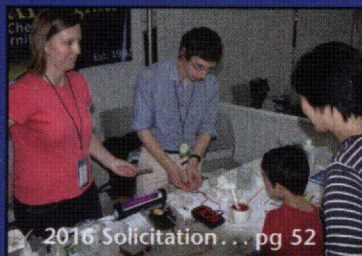




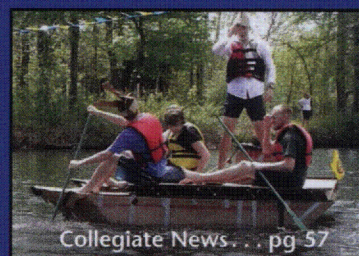
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FALL 2015

THE **HEXAGON**
of Alpha Chi Sigma

Rediscovering
The Rare Earths

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SUBMISSION DEADLINES

Spring (March)	January 1
Summer (June)	April 1
Fall (September)	July 1
Winter (December)	October 1

Chapters and groups: Send stories of events, and don't forget photos. Send contact information as well.
Alumni: Personal and professional news is always welcome.

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No Time to Rest!



Patrick J. Johanns, GR
 Alpha Theta 1981

"There is no time to rest on your laurels." This is the mantra of the National Office and the Supreme Council. The world is changing and so are we. We barely got settled into the new National Office when we tackled the project of updating the website. People surf the web on a variety of devices of different shapes, sizes and operating systems, and so our website needs to be informative and friendly to everyone. Our website was getting that dated look, and so our National Office staff, GMC Kip Nalley, and I tackled an overhaul of our website with the assistance of the experts at Blackbaud.

The new website has a fresh, clean look no matter what platform you are viewing it on. Thanks to a cadre of brothers who reviewed and interacted with test pages, we were able to use scientific methods. We have built a

more intuitive navigation system that will help you quickly find how to start a new collegiate or professional chapter, learn about outreach programs, ascertain the deadline for a report, or make a donation. You will find an interactive map to help you visualize the geographic locations of all of our chapters and acquire valuable information about each of those chapters. One of the primary goals was to use more imagery to show, instead of tell our messages. Another goal was to increase the traffic to and from the site from social media sites like LinkedIn and Facebook.

"We plan to keep up with the times."

The whole process started in January of 2015 with an introspective look at who we are and who was our audience for the website. The discussion of who we are led to discussions that led us to change the tagline for the Fraternity from "Professional in Chemistry" to the broader "Professional in the Chemical Sciences" which was felt to be more reflective of our membership and the expansion of the field. Consideration of who would visit our website identified five major groups: Collegiate members, Professional members, prospective members, the faculty and administration of schools to where we are expanding, and the general public. This focused our attention on how to ensure the website is pertinent to each of these groups. Finally, we will soon launch the site. Stay tuned!

Of course, after all this work if we are simply content to say, "Look! Here it is complete!" we would be making that "resting on the laurels" mistake. Keep coming back to the site to see what is new. We have committed staff time each week to develop more material. You can help us with that. Give us your feedback. Let us know what you or your chapters are doing. Tell us your stories. It is an exciting time in the Fraternity and the world and we plan on keeping up with the times.

What other changes can you expect to see in the future? Period newsletters are a dated form of communication. This fall, we plan on delivering the information that we had included in the *Chrome and Blue* in a more continuous fashion on Facebook and on the website. Enabling professional brothers to break up their annual contributions into small automatic monthly deductions from their credit cards is another step we are considering.

We can't do it alone. Please send your ideas, stories, and feedback to:
 National@alphachisigma.org.

On the Cover

The Mountain Pass rare earth ore body in Southern California, 86 km (54 mi) south-southwest of Las Vegas, Nevada, is one of the largest, richest, and most readily mineable rare earth deposits in the world (N35° 28.74 W115° 31.98). Its proven and probable reserves exceed 1.3 million metric tons of rare earth oxide (REO) equivalent contained in 18.4 million metric tons of ore with ~8% ore grade and a 5% cut-off grade. It contains all of the naturally occurring rare earth elements. Photo, courtesy of Molycorp, Inc.



The 53rd Biennial Conclave

in 2016 will be hosted at

Alpha Omega Chapter at Georgia Tech

Be on the lookout for more information!

Dear Brothers:

The distribution of the Fall Issue of *The HEXAGON* goes to all of the membership for whom we have mailing information (ca. 32,000 of you), while the other three issues are provided to collegiate members and contributors. I mention this for two reasons. First, you might actually be unaware that there are three other issues of *The HEXAGON* published, and second, this will motivate you to think about your solicitation letter when you receive it!

Yours in the Double Bond –GE

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The Objects of Alpha Chi Sigma

1. To bind its members with a tie of true and lasting friendship.
2. To strive for the advancement of chemistry both as a science and as a profession.
3. To aid its members by every honorable means in the attainment of their ambitions as chemists throughout their mortal lives.

Rediscovery of the Elements

The Rare Earths—The Beginnings



James L. Marshall, *Beta Eta* 1971, and Virginia R. Marshall, *Beta Eta* 2003, Department of Chemistry, University of North Texas, Denton, TX 76203-5070, jimm@unt.edu

PERIODIC TABLE OF THE ELEMENTS

1A	2A	3B	4B	5B	6B	7B	8B	1B	2B	3A	4A	5A	6A	7A	8A		
H 1															He 2		
Li 3	Be 4									B 5	C 6	N 7	O 8	F 9	Ne 10		
Na 11	Mg 12									Al 13	Si 14	P 15	S 16	Cl 17	Ar 18		
K 19	Ca 20	Sc 21	Ti 22	V 23	Cr 24	Mn 25	Fe 26	Co 27	Ni 28	Cu 29	Zn 30	Ga 31	Ge 32	As 33	Se 34	Br 35	Kr 36
Rb 37	Sr 38	Y 39	Zr 40	Nb 41	Mo 42	Tc 43	Ru 44	Rh 45	Pd 46	Ag 47	Cd 48	In 49	Sn 50	Sb 51	Te 52	I 53	Xe 54
Cs 55	Ba 56	La 57	Hf 72	Ta 73	W 74	Re 75	Os 76	Ir 77	Pt 78	Au 79	Hg 80	Tl 81	Pb 82	Bi 83	Po 84	At 85	Rn 86
Fr 87	Ra 88	Ac 89	Rf 104	Db 105	Sg 106	Bh 107	Hs 108	Mt 109	Ds 110	Rg 111	Cn 112	113	Fl 114	115	Lv 116	117	118
Lanthanides -		Ce 58	Pr 59	Nd 60	Pm 61	Sm 62	Eu 63	Gd 64	Tb 65	Dy 66	Ho 67	Er 68	Tm 69	Yb 70	Lu 71		
Actinides -		Th 90	Pa 91	U 92	Np 93	Pu 94	Am 95	Cm 96	Bk 97	Cf 98	Es 99	Fm 100	Mv 101	No 102	Lr 103		

Figure 1. The “rare earths” are defined by IUPAC as the 15 lanthanides (green) and the upper two elements of the Group III family (yellow). These elements have similar chemical properties and all can exhibit the +3 oxidation state by the loss of the highest three electrons (two s electrons and either a d or an f electron, depending upon the particular element). A few rare earths can exhibit other oxidation states as well; for example, cerium can lose four electrons— $4f^15d^16s^2$ —to attain the Ce^{+4} oxidation state.

Rare earths—introduction.¹ The rare earths include the 17 chemically similar elements occupying the f-block of the Periodic Table as well as the Group III chemical family (Figure 1). These elements include the 15 lanthanides (atomic numbers 57 through 71, lanthanum through lutetium), as well as scandium (atomic number 21) and yttrium (atomic number 39). The chemical similarity of the rare earths arises from a common ionic configuration of their valence electrons, as the filling f-orbitals are buried in an inner core and generally do not engage in bonding.

The term “rare earths” is a misnomer—these elements are not rare (except for radioactive promethium). They were named as such because they were found in unusual minerals, and because they were difficult to separate from one another by ordinary chemical manipulations.² In fact, except for promethium, the crustal abundance of any “rare earth” (ranging from 0.5 ppm for lutetium or thulium to 60 ppm for cerium) is greater than for silver (0.07 ppm). The most common rare earth (cerium) is more abundant than copper (55 ppm).

