jerome Harold '05
Stark-Kasley, Lori Ann '82
SD Β Bocklund, Lori Sue '83
TN Α Armentrout, Daryl Ralph '65
Ayers, William Ralph '80
Bowden, Bryant Baird '68
Bowers, Bob '68
†Broome, Joseph Carroll '65
Cashion, Gregory Lee '79
Cavender, James Milton '66
Chambers, George Philip '58
Cook Jr., Joseph Campbell '65
Ellis, Jeffrey Thomas '93
Hickman, Charles Edward '57
Hitch, Benjamin Franklin '67
Hunt, Roy Joe '67
Jenkins, Alvin Leigh '61
King, Gregory T. '93
Lowe, Robert Alexander '70
Miller, Freddy M. '79
Mossman, David Charles '67
Oliver, Edward Earl '66
Peugeot, Richard Scott '60
Shoemaker Jr., John E. '67
St Clair, Edward Garland '70
Ward, Joanne Schaich '81
Williamson, James Moore '79
Zimmerman, James L. '58
TN Β Brown, Kevin George '85
Burnett Jr., Wilton Wright '67
Convery, Thomas Patrick '02
Green Jr., Thomas Bagley '75
Johnston, Stephen J. '76
Macchio, Gregory John '84
Petersen, Eric Scott '84
Petersen, Stephanie Anne '84
Pulley, Debra Domino '78
TN Γ Badiru, Adedeji B. '79
Buell, Phillip Ray '95
Crawford Jr., Walter Keith '62
Dooley, Joseph Brooks '70
McDonald, Gary Haywood '77
Moyers, Robert Lewis '05
Murphy, Fred Anthony '71
Perkins, William Samuel '54
TX Α Angel-Jaramillo, Danilo '61
Badgwell, Thomas Alan '92
Caudle, Brian Hall '77
Damek, Herman Andrew '97
Dodge, Nathan B. '68
Hogan, David William '69
Horton, Larry Earl '83
Huang, Lawrence Peter '81
Kopecky, Johnny Anthony '65
Le Bleu, Robin Boyce '65
Matlock, John Hudson '67
Meers, Steven Wayne '72
Stanbery, Sam R. '64
White, Karen Leigh '84
Whitesides Jr., John Lindsey '65
Wong, Lucas '84
TX Β Boyd, Joseph Gregory '76
Boyd, Suzanna Ruth '81
Johnson, Mark Sheldon '74
Marasco, David Foster '87
Moss, Michael William '83
Schacht, John Paul '63
Smith, David Lewis '71
Uher, Edward L. '65
TX Γ Cox, Bill E. '76
Fisher, John David '70
Hagler, Marion Otho '63
Horn, Kenneth Porter '61
Johnson, Terry Robert '55
Larkins, Robert Pruett '56
Lucas, Raymond David '60
Money, Lloyd Jean '42
TX Δ Brittan, Charles Laury '65
Caso, Gregory Scott '87
Cox, Ralph Frank '54
Crosser, Robert Earl '50
Franke III, Henry Gerhart '77
Johnson, Vance Clay '78
Jordan, Kirk Gerald '80
Kasch, Vernon Ray '73
Linn, William Ray '81
McCord, Jimmy Delwyn '70
Mitchell, Melvin M. '52