The importance of rare earths to modern technology cannot be overstated. Because of their unusual properties, rare earths are used in hundreds of modern applications as industrial chemical catalysts, electronic and communica-

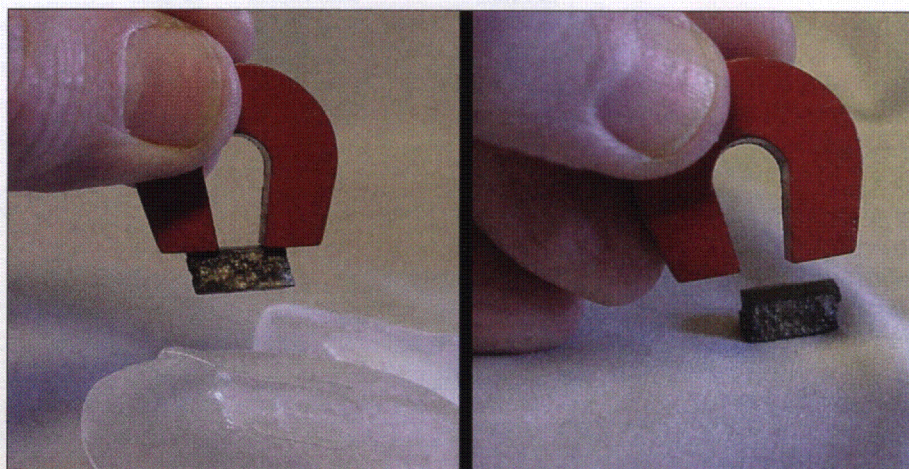


Figure 2. Metallic gadolinium is ferromagnetic at room temperature, with a Curie point of 19°C. In ice-water the metal is attracted by a magnet (left) but in warm water it loses its magnetism (right). This phenomenon was discovered¹¹ in 1935 by Georges Urbain (1872–1938), the co-discoverer of lutetium.* Demonstration by the authors in ACS tours.

tion devices, computers, phosphors in lighting sources, display screens, medical devices (MRI magnets), etc. In an automobile alone, rare

earths can be used in catalytic converters (cerium), permanent magnets (neodymium and samarium), electric sensors (yttrium), optical



Figure 3. The entrance to Molycorp, Inc.'s, Mountain Pass mine, CA (N35° 28.35 W115° 31.70). The view is north; the rim of the open-pit mine is on the horizon. (See the cover for an aerial view of the mine).



Figure 5. The entrance to the largest producer of rare earths, the Inner Mongolia Baotou plant, 8 km west of Baotou city center. The huge industrial complex is 560 km west of Beijing and can be identified on Google maps centered at N40° 39.38 E109° 44.70. Originally a steel production plant, Baotou Company entered the rare earth business in 1958. This rolling steppe was once a vast, beautiful grassland, but now is a toxic wasteland with atmospheric coal dust and sulfuric acid, and an infamous sludge lake clearly visible on Google maps (N40° 38.22 E109° 41.33). By the 1980s, leakage from the toxic lake (including thorium discharge into the Yellow River) was damaging five surrounding villages, resulting in their complete removal. Image reproduced with the kind permission of CBS News/"60 Minutes."⁴

displays (yttrium, europium, terbium), hybrid batteries (lanthanum), and electronic devices (gadolinium). A classic laboratory example of the unique properties of rare earths is the unusual Curie point of metallic gadolinium (Figure 2).

The main production centers of the rare earths. Until recently, the rare earth market was dominated by the United States (Mountain Pass, California). In the previous *HEXAGON* "Rediscovery" article,³ the authors visited the Borax Visitor Center and its associated mine in Southern California. If one then proceeds 144 miles eastward, one reaches Mountain Pass in the Clark Mountain Range, the highest point (4,730 feet) on Interstate 15 before reaching the Nevada border. Mountain Pass is the site of the Molycorp Inc. open-pit rare earth mine (see

cover). This mine (Figure 3) was once the world's largest provider of rare earths, and after a brief hiatus when it successfully worked to achieve mandates of the EPA, again became one of the world's major providers of the valuable commodity.

The major ore of the Mountain Pass mine is bastnäsite, a mineral with the formula (RE)(CO)₃F, where RE = rare earth (Figure 4). Geologically speaking, bastnäsite is not a "carbonate," which is laid down by a sedimentary process, commonly of organic origin, e.g., limestone, CaCO₃. Instead, the mineral is a "carbonatite," an igneous mineral produced in carbon dioxide-rich magmas.² Rare earth carbonatites are typically formed deep in the upper mantle, from which they are later uplifted to the surface of the earth. The process creating such surface exposures of rare earth carbonatites is quite



Figure 4. These are bastnäsite boulders lining the entrance road to Molycorp—the stones appear as reddish (RE)CO₃F crystals in a white matrix of calcite, dolomite, and barite. A check with a Geiger counter proved they were slightly radioactive, typical for a rare earth mineral. The composition for Mountain Pass bastnäsite is variable, but a rich sample procured by the authors showed a content (RE%) of La 32%, Ce 49%, Pr 4%, Nd 14%, Sm 0.5%, Gd 0.3%, Eu 0.1%, with ppm quantities of the remaining lanthanides (except promethium) and Sc and Y.

unusual, and rare earth mines are at a premium globally.

Recently, China has assumed a major role in the industrial production of rare earths, and this past year a presentation by CBS "60 Minutes" has described the U.S.'s concern of China's market dominance of such a strategic material.⁴ The major competitor to the Molycorp rare earth enterprise is the Bayan Obo Mining District of Inner Mongolia, China (N41° 46.97 E109° 58.42), whose bastnäsite ore is not processed on site (like Molycorp) but instead 130 kilometers south at Baotou (city center: N40° 39 E 109° 50), "China's rare earth capital"⁴ (Figure 5). Baotou is a city of some notoriety because of its industrial pollution.⁵ In particular, the "toxic nightmarish lake" into which the Baotou Steel Rare Earth (group) High-tech Company dumps its sludge has been vividly described.⁵

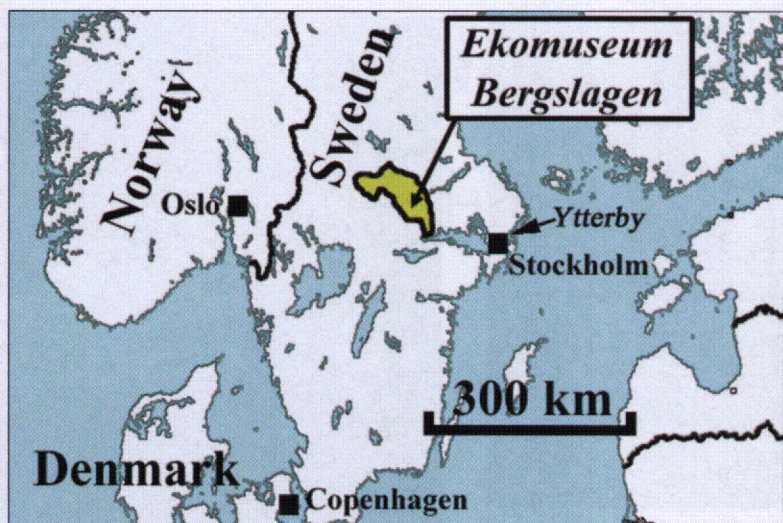


Figure 6. The two discovery sites of the first two rare earths (yttrium and cerium) were respectively the Ytterby Mine* near Stockholm, and the Bastnäs Mine near Riddarhyttan in the Ekomuseum Bergslagen, a region in the center of Sweden containing several national heritage sites.

Figure 7. The Ytterby mine (N59° 25.60 E18° 21.18) has been closed off, but the surrounding rock facing (right) is typical of the pegmatite geology of the area. Pegmatites have the same composition as granite—quartz, feldspar, and mica—but the crystals are larger (left). In pegmatite outcroppings in Sweden, frequently other minerals are found, such as the gadolinite (left) in which yttrium was originally found. Historically, the quartz and feldspar were mined for the porcelain industry. Directions to reach this mine have been previously published in the 2008 Spring HEXAGON.*



Figure 9. The entrance of the Bastnäs Mine. “Bast-näs” in Swedish means “Raffia-peninsula,” referring to the wetlands where raffia was collected in historic times and used to make baskets and even hardy skirts for hard labor. Today the wetlands about Bastnäs abound in wildflowers and strawberries and are visited by an occasional moose. The Bastnäs mine was originally an iron mine owned by Hisinger but later provided quantities of industrial cerium.

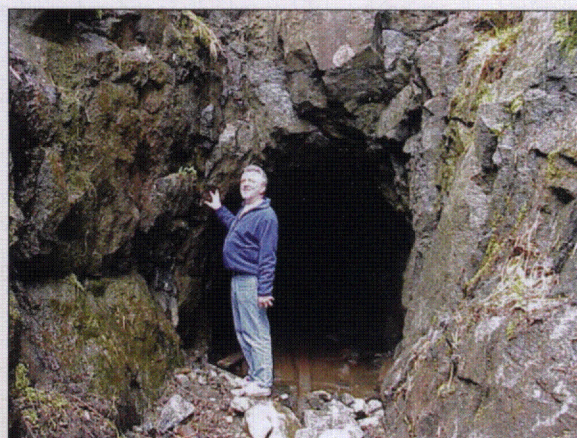


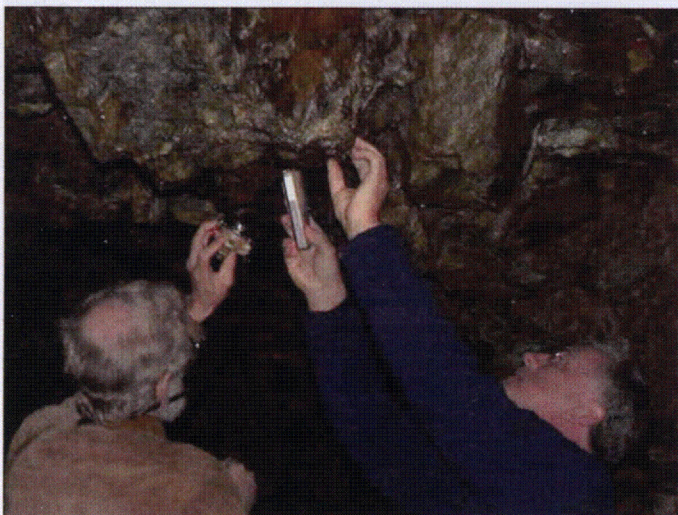
Figure 8. This map describes how to reach the Bastnäs Mine. The Swedish government wishes to leave the countryside pristine and convenient highway signs are not posted to guide the traveler. The Mine itself (A) is located at N59° 50.75 E15° 35.34. One enters the mine road off Highway 68 (which leads north from Riddarhyttan) at either B (N59° 49.99 E15° 32.99) or C (N59° 52.06 E15° 36.86). The historic Hisinger house (D) is located on Herrgårdsvägen (N59° 49.71 E15° 40.79).

Other sources of rare earths are rare earth phosphates (monazite and xenotime, (RE)PO₄) and “ion-adsorption ores.”⁶ Monazite and xenotime sand sources are scattered worldwide, but ion-adsorption ores are found only in southern China. These latter deposits were formed by “geological chromatography” where surface granite is leached to clay layers below. This leaching process favors Ln⁺³ ions so that insoluble cerium (Ce⁺⁴) is retained at the surface. The lower clay layers are rich in both lanthanum and yttrium and have a remarkably consistent concentration of all the other rare earths. Notable ion-adsorption mines in southeastern China include those within several kilometers of the village of Longnan (N24° 54.65 E114° 47.39), Ganzhou (prefecture), Jiangxi (province) (ca. 300 kilometers north of Hong Kong). In ion-adsorption mining, holes are drilled into the rock into which leaching solutions are injected and then withdrawn and allowed to evaporate, precipitating out the soluble rare earth salts.

“Light” and “heavy” rare earths. Because of the “lanthanide contraction,”⁷ as one proceeds to the right in the f-block of the Periodic Table, the ionic radius (+3) decreases from 1.17 Å for lanthanum to 1.00 Å for lutetium—and the density correspondingly increases. Hence, the lanthanides can be divided into the “light” lan-

thanides, including La, Ce, Pr, Nd, Sm, Eu, and Gd (left-hand side of the Periodic Table), and the “heavy” lanthanides, including Tb, Dy, Ho, Er, Tm, Yb, and Lu (right-hand side). Yttrium, with an ionic radius of 1.04 Å, resembles the heavy lanthanides, which fit more easily into the crystalline lattices of yttrium compounds,





) 183 (

Järnkalk bunden med annan obekant jord. Ferrum calciforme terra quaedam incognita intime mixtum. Tungsten. Lifnar Granatberg

I. Lät fingrynig,
a. Rödlätt eller Liffärgad.
**β. Gul. Bastnäs grufwa wid Rid-
 darhytta.**

Figure 10. (Above left) Inside the Bastnäs mine, checking for radioactivity—common in rare earth mines, usually produced by thorium. Figure 11. (Above right) This is the original description by Cronstedt of cerite.⁸ On the basis of his expert blowpipe analysis, he recognized the mineral as an iron ore with a “new earth.” He called it “Tungsten,” Swedish for “heavy stone.” He characterized it as [translated] “similar to garnet-stone./ Solid [and] fine-grained./ Ruddy or flesh-colored./ Yellow, [from the] Bastnäs Mine at Ridrarhyttan.”



Figure 12. The dwarf planet (asteroid) Ceres was discovered in 1801 by Giuseppe Piazzi, Catholic priest, mathematician, and astronomer (1746–1826), at the observatory he established in Palermo, Italy, at the Palazzo dei Normanni (Norman Palace) at Piazza del Parlamento, running south from Via Vittorio Emanuele (N38° 06.69 E13° 21.17). Coincidentally, the element technetium was discovered 1.7 km to the east in 1937, at the previous Institute of Experimental Physics (Royale Istituto di Fisica Sperimentale), Via Archirafi 36 (N38° 06.61 E13° 22.39), by Emilio Segrè (1905–1989) and Carlo Perrier (1886–1948).³¹

giving rise to minerals such as gadolinite or xenotime, rich in yttrium and the heavy rare earths. The “light” rare earths are more commonly found in bastnäsite or monazite. Scandium, with a smaller radius of 0.088 Å tends to be an outlier and can occur also in specialized minerals, such as euxenite, a radioactive niobate-tantalite.

The original Bastnäs Mine. The first rare earths—yttrium and cerium—were discovered

in Swedish mines (Figure 6). Yttrium was found in 1794 in gadolinite, $(RE)_2FeBe_2Si_2O_{10}$, from the Ytterby Mine of Sweden (Figure 7) by Johan Gadolin (1760–1852) in Åbo, Finland, then a Swedish territory.³² Cerium was discovered in 1803 in cerite, $(RE,Ca)_9Fe(SiO_4)_6(SiO_3OH)(OH)_3$, from the Bastnäs Mine (Figure 8) in Sweden by Jöns Jakob Berzelius (1779–1848) and Wilhelm Hisinger (1766–1852)^{3b,d} (Figures 9,10). The mineral cerite was originally described in 1751 by Axel Fredrik Cronstedt

(1722–1765, the discoverer of nickel³³ as “Ferrum calciforme terra quadam incognita intime mixtum” [Iron calx with an unknown earth]⁸ (Figure 11). Berzelius and Hisinger called it “Bastnäs tungsten” (“Bastnäs heavy stone”).^{3a} They named the separated new element “cerium,”^{3d} after the first asteroid Ceres discovered two years previously (Figure 12). The element was simultaneously discovered by Martin Heinrich Klaproth (1743–1817)^{3c} in Berlin, who had obtained a sample of cerite from the same Bastnäs Mine; he called it “ochroite” from its yellow color^{3b} (Figure 13). A decade later Hisinger and Berzelius discovered bastnäsite, described by them as a “basic fluoride of cerium,” or a “fluoride-carbonate of cerium” (“Flusspatzsyradt och kolsyradt cerium”),^{10a,b} in 1841 the mineral was given its modern name of bastnäsite.^{10c} The crude ore mined at Mountain Pass and Bayan Obo is granular and mixed in a matrix of other carbonates and sulfates (Figure 4), but beautiful brandy-colored crystals are sometimes found (Figure 14).