Murthy, Prahlad N. '92
Newton, Philip Lynn '67
Perkins, Thomas Keeble '52
Schwierzke Jr., Perry Julius '60
Simpson, Stancy Jean '79
Spahn, Rex Lee '80
Sturrock, John Michael '72
TX Ε Herrmann, Edwin Peter '67
Martin, Samuel Ray '83
Lim-Smith, Yee Lan '82
Smith, Kevin George '81
TX Η Brewster, William Howard '94
Godwin, Albert Eugene '84
Potvin, Alfred Raoul '64
Schaeper, Wilfred H. '76
Williams, Larry Donal '80
TX Θ Fong, Keith Batchelor '88
Fong, Maria D. '91
Putnam, Judd Lee '73
Van Landingham, David J. '74
Van Reet, Leo Joseph '70
TX Κ Davis Jr., Hulen Mack '80
Davis, Pamela Walker '79
TX Λ Carter, Jason Oliver '87
Carter, Norhanani '87
Garcia, Danny '85
Perez, Romeo Rene '82
Wallace, Weldon Lee '74
UT Α Carn, Ronald M. '72
UT Β Craig, Donald Dean '82
DeCarlo, Armondo '95
Enke, Glen Graham '62
Hardy, Mark Douglas '84
Hart, Robert Evan '73
Thompson, James Rowley '76
VT Α Goddard, Eric Hapenny '86
VT Β Berkman, Richard Lewis '69
Clark, David Thomas '81
Dekalb, Shawn Wayne '85
Henry, Thomas Arthur '70
VA Α Anderson, Willie Corevis '75
Ashton, Michael Duane '74
Barrell, Charles Davidson '70
Colonna, James Lewis '65
Conway Jr., George Franklyn '70
DeYoung, John Howie '99
Evans, Gary Kyle '77
Forziati Jr., Kenneth Thomas '92
Ginader, Kenneth Lee '76
VA Β Cassell II, Ray Vaugn '88
Dalton Jr., Eddie Gene '86
Doughty, Gary Springer '77
Long, David A. '91
Michelson, Darlene Sue '86
Ray II, Robert E. L. '74
Reading, Christopher Russell '00
Sloan, Forrest Eugene '83
Snidow III, Lyle Christian '74
Wayne, Jennifer Susan '83
VA Γ Carlson, Diana Lu Weaver '91
McGowan, David Michael '89
Rausch, Leonard Earl '80
Wood, Travis B. '83
VA Δ Bunch Jr., Jennings B. '50
WA Α Bullock, Dennis Eugene '76
Chandler, Alan Scott '77
Follett, Mark Samuel '74
Matteson, James Harris '66
McNees, Jackson Lowry '68
Orr, Peter Courtenay '71
Reichel, Jerel Dave '66
Rising, Jerry Joseph '61
Rosen, Donald George '58
Schwam, Susan Elaine '88
Smith, Jeffrey Francis '82
WA Β Aaserude, Robert Gerald '84
Groat, J. Everett '94
Hartup Jr., John Dewey '50
Hudspeth, James Charles '88
Langley, Duane Douglass '55
Simon, Terry William '68
Turi, Michael Allen '07
Washburn, Arthur King '67
WA Δ Burton, Brian Carver '97
WV Α Amrhein-Cain, Wendy Ann '94
Bibbee, Dennis Evans '75
Boggs, Mark Steven '80
Engle, Geoffrey Stuart '94
Fleischer, Charles John '70
King, Staci Renee '96
Koval, John Stephen '78
Napier, Richard Stephen '71
Rowe Jr., Eldridge Eugene '68
Tompkins, Joseph Andrew '77
WV Β Stevens, Ellen Weber '84
WI Α Berman, Neil Sheldon '55
Diedrich, Donald Leo '69
Goehring, Henry G. '57
Guelker, Eric James '90
Martell, Donald Louis '60
Nesbitt, John David '82
Page, Chris Scott '90
Przedpelski, Zygmunt '53
Sieker, Frederick A. '70
Thomas, Richard H. '63
Yuen, David P-K '73
WI Β Lugthart, Cornell William '51
Petrie, Dennis James '78
Smith, Thomas M. '60
Swiontek, Thomas John '69
Wick, Paula M. '81
Wolf, Thomas Francis '59
WI Δ Gerloff, James Robert '00
WY Α Fassett, Jeff W. '74
Lester, Roger N. '87
Worden II, James B. '77

Spring Problems: Brain Ticklers

Continued from page 23

BONUS: Syzygy The planets' orbits are circular and have orbital periods of 3, 5, and 7 Earth years, respectively. The planets and the sun are currently collinear. Not counting their present state, how many times in the next 105 Earth years will the three planets be collinear (not necessarily collinear with the sun)?