The “pioneer” of rare earths—Mosander.^{3b}

The discoverers of yttrium and cerite—Gadolin, Hisinger, Berzelius, and Klaproth—did not know that their new substances actually held 15 additional elements. The scientist who recognized a variety of new elements in “Bastnäs tungsten” was Carl Gustaf Mosander (1787–1858), a student of Berzelius (Figure 15). Mosander became an instructor at the Karolinska Institute in Stockholm and in 1828 was appointed custodian of the mineral collection at the Royal Swedish Academy of Sciences. He was given a laboratory at the Academy’s new building at Wallingatan 2 (N59° 20.26 E18°



Figure 15. Carl Gustaf Mosander's research proved that yttrium and cerium, the two most abundant rare earths, actually held additional elements. Like Berzelius, Mosander studied medicine but became interested in chemistry where he made a major impact studying unusual minerals of Sweden.

03.52); the Stockholm building still exists and is used as an office building.^{3d}

Mosander was a meticulous researcher, moving slowly and methodically, never jumping to conclusions. After years of research, he began to suspect that "all was not right with cerium"^{9b} and thought that perhaps another element was present. It was known that cerium had two oxidation states, giving rise to "cerium oxide" (today known as CeO_2 , or ceric oxide, or ceria; and Ce_2O_3 , or cerous oxide; respectively). Mosander suspected the unknown element was hidden in the latter compound—and he was correct, as we know today that cerium can be present in the Ce^{+4} or Ce^{+3} oxidation state, while virtually all the other rare earths are present in the M^{+3} oxidation state. Mosander took a sample of his cerium oxide mixture and treated it with chlorine water, which extracted out the hidden new element, in the form of a chloride. Similarly, weak nitric acid would remove the new element, giving the nitrate. Mosander named the new element *lanthanum*, from the Greek "to lie hidden." (Today, the common industrial method for removing cerium from the other lanthanides uses the same method of chemical separation. First, the rare earth mixture is allowed to air-oxidize, which transforms all cerium into the more stable, insoluble oxide CeO_2 (Ce^{+4} oxidation state), while the remaining lanthanides remain as soluble Ln^{+3} and can be easily extracted out).

More rare earth discoveries by Mosander:^{9b}

The observant and cautious Mosander noticed that some of his lanthanum fractions were amethyst-colored, and he suspected yet another new element. In 1840, he heated a solution of lanthanide sulfate, thereby observing a precipitate of amethyst-colored crystals (it was known by then that cerous and lanthanum salts exhibit *retrograde* solubility, where salts are more sol-



Figure 13. Martin Heinrich Klaproth (1743–1817)^{9f} was codiscoverer of cerium. This exhibit at the Berlin Museum für Naturkunde (Museum of Natural History; Invalidenstrasse 43; N52° 31.79 E13° 22.78) displays authentic samples of the minerals from which he discovered/co-discovered eight elements, including cerium, beryllium, titanium, chromium, strontium, zirconium, tellurium, and uranium. Always a modest and unambitious gentleman, he often gave credit to others when in fact it was his splendid research that confirmed a discovery.

uble in *cold* water; this solubility behavior is quite general for Ln^{+3} salts, especially for the light rare earths, and is particularly exaggerated for the sulfates). Repeating this process several times allowed lanthanum salts to be recovered, now white—as well as a separated amount of amethyst-red crystals (1840). He named this new element *didymium* (later found by Welsbach to be actually a mixture of two different elements.)^{3b} Today didymium working spectacles, easily procurable from on-line vendors, are used by glassblowers to filter out the blinding yellow of sodium-containing melts.

Mosander also made a careful study of yttrium, obtained from the Ytterby Mine. Again alerted by colored solutions of its salts, in 1842 he undertook its fractional crystallization. From ammonium hydroxide solutions he obtained three fractions: the first fraction yielded a dark orange oxide of an element he named *erbio*; the second a rose-colored oxide of another element he named *terbio*; and the last a white oxide of the parent yttrium.^{9b} He could accomplish the same task by fractional crystallization of the oxalates. [Note: in 1877 the original names of "erbio" and "terbio" were reversed^{9b}—today erbium oxide is used to produce pink ceramics and jewelry]. His results were confirmed by Berzelius, who went on to find that Gadolin's mineral (gadolinite, in which he found yttrium) also held cerium.



Figure 14. This gemmy crystal of bastnäsite, measuring 10 mm across, is hexagonal, resembling a ruby; while simultaneously it appears as translucent coffee-colored, very much like a garnet. This crystal analyzed by EDX to give 26% La, 29% Ce, 6% Nd, and lesser amounts of Pr, Sm, Eu, and Gd. From the private collection of the authors.

With the discovery in 1802 by Anders Gustaf Ekeberg (1767–1813; the discoverer of tantalum^{9h}), that gadolinite also held beryllium,^{3c} this meant that Gadolin's original discovery was in fact a mixture of (at least) seven new elements: yttrium, cerium, lanthanum, didymium, terbium, erbium, and beryllium—prompting Berzelius to exclaim in 1843: "What a scoop it would have been if [Gadolin] had been able to separate them."^{9b}

And many more rare earths were yet to be discovered! ☉

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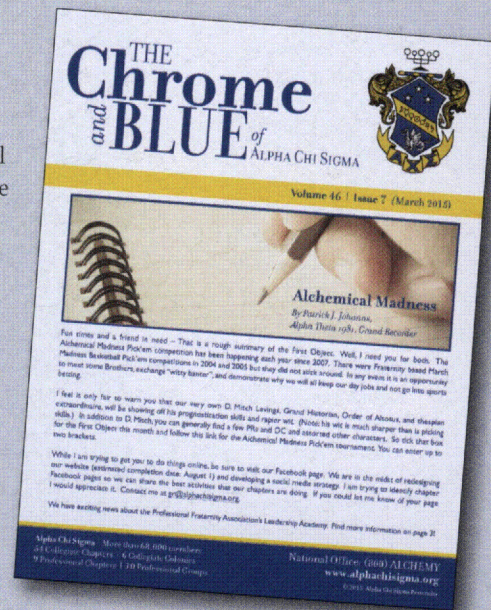
In the next issue of *The HEXAGON*, we will see how these additional rare earths were found.

Fraternal Publications—The Chrome and Blue

One long-standing communication medium between the National Office and the subordinate chapters has been the monthly publication of *The Chrome and Blue*. The first issue was distributed in August 1927. Titled *Monthly Report of the Grand Recorder*, it was to be a confidential information exchange from Grand Recorder John Kuebler to the Grand Chapter. Unlike *The HEXAGON*, which contained information of broad interest to all members, the *Monthly Report of the Grand Recorder* was tightly focused on what was happening in the National Office. After the 1930 Conclave, the Office of the Grand Recorder modified its monthly report to be an informational resource to the collegiate chapters. At the suggestion of New England DC, Avery Ashdown, (*Alpha Zeta*), the reimagined publication was named *The Chrome and Blue*. After the new name went into effect, SC member Marion Dice frequently referred to it as *The Chromium Blues*. While *The Chrome and Blue* was issued by the National Office, it was expected that there would be other contributors. Supreme Council proposition 632, dated August 15, 1932, creating the Order of Altotus, listed among the duties of the Order was, "...to keep in touch with the Fraternity through *The Chrome and Blue* and *The HEXAGON*..." The first incarnation of *The Chrome and Blue* ceased publication with the December 1945 issue as both a cost cutting measure and a war-related resource shortage. During its summer meeting in 1957, the Supreme Council directed the Grand Recorder to resurrect *The Chrome and Blue* as a confidential monthly newsletter issued to the Supreme Council, District Counselors and the Order of Altotus. The re-launched publication began publication with the January 1958 issue. Collegiate Chapter MAs and Professional Chapter presidents were soon added to the distribution. The second version of *The Chrome and Blue* did not endure for long with the retirement of J. R. Kuebler, considerable personnel turnover in the National Office, and the appointment of a Grand Recorder that lived outside of Indianapolis. *The Chrome and Blue* became a casualty of too much to do and not enough staff to do it. But *The Chrome and Blue* was too good of an idea to stay dormant for too long. For the third time, Grand Recorder Jim Miller resumed publication of *The Chrome and Blue*. The premiere issue, dated September 1971, reset the counter and was distributed as Volume I, Number 1. The stated purpose of this third incarnation of the newsletter was to serve as a means of communication between the national officers and chapter officers, both collegiate and professional. *The Chrome and Blue* was to be mailed on the Friday of the last week of each month from September through May with each issue to contain a six-week calendar of all fraternity business, news items of interest to chapter officers and timely announcements from the Supreme Council and Grand Recorder.

For decades, *The Chrome and Blue* was a part of a monthly mailing that came to the chapters, recognizable by its printing on alternating blue and yellow pages. But mail is too slow a medium in a modern age, so in the fall of 2005, under GR Pat Johanns, *The Chrome and Blue* was no longer delivered via the U.S. Postal Service, but as a file saved in the Portable Document Format (pdf) and clickable on the National website. Gone were the blue and yellow pages, replaced with stock graphics and clickable links to other resources. Like the Fraternity itself, it has come a long way since its inception 88 years ago.

And as of fall 2015, *The Chrome and Blue* is once again being discontinued. The Fraternity is moving the distribution of its information to chapters through various social media outlets and the website.



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The Supreme Council expresses its gratitude for the significant support provided by those Brothers composing the Elixir of Life Club, the Paracelsus Club and the Altotus Club.

Special recognition is given to the Reserve Fund Members whose additional contributions help to ensure the long-term financial security of the Fraternity.

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Two things kept me investing time and effort in the Fraternity once I left UNH (Mu Chapter). I attended the 47th Biennial Conclave at Gamma Iota in Blacksburg, VA. At conclave, I was able to connect with all the professional brothers who attend either in some representational way (DC, PR, SC, etc.) and those who attend because they want to be there. Just as we tell our collegiate brothers, once you attend and experience Conclave you will want to come back. Second, I was exposed to what the Fraternity means as a whole, and how it operates. So many brothers never really see the Fraternity beyond their chapter, or maybe beyond their district, so they lack that perspective of how all the pieces make the whole. So, after having my vision of the Fraternity widened beyond the reactivated Mu Chapter, plus some small exposure I had had to the local district, and seeing how active and involved professional brothers could be, I became interested in staying involved with the Fraternity. —Tim Deschaines, PR, Mu 2002

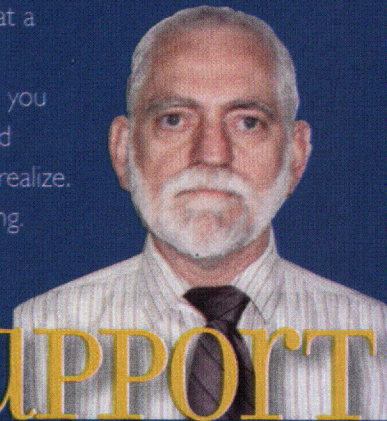
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I have gotten so much out of the Fraternity, both collegiate and professionally. It personally rewarding to "pay it forward" to the next generation, by giving of money and time. —Bob Stevens, Beta Delta 1979

When I was initiated, over 61 years ago, I had no idea what I was getting myself into. I could say the same about getting married six years later. But both were among the wisest things that I did in my youth. These days, as an 81-year-old widower, I particularly enjoy all of the brothers (and occasionally family members of brothers) that I run into unplanned. They are everywhere, at airport terminals, at a retirement community in New Mexico, at Disneyworld, at an exercise room, and (can you believe it) in a bar. We have ties of "true and lasting friendship" with more folks than we realize. And that, brothers, is really worth supporting.

—Col. William Myers, OA, Alpha Sigma 1954



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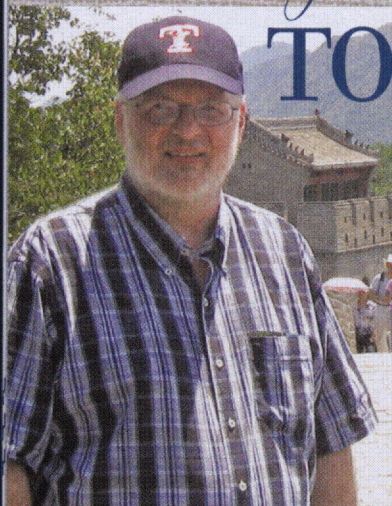
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—R Scott Wilson, Alpha Zeta 1978

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Gary S. Natwig
Timothy Need
Samuel Resconich
Thomas A. Runge, PhD
Stephanie C. Schroeder
Nick S. Semenuk
Robert D. Sherwood
Ann E. Simmons
Janice L. Vaughn
James A. Walsh
John R. Wiley

BETA XI

Frederick Antosz
Russell S. Banush
Donald R. Blevins
Andreas Lindert
Donald J. Melotik
Ralph J. Mercier

BETA OMICRON

Janice M. Arceneaux
Marius R. Naris

BETA PI

Robert E. Davenport
Kenneth N. Drew
Natasha Drew
Timothy R. Felthouse
Julie M. Gallagher
Ronald E. Leach
Ernest J. Oliveras, Jr.
Anne C. Ryder
Donald K. Wedegaertner

BETA RHO

Ronald G. Albrecht
Larry E. Erickson
Charles L. Foxx
Eric S. Geanes
Rebecca A. Kenyon
Carol A. Malin
Christian A. Montes
Pedro L. Muino
Joseph V. Ortiz
William N. Patry
Renee A. Smith
Karen A. Veverka
Randy L. Wehling
Kenneth M. Wolma

BETA SIGMA

Norman A. Adams
Michael Caution
Mark N. Evaniak
Cynthia A. Imel
Robert J. Konig
Edward W. O'Grady
Eleanor J. Olsen
Jeffrey S. Pyka
Bobbijo V. Redler
Roger L. Shaw

BETA TAU

Armando C. Angel
John E. Bullard
Michael D. Carducci
Paul D. Oram
Michael S. Tempesta

BETA UPSILON

Debra Bensen-Kennedy
William Y. Ellis
Richard E. Meyers
Lee J. Miller
Victoria Porter
Charles D. Thompson
William G. Wright, Sr.

BETA PHI

Andrew D. Baumgartner
John Bendler
Sam C. Colvin
John D. Davies
Brian Drake
Jan W. Dunker
Stephen J. Dyer
Mary L. Good
Gordon G. Hanson
Donald R. Hixson
John A. Klube
Keith E. Kostlan
Glenn A. Lambert
Amber D. McWilliams
Lorrey D. Muellenberg
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Brian T. Picard
Sara Reausaw
Eric W. Sauer
Gregory L. Thies
Barbara A. Watson
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Gary L. Wells
William F. Whitehead

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William H. Graf
Berwyn E. Jones
Paul E. Smith
Jimmy D. Webster

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James P. Economos
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Mary Kinsel
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Robert D. George
Heidi P. Miller
Thomas W. Miller
Carleton B. Moore

GAMMA ALPHA

James L. Pearlman

GAMMA BETA

Christopher R. Brewer
Sean C. Campbell
Katerina Coumbos
Steven J. Duranceau
Elizabeth R. Gaillard
Adam J. Hopkins
William M. Landing
Mary C. Magdziak
Jennifer A. Schnippert
Matthew J. Schnippert
Michael C. Sumner
Robert Q. Topper
Gary E. Walker

GAMMA GAMMA

Doreen M. Fava

GAMMA DELTA

Clyde R. Metz
Chandra Potter
Renee B. Thomas

GAMMA EPSILON

Mark E. Kaye

GAMMA ZETA

Christina A. Bailey
Kerry M. Friend
Lisa L. Kennedy
Cheryl A. Lovato
Derek Marin
Jeannette Osterloh
Abbey Rickelmann
Taylor Wagner
James P. Wilimek II

GAMMA ETA

Michael L. Norton

GAMMA THETA

Rachel J. Allenbaugh
Laura J. Blunk
Joel Brockmeyer
Chelsea Crow
Brian Dockins
Season Kerns
Randa F. LaVelle
Kyle A. Miller
Eric Null
Oliver Penrose
Sarah J. Pickett
Jessica L. Pryor
Nicole M. Reinartz, PhD
Kevin A. Robb
Kristen VonGruben
Allison L. White

GAMMA IOTA

Laura A. Chevalier
Lydia S. Choi
Michael R. Clager
Katharine A. Davenport
Davis
Robert J. Duff
Jennifer C. Duff
Preston Durrill

Erin M. Fagan
Karen H. McLean
David B. McLean
David R. Morgan
Kirsten M. O'Brien
Wendy S. Robinette
Charles W. Saunders, PhD
Angela M. Snow
James N. Thomasson III