—*FiveThirtyEight.com*

COMPUTER BONUS

Consider all ten-digit integers composed of the digits 0 through 9 each used exactly once, such that the first five digits are all odd and the last five digits are all even. Of these numbers, find the one that is closest to being a perfect square, that is, find N such that $|N - \text{round}(\sqrt{N})^2|$ is a minimum. For example, 1,357,902,468 differs from a perfect square by $|1{,}357{,}902{,}468 - 36{,}850^2| = 20{,}032$, but this is not the smallest difference.

—**Don A. Dechman,** *TX Α '57*

Email your answers (plain text only) to any or all of the Spring Brain Ticklers to *BrainTicklers@tbp.org* or by postal mail to **Dylan Lane, Tau Beta Pi, P.O. Box 2697, Knoxville, TN 37901-2697**. The method of solution is not necessary. The Computer Bonus is not graded. Where possible, exact answers are preferable to approximations. The cutoff date for entries to the Spring column is the appearance of the Summer *Bent* which typically arrives in mid-June (the digital distribution is several days earlier). We welcome any interesting problems that might be suitable for the column. Dylan will forward your entries to the judges who are **F.J. Tydeman,** *CA Δ '73;* **J.C. Rasbold,** *OH Α '83;* **J.R. Stribling,** *CA Α '92;* and the columnist for this issue,

— **G.M. Gerken,** *CA Η '11*

ASSOCIATION BRIEFS

Members of the Milwaukee Area Alumni Chapter on the court at Fiserv Forum.

Southeastern Michigan Alumni Chapter members on the ice at Detroit Curling Club.

ALUMNI ACTIVITY:

MILWAUKEE AREA (WI) ALUMNI CHAPTER

On Saturday, November 13, members of the Milwaukee Area Alumni Chapter hosted a tour of the Fiserv Forum, home of the 2020-21 NBA Champions Milwaukee Bucks.

Tau Bates include: (left to right), **Teresa J. Hutton,** *WI B '91*; **Kelley Korinek,** *WI A '16*; **Carmen I. Daoud,** *WI A '20*; **Tim R. Biggin,** *WI E '13*; **Paul G. Saari,** *WI Γ '17*; and **Elizabeth A. Wendt,** *WI Γ '11*.

Thanks to **Teresa J. Hutton** for the image. Contact the chapter at: *MilwaukeeAC@tbp.org*.

ALUMNI ACTIVITY:

SOUTHEASTERN MICHIGAN ALUMNI CHAPTER (SEMIAC)

In late November, members of the SEMIAC hosted a "learn to curl" event at the Detroit Curling Club.

More than 15 Tau Bates were present for the fun and informative social event, including 2022 TBΠ Executive Council Secretary **Michael L. Peterson,** *IA A '89*.

Thanks to **Melissa R. Wrobel**, Ph.D., *MI E '17*, for taking the photo. Contact the chapter at: *tbp.semiacl@gmail.com*.

On November 30, the Great Smoky Mountains Alumni Chapter (GSMAC) participated in Toy Tech 2021, an event organized by Spark and Knox Makers. Toys that are not necessarily functional for children with disabilities were switch-adapted for use by children of all ability levels.

Our thanks to GSMAC officer **Terry D. Olberding**, *TN A '78*, (above) for sharing this info. Contact the chapter at: *GSMAC@tbp.org*.

JOIN AN ALUMNI CHAPTER AND EVEN BECOME AN OFFICER!

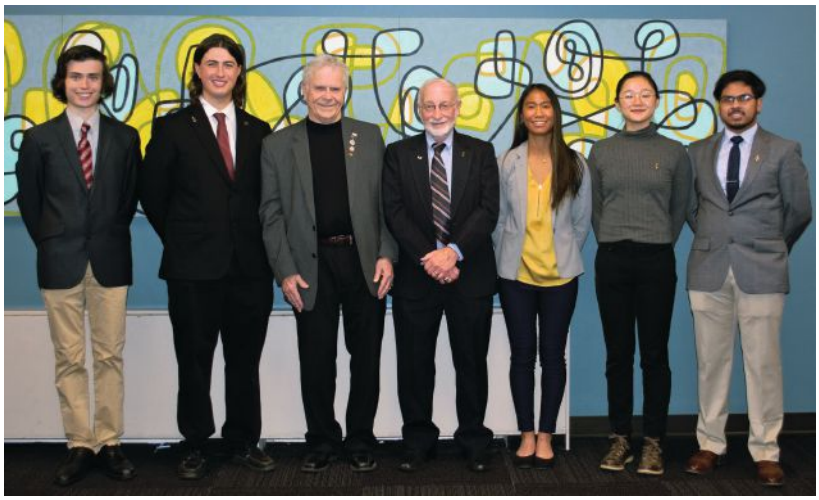
Tricia E. Gomulinski, *SD A '98*, Director of Alumni Affairs, works as a software/IT project manager for Teledyne Brown Engineering in Knoxville. Visit: www.tbp.org/?ACcontact or, contact tricia@tbp.org, to discuss participating with a chapter near you.

VIRGINIA TECH HOLDS IN-PERSON INITIATION:

The Virginia Beta Chapter held an in-person initiation ceremony on November 11, 2021, for 20 engineering students and eminent engineer, **Homer Hickam Jr.,** *VA B '64*. This was a welcome change after two years of virtual initiation ceremonies due to the pandemic. Candidates earned their spots by fulfilling academic, service, social, and general initiation requirements. Offering a combination of virtual and in-person events promoted engagement and retention. Adaptability was critical for both candidates and the officer team to ensure a safe and successful initiation process for all.

Hickam is a proud Virginia Tech alumnus who graduated in 1964 with a bachelor's degree in industrial engineering. A U.S. Army veteran, he served in Vietnam where he was awarded the U.S. Army Commendation and Bronze Star medals. Hickam has worked at U.S. Army Missile Command and NASA and is also a best-selling author. After the ceremony, he held a private book signing where Tau Bates could purchase some of his most notable memoirs, *Rocket Boys* and *Don't Blow Yourself Up*. Successful orchestration of the ceremony was largely due to collaboration between VA Beta Chapter officers and District 4 Director **Russ Werneth,** *MD B '64*. The officer team is looking forward to in-person initiation ceremonies in the future.

Thanks to **Julia E. Pimentel**, *VA B '22*, and **Arinjoy Basak**, *VA B '21*, for this write-up and image.



Left to Right: Justin Hartman (service chair), Travis Bowman (president), Homer Hickam Jr., Russ Werneth, Julia Pimentel (vice president), Candy Li (academic & corporate affairs chair), and Arinjoy Basak (webmaster).

STAY CONNECTED
ON SOCIAL MEDIA

Follow us on social media and tag us, so we can see your ΤΒΠ images using **#taubetapi**.

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Association Vision, Mission & Strategic Goals!

Updated in 2021 by the ΤΒΠ Executive Council:

OUR VISION: Tau Beta Pi is universally recognized as the preeminent engineering honor society that students of all engineering disciplines strive to join.

OUR MISSION: As the only academic honor society that confers recognition on eligible individuals from all engineering disciplines, Tau Beta Pi:

- Recognizes those who have conferred honor upon their Alma Maters by distinguished scholarship and exemplary character as students in engineering, or by their attainments as alumni in the field of engineering;
- Provides leadership and professional development training for engineering students and alumni members;
- Promotes lifelong alumnus member involvement.

STRATEGIC GOAL AREAS:

- Enhance Image, Visibility, and Branding
- Strengthen Finances and Fundraising
- Advance Collaborative Member Engagement
- Provide Relevant & Recognized Leadership and Professional Development
- Develop Organizational Process of the Association
- Improve Chapter Support and Operations

ALUMNI NOTES

Your fellow Tau Bates are interested in news about **you.**

ALABAMA ALPHA '82

Gerald L. Pouncey Jr.

Gerald was honored as a Distinguished Auburn Engineer by the Auburn Alumni Engineering Council for his exemplary professional career. He serves as chairman, senior partner, and heads the environmental & infrastructure practices at Morris, Manning and Martin LLP. His B.S. degree is in ChemE.

COLORADO ZETA '99

Lt. Col. Raja J. Chari USAF

Raja is an Indian American astronaut and the first rookie to command a NASA space mission since the final crew blasted off to the Skylab space station in 1973. The SpaceX Crew-3 Dragon capsule docked with ISS in November and will return in April. Raja has also been selected for NASA's Artemis corps.