GAMMA KAPPA

Marita C. Lawler

GAMMA LAMBDA

Robin Castro

GAMMA NU

Mark N. Calabro
John Feltenberger
Alexander P. Herbert
Klaus Himmeldirk
Mark C. McMills
Lauren H. McMills
Randi L. Ress
Lisa Stout
Anthony T. Vallance
Benjamin L. Wegenhart

GAMMA XI

Stephen M. Stewart

GAMMA OMICRON

Jeremy Eberhardt
Jessica L. Fraser
Ned D. Heindel
Emily E. Hollander
Sarah Muse
Timothy Prozonc
Daniell L. Rowles
Brian R. Thomas
Heather Thomson

GAMMA PI

Allison R. Hord

GAMMA RHO

Mindy M. Kuhn

GAMMA SIGMA

Lindsey Bobak
Vickie Krupka

GAMMA TAU

Christopher Stanis

GAMMA UPSILON

Sean C. Pawlowski

GAMMA PHI

Barbara J. Casavant
Jeffrey A. Dudziak
Shane T. Willing

GAMMA PSI

Nichole M. Bennett

GAMMA OMEGA

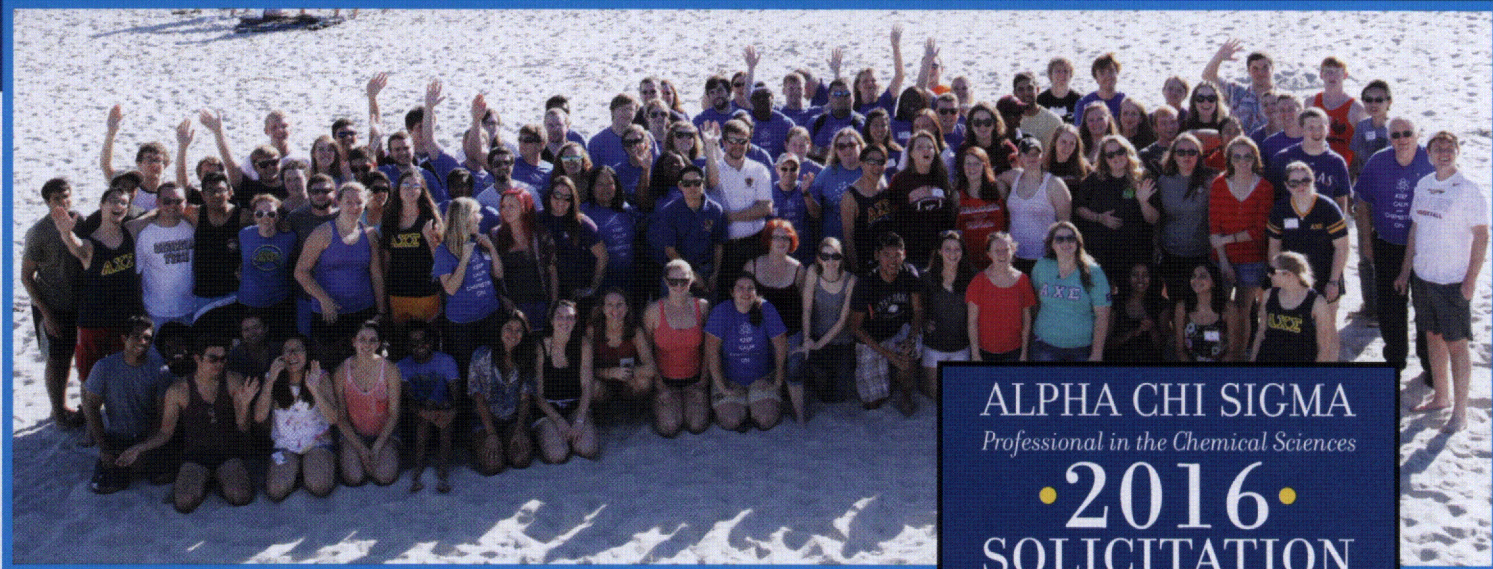
Stephen W. Ingham
Andrea E. Martin
Anthony D. Rodriguez
Jacob A. Shusterman

DELTA ALPHA

Taylor W. Perkins

DELTA DELTA

Sariah Q. Cantrell
Kyle D. Nealy
Justin M. Pratt
April S. Berlyoung



Brother, we hope that this message finds you well and in good spirits. When we were initiated into Alpha Chi Sigma, we were taught that our membership is lifelong. It is through the gifts of hard work and resources our members joyfully donate throughout their lives that has allowed Alpha Chi Sigma to grow and prosper in recent years. A small financial gift can make a large impact on our member's lives; whether special events and services for our professional and collegiate chapters, our remarkable and historic growth to new campuses, or the roll-out of a new website and social media to interconnect our members throughout the country. Each year we ask our members to give and without your support, Alpha Chi Sigma would not be able to make the impact it does. Please join us in donating today. If your gift is \$100 or more, you can receive an Alpha Chi Sigma tote bag as a memento of your service.

Mark N. Evaniak, Beta Sigma, '80
Grand Master Alchemist

Dr. Jonathan Wenzel, Delta '96
Grand Professional Alchemist

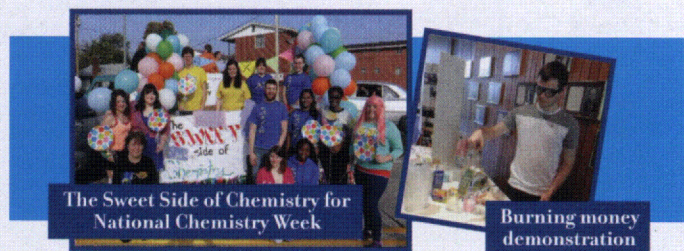
Helen M.M. Webster, Alpha Rho '94
Grand Collegiate Alchemist

Kip A. Nalley, Alpha Sigma '90
Grand Master of Ceremonies

Your donations at work in the Collegiate Branch



Alpha Chi Sigma was one of the main sponsors for Alpha Kappa's CHEMFEST 2014. CHEMFEST is a day-long event that features experiments and demonstrations that spark the curiosity in children and parents alike! Approximately 80 to 100 people attended CHEMFEST.



Each year, active chapters are awarded 5% of the amount that chapter's alumni contributed to the solicitation the previous year. This money is used for a variety of purposes. For example, Beta Psi Chapter has used it to do demonstrations and create a float based on the National Chemistry Week theme for their homecoming parade.

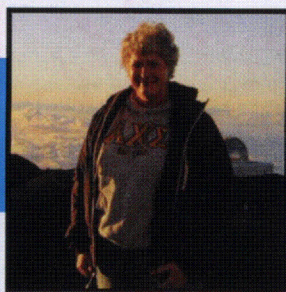
Why I donate to ALPHA CHI SIGMA



"I donate to Alpha Chi Sigma to support the education and science outreach that our Brothers do."

Merryn Cole,
Alpha Theta 2003

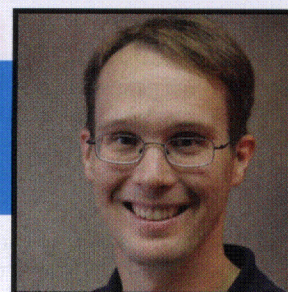
Bluegrass District Counselor,
District Counselor Chair



"I have gained so much from Alpha Chi Sigma, personally and professionally. That could not have happened if the professional Brothers when I was a student hadn't contributed generously to the Fraternity's operations. It is important to me that the costs of membership remain affordable so that all students of the chemical sciences have the opportunity to benefit from Alpha Chi Sigma as I have."

Sherrie E. Settle,
Alpha Kappa 1983

Order of Altotus



"Alpha Chi Sigma has done so much for me, socially and professionally. The fraternity has transformed my career. I donate so that others can have an even better experience!"

Dr. Jonathan E. Wenzel,
Delta 1996

Grand Professional Alchemist

Donate by
November 30th
to vote for
Professional
Representatives!

Donate online at www.alphachisigma.org

Alpha Chi Sigma Fraternity is a
nonprofit 501(c)3 educational organization.

Your contribution is tax deductible as permitted by law.

Your donations at work in the Professional Branch



The Kansas City Professional Group hosted Grand Master Alchemist Mark Evaniak to discuss petitioning to become a professional chapter. At the summer Supreme Council meeting, it was unanimously voted to reactivate Kansas City Professional Chapter. It is exciting to add another Professional Chapter!