FLORIDA ZETA '87

Lonnie J. Price

Lonnie has joined Peraton as VP, cyber and mission security. Most recently, he was deputy assistant secretary of cyber and technology security directorate for the U.S. Dept. of State where he oversaw planning and implementation of the technology innovation and cybersecurity programs. His B.S. is in electrical eng'g.

IOWA ALPHA '83

Ben H. Thacker Ph.D., P.E.

Ben was named vice president of Southwest Research Institute's mechanical engineering division, previously served as executive director of the division's materials & fluids departments, and was a key contributor to NASA's probabilistic structural analysis methods for select space propulsion system project.

LOUISIANA ALPHA '95

Stephen M. Moret Ed.D.

Stephen was selected as president and CEO of Strada Education Network, a nonprofit dedicated to increasing individuals' economic mobility. Since 2017, he's been president/CEO of Virginia Economic Development Partnership, formerly served as president/CEO of the Louisiana State Univ. Foundation, and has a B.S. in mechanical eng'g.

MASSACHUSETTS BETA '05

Robin M. Davis J.D.

Robin was promoted to Chief Investment Officer, U.S., for Woodsford, which provides tailored litigation financing solutions. She joined Woodsford in 2018 as a senior investment officer with expertise in patent infringement actions, earning a J.D. from Cornell, and a B.S. in materials science & engineering from MIT.

MISSISSIPPI BETA '16

Kristen Casey Baddley

Casey was enshrined into the Northwest Sports Hall of Fame class of 2021. She excelled in softball during her two years at Northwest and earned First Team MACJC and Region 23 honors. Her B.S. is in chemical eng'g from Ole Miss and she works as a rail program manager at The Chemours Company (TN).

NEW HAMPSHIRE ALPHA '15

Kayla N. Hadley P.E.

Kayla was one of five honored with the 2021 Environmental Business Council of New England, Inc.'s Ascending Leader Award. An engineer at Woodward & Curran Inc. since 2016, she earned a B.S. in environmental engineering from the University of New Hampshire, and served as NH Alpha Chapter VP.

NEW YORK TAU '13

Devan L. Tracy P.E.

Devan received the BOLD 10 Under 10 Award from Binghamton University, where she earned her B.S. in mechanical engineering. She is the Smart Buildings and Go Green associate manager for the rotary and mission systems division of Lockheed Martin. The award recognizes alumni for high career achievement.

OHIO ZETA '84

John K. Estell Ph.D.

John was recognized as a recipient of the 2021 ABET Fellow Award for sustained contributions in harmonization across commissions through service as a commissioner, for both computing and engineering commissions, as well as for service on the Accreditation Council Training Committee. He is a professor at Ohio Northern University.

Send items about civic activities, honors won, weddings, promotions, etc. to Tau Beta Pi, P.O. Box 2697, Knoxville, TN 37901-2697 or to media@tbp.org. Material for publication must be received by May 1 for the **Summer** issue and August 1 for the **Fall** issue. Include name, address, chapter/class year, and email address or phone number. Thank you!

OHIO IOTA '13

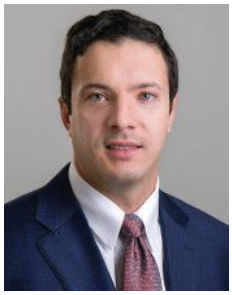
Courtney M. Schkurko

Courtney was selected to receive the 2021 William L. Robinson Young Alumni Award from Ohio Northern University (ONU). She serves as engineering project manager for NASA Glenn Research Center (OH), earned her B.S. degree in electrical engineering from ONU, and was a USA triathlete.

TENNESSEE ALPHA '94

Jerry L. Johnson

Jerry is a 2021 University of Tennessee Alumni Professional Achievement Award recipient. He is a partner at Halifax and formerly was a founding member, VP, and managing director at RLJ Equity Partners. His B.S. is in chemical engineering from UT and earned the Secretary of Defense Medal for exceptional public service as a White House Fellow.