In spring 2014, the Washington Professional Chapter assisted the Gamma Iota Chapter at Virginia Tech at the US Science and Engineering Festival. This is the largest and only national science festival. Our Brothers demonstrated the principles of a solar cell. The Washington Professional Chapter and Gamma Iota Chapter were able to promote the Second Object at this event thanks to the Sedlak Fund, a fund established by the estate of late Brother Vincent A. Sedlak, Alpha Pi 1946.

ALPHA CHI SIGMA
Professional in the Chemical Sciences

• 2016 •
SOLICITATION

2015 Awards Wrap-Up

2015 ACS Award in Pure Chemistry

The 2015 ACS Award in Pure Chemistry was presented to Adam E. Cohen, a chemistry professor at Harvard University. First awarded in 1931 to two-time Nobel Prize-winning chemist Linus Pauling, the award celebrates independence of thought and originality in research among chemists 35 and under. It is bestowed annually by the ACS "to recognize and encourage fundamental research in pure chemistry carried out in North America by young men and women who have accomplished research of unusual merit for an individual on the threshold of his or her career."

At Harvard, Professor Cohen and his students develop new physical tools to study molecules and cells, and they apply these tools to make new measurements. His group combines nanofabrication, optics, microfluidics, electronics, and biochemistry to generate data, and apply statistics and physical modeling to understand the data. Current projects include: development of fluorescent voltage-indicating proteins for all-optical electrophysiology; studies on the nanomechanical properties of DNA; and design of highly contorted electromagnetic fields that excite "forbidden" transitions in molecules.

Professor Cohen earned his B.A. in chemistry from Harvard University in 2001 and two Ph.D.s in physics, one from Cambridge University in 2003 and the other from Stanford University in 2006. He started his independent career as a faculty member at Harvard in 2007 after completing a postdoctoral appointment at Stanford. In addition to the ACS Award in Pure Chemistry, Professor Cohen has been recognized as a Sloan Fellow, a Camille Dreyfus Teacher-Scholar, a Presidential Early Career Awardee, and as one of the Popular Science "Brilliant 10."

2015 AIChE Award in Chemical Engineering

The 2015 AIChE Award in Chemical Engineering recipient is Dr. James Dumesic, Steenbock Professor (College of Engineering) and Michel Boudart Professor of Chemical and Biological Engineering at the University of Wisconsin-Madison.

James A. Dumesic earned his B.S. degree from UW-Madison and his M.S. and Ph.D. degrees from Stanford University, under the supervision of Professor Michel Boudart. Dumesic joined the Department of Chemical Engineering in 1976. Throughout his career, Dumesic has used spectroscopic, microcalorimetric, and reaction kinetics techniques to study the surface and dynamic properties of heterogeneous catalysts. Dumesic pioneered the field of microkinetic analysis, in which diverse information from experimental and theoretical studies is combined to elucidate the essential surface chemistry that controls catalyst performance.



James Dumesic



Adam E. Cohen, recipient of the ACS Award in Pure Chemistry, poses with ACS President Diane Grob Schmidt (L) and GMA Mark Evaniak (R). Photo courtesy of the American Chemical Society.

He received the inaugural Heinz Heinemann Award by the International Association of Catalysis Societies. He was elected as a Fellow of the American Academy of Arts and Sciences in 2009, and he was awarded the William H. Walker Award of the American Institute of Chemical Engineers for outstanding contributions to the chemical engineering literature. In 2011, he received the Michel Boudart Award for advances in catalysis at the North American Catalysis Meeting and at the meeting of the European Federation of Catalysis Societies. In 2012, he received the George A. Olah Award in Hydrocarbon or Petroleum Chemistry from the American Chemical Society.

2015 Alpha Chi Sigma Scholar

Eric Alexy, Gamma Xi 2011, was selected as the 2015 Alpha Chi Sigma Scholar. Eric is currently a senior in chemistry at North Carolina State University. A Goldwater Scholar, he has maintained a 4.0 GPA during his undergraduate career, with his transcript showing more A+'s than A's in chemistry courses. By graduation, he will also have completed four graduate level organic chemistry courses.

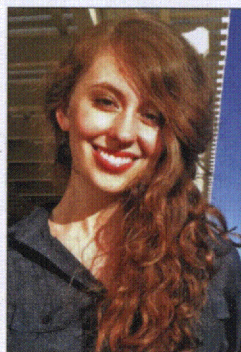
His undergraduate research, under the direction of Dr. Jonathan Lindsey, has included investigating early Earth plausible routes to biologically important molecules in order to elucidate the molecular origins of life as well as developing next-generation light absorbing pigments for solar light-harvesting. He has a first author publication and has presented his work at numerous conferences, both local and national.



Eric Alexy
Gamma Xi 2011

Alexy comes from a very diverse family, with immediate family members living in five different countries on three different continents. He is also very well-traveled, having been to eight different countries, including nearly a dozen separate trips to Europe. After graduation, he plans to pursue a Ph.D. in chemistry focusing on natural product synthesis and reaction methodology development.

2015 Priscilla Carney Jones Scholarship



Samantha Miner

Samantha Miner is a senior at Montana Tech of the University of Montana currently seeking a B.S. in biochemistry. She developed a strong passion for science, specifically cancer research, following the unfortunate loss of a childhood friend to T-cell non-Hodgkin's lymphoma in 2012. Since then, Samantha has completely immersed herself in chemistry and biology courses and sought every opportunity to become involved in a biomedical research laboratory setting.

Most recently, Samantha was accepted into the prestigious 2015 Amgen Scholars Program at the Massachusetts Institute of Technology. She conducted research at the Yilmaz Laboratory in the Koch Institute for Integrative Cancer Research. The laboratory's objective is to understand how various diet conditions affect adult stem cell physiology in the context of tissue regeneration and cancer initiation.

Samantha also has several interests outside of the academic environment. For 12 years, she was a Dynamic Dance Academy company member before signing with a production company to dance on Norwegian Cruise Lines in 2010. Then in 2011, she received her 200-hour yoga teacher training certification with At One Yoga in Scottsdale, Arizona.

Samantha will continue her education and research knowledge in chemistry as it applies to the field of cancer research. She intends on earning an M.D.-Ph.D. and continuing in academia, where she hopes her discoveries can be shared within the entire scientific community in a large collaboration from which scientists freely share their findings to combat disease and better human health.

2015 Cooper Awardee



Megan Elizabeth Farell

Megan Farell is a student at the University of Tennessee (UTK) majoring in chemical engineering. She is an undergraduate research assistant under Dr. Paul Frymier in the chemical and biomolecular engineering (CBE) department. She has been involved in multiple organizations in her undergraduate career, such as AIChE, ChemE car team, SWE, and Tau Beta Pi. Currently, she is vice president of AIChE and a grader for a thermodynamics course.

Farell participated in the first College of Engineering Alternative Spring Break trip to Cartago, Costa Rica, in the spring of 2013.

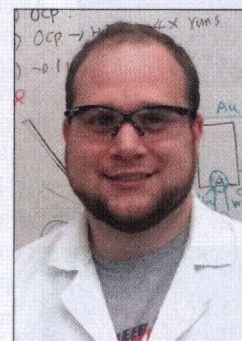
With nine other students from the university, she volunteered at two orphanages. Farell has been involved in undergraduate research for more than two years. She has researched in Dr. Frymier's lab during this time and has had the opportunity to work on a variety of projects. She has greatly enjoyed her experimental work with the enzyme hydrogenase. During the summer of 2014, she was selected for a DAAD RISE internship in Mülheim an der Ruhr, Germany, at the Max Planck Institute for

Chemical Energy Conversion. She researched in Dr. Wolfgang Lubitz's lab on a project concerning a different type of hydrogenase. The professors, courses, research, and classmates at UTK has made her undergraduate experience very memorable and exciting.

Farell plans to continue her academics and research in chemical engineering in graduate school.

2015 Beta Eta Distinguished Teaching Assistant Award

Nick Ross received a B.A. in chemistry at the University of North Texas (UNT) with a GPA of 3.41/4 in fall 2010. Nick took one semester at the University of Texas at Austin (UT) and four summer semesters at Austin Community College (ACC). During Nick's freshman year (fall 2006–fall 2007), he was treasurer for Residence Hall Association at Legends Hall at UNT for three years. During his junior year, he worked as a pharmacy technician for one year at H.E.B. pharmacy. During his senior year, he worked in Dr. Youngblood's lab with Marco Rodriguez. It was in this experience and guidance that Nick decided to pursue a Ph.D. in chemistry rather than a pharmacist degree.