VIRGINIA ALPHA '11

Matthew A. Albanese M.D.

Matthew has joined UBMD Orthopaedics & Sports Medicine (NY) as a hand and upper extremity surgeon. Previously at The University at Buffalo, he completed his hand and upper extremity fellowship and earned a B.S. degree in electrical engineering from the University of Virginia.

WASHINGTON GAMMA '97

Layne S. Hazama P.E.

Layne was selected as the Naval Facilities Engineering Systems Command Pacific Civilian Engineer of the Year for 2022 fiscal year. He is leader of the Dry Dock 3 replacement design branch at NAVFAC Pacific. He earned his civil engineering B.S. degree at Seattle University and is a licensed structural engineer in the state of Hawaii.

Dr. Porras and statue from her Instagram account. Other images are her crocheted creations.
www.instagram.com/anamaporras/

TEXAS ALPHA '11

Ana M. Porras Ph.D.

Ana joined the University of Florida (UF) in August of 2021 as an assistant professor. Previously, she was a Presidential Post-Doctoral Fellow at Cornell University.

Dr. Porras' renderings of micro-organisms have landed her a life-sized statue of herself in a Dallas park. The statue stands among a field of 3-D printed women in STEM in the #IfThenSheCan exhibit, designed to encourage girls to pursue STEM careers. In part because of her art outreach, Porras was selected as one of 125 AAAS IF/THEN ambassadors, which led to her inclusion in the exhibit.

She leads the Tissue-Microbe Interactions lab at UF, specialized in engineering in vitro models of disease to study human-microbe interactions. Ana is particularly interested in understanding how microbes interact with human extracellular matrix to drive disease in the contexts of the microbiome, global health, and infectious disease. She is also a science artist and an expert on inclusive multilingual science communication.

Ana earned a B.S. from the University of Texas at Austin and her Ph.D. from the University of Wisconsin-Madison, both in biomedical engineering.

TRUE TALES from the TESTBENCH...

Fellow engineers: the story you are about to read is *true*. Only the *names* have been changed to protect the guilty.

Words / Art:
Krishna M. Sadasivam
krishnadraws.com

DO YOU HAVE A TRUE AND HUMOROUS TALE FROM YOUR ENGINEERING EXPERIENCE TO SHARE?

It could be featured in the next True Tales from the Test Bench! Send your submissions for consideration to **dylan@tbp.org**.

Council's Corner *from page 2*

As conditions allow, we look forward to returning to meeting and interacting regularly in person and continuing plans and setting new goals for the future. In the meantime, stay safe and be well, and keep on excelling and leading in your fields.

MINGDE LIN is director, clinical research North America, at Visage Imaging, Inc. He is also an assistant professor adjunct at Yale University School of Medicine and serves as a CT Alpha Chapter Advisor and director of the Central Connecticut Alumni Chapter. Ming was elected to the ΤΒΠ Executive Council in 2021. His B.S. in biomedical engineering is from Rensselaer Polytechnic Institute and earned his Ph.D. from Duke University.

THE BENEFITS OF MEMBERSHIP

See the complete list at: **www.tbp.org/memb/benefits.cfm**

DELL: Discount program on Dell branded personal products, electronics, and accessories.

GEICO: Additional discounts on auto insurance. (Inside back cover)

LINKEDIN: Join 33,000 members in our official group for professional networking and career discussions (search: Tau Beta Pi Engineering Honor Society).

LOCAL HOSPITALITY: Access to a worldwide inventory of hotels at exclusively discounted rates.

PPI: 20 percent discount on professional licensing exam review materials (FE/EIT, PE, and more).

TAU BETA PI JOB BOARD: Post a resume online and browse hundreds of engineering jobs at top companies.

We need *YOU*, to write for *The Bent*

The Editors of *The Bent* are frequently searching for well-written, general interest feature articles for the magazine. Many of you have the appropriate experience, are qualified, and capable of preparing such a feature.

Manuscripts can be between 1,000-3,000 words, and should be double-spaced and submitted as a text or MS Word document. Publishing decisions cannot be guaranteed.

Email your proposal to **media@tbp.org.**

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