Nick Ross, Beta Eta 2014

Nick is currently a Ph.D. student in the chemistry department at UNT with a GPA of 3.68/4. He became a member of Alpha Chi Sigma in the fall of 2014 and is an active member. Nick joined the Ph.D. program in January 2011 and is pursuing his degree in Dr. Chyan's group. For Nick's first research project, he was a part of the team responsible for working on a collaborative project with Intel. The project was to provide chemical bonding information via Multiple Internal Reflectance Infrared (MIR-IR) spectroscopy to classify the effect of a new hydrophilic treatment used after plasma etching and before wet-clean at the back end of the semiconductor wafer developmental process. Further MIR-IR analysis has been performed on boron doped hydrogenated amorphous silicon for micro bolometers (infrared cameras) for the U.S. Army. Nick is currently project leader on a Freescale collaborative project involving bimetallic corrosion on Al pad/Cu wire connections on Freescale's semiconductor automotive products.

Nick Ross is currently planning on graduating with his Ph.D. in analytical chemistry in fall 2015 and will be seeking a position in the semiconductor industry.

2015 Dunlap Scholar

Michael Samp is a junior from Lisle, Illinois studying chemical engineering at Rose-Hulman Institute of Technology (*Iota* Chapter). He initiated in the winter of his sophomore year, and this year he became the reporter for the *Iota* Chapter. He reports, "Joining Alpha Chi Sigma has been an extremely rewarding experience. I really enjoy the brotherhood aspects of the chapter and the role we play in the community, teaching children about the wonders of chemistry. I love the Fraternity and look forward to serving my chapter in the future."

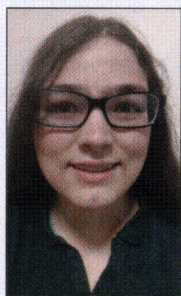


Michael Samp, Iota 2013

(Dunlap Grants continued on page 56)

2015 Awards Wrap-Up

2015 Dunlap Grants/Honorary Scholars



Anne Leonhard,
Iota 2013

from Rose-Hulman, Anne plans to attend graduate school with the goal of becoming a chemical engineering professor.

Anne Leonhard is a junior at Rose-Hulman Institute of Technology and is from Fishers, Indiana. She plans to graduate in the spring of 2017 with degrees in chemical engineering and computer science. She became a member of the *Iota* Chapter in the fall of 2013, and has since held the positions of vice professional chair and webmaster. Besides Alpha Chi Sigma, Anne is involved in Tau Beta Pi, Alpha Lambda Delta, and the Society of Women Engineers at Rose-Hulman. She has completed an internship at Ameridrives Power Transmission and has contributed to projects investigating bioplastics and small-scale nylon production. After graduating



Jonathan Lee, Iota 2013

Jonathan Lee is a sophomore at Rose-Hulman Institute of Technology, where he is majoring in chemical engineering and biochemistry/molecular biology. He joined *Iota* Chapter in fall 2013. He is from Northfield, Ohio, and he will be graduating in May 2017. Lee is also a tutor at the Rose-Hulman Homework Hotline and the current president of Alpha Lambda Delta, an honor society focused on community service for high achieving students. After he graduates, Lee plans on attending graduate school.

2015 Gamma Eta Scholar

Ryanne Brown is a junior studying forensic chemistry at Marshall University where she has been a member of the *Gamma Eta* Chapter of Alpha Chi Sigma since fall 2014. While in attendance, Ryanne has been recognized as the 2015 Outstanding Analytical Chemist at Marshall University and a 2014 Student of Distinction in Chemistry. She is originally from Greensboro, North Carolina, and graduated from Northwest Guilford High School.

Through her involvement with Alpha Chi Sigma, Ryanne has enriched her passion for science and chemistry as well as helped others do the same. In addition to this, she is also involved in the Honors College, Golden Key Honor Society, and serves as secretary of Gamma Beta Phi in both the campus chapter and state.

Outside of class, Ryanne enjoys watching movies, crafting, and volunteering throughout the community. She also loves travelling to exciting destinations with friends and family. Following graduation, she plans to attend graduate school in pursuit of a forensics degree.



Ryanne Brown
Gamma Eta 2014

We want your news!

Be sure to send any news and newsworthy information you have about yourself or your chapter. Send to: national@alphachisigma.org.

2015 Jody Aaron Goad Scholarship

The *Gamma Iota* Chapter established a scholarship in memory of Jody Aaron Goad, *Gamma Iota* 1995, who passed away in 2003 of brain cancer. The scholarship is awarded to a student of chemistry or any chemistry-related major attending Virginia Polytechnic Institute and State University in Blacksburg, Virginia. Jody was Master Alchemist of *Gamma Iota* Chapter from 1997-98 and Reporter from 1996-97.

Heather Pendergrass is a senior at Virginia Tech, majoring in both chemistry and biochemistry. She was initiated into the *Gamma Iota* Chapter in fall 2013 and has recently been elected master of ceremonies for the upcoming pledge year. The Goad Memorial Scholarship is the second award she has received through the *Gamma Iota* Chapter. Earlier last year she also received the



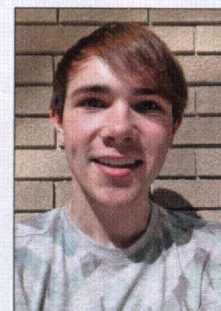
Heather Pendergrass, *Gamma Iota* 2013

Outstanding Brother Award, a newly instated chapter award recognizing commitment to the chapter above and beyond regular brotherhood duties. Heather has spent the last two and a half years as an undergraduate researcher for Dr. Joseph Merola's organometallic chemistry lab, where her duties include synthesizing new drugs and catalysts under multiple graduate students. Her plans for the future include graduate school to earn her Ph.D. in chemistry so that she can pursue a career in drug discovery and design.

2015 Alpha Beta Alpha Chi Sigma First-Year Award

This award is designated by the *Alpha Beta* Chapter of the Alpha Chi Sigma to a student in first-year chemistry who has demonstrated an interest in chemistry, shown outstanding academic potential as judged by instructors, and has demonstrated leadership with fellow students.

Brandon is a freshman pursuing a dual major in chemistry and chemical engineering with a minor in Chinese language. His passion for chemistry began to grow very early on in childhood. His dad would lend him money to buy acids and metals and he would accidentally burn holes in the driveway. However, his passion for chemistry is easily matched by his passion for cooking. He loves baking pies, tarts, and all kinds of pastries. He also loves fishing, nature, and is a huge softy for animals. Brandon spends a lot of time volunteering at a farm near his home where he takes care of animals and acclimates the new animals to farm life. In his research work under Dr. Bart Bartlett, he is studying the use of cupric tungstate as a catalyst for photoelectrochemical water splitting. Specifically, he will look at the effects of dopant atom type and dopant atom concentration on resultant photocurrent measurements. In the future, he plans to go to graduate school to pursue a Ph.D. in chemistry. He has passion for research and teaching, so he hopes to one day end up at a university doing research on biofuels and sustainable energy projects as well as instructing a few classes.



Brandon Daily



Gamma brother adds sodium bicarbonate to make a lava lamp.

Wyvern 4 Pin: Yashavika Duggal, *Gamma* 2013

Over the past few years, *Gamma* Chapter has grown significantly. While normally volunteering and doing science demonstrations at the Great Lakes Science Center, I wanted to reach out and serve more of the community. With this in mind, I contacted the local Montessori school to set up a day of demonstrations. At Montessori, our goal was to teach a class of 22 fourth through sixth graders, plus two teachers, how much fun learning chemistry can be.

The first visit in October focused on the "Sweet Side of Chemistry" (2014's theme for National Chemistry Week). Obviously, this theme meant that we needed experiments that the kids could eat once we were done! That day we played with saltwater taffy, candy chromatography, floating letters, and lifesavers that sparked in the dark. The kids had fun getting messy with chocolate and candy, all while learning the chemistry behind their favorite foods.

This past spring, *Gamma* was contacted again to set up demonstrations—this time about chemical reactions. Brothers demonstrated how it is easy to tell when a chemical reaction is occurring based on qualitative observations such as change in heat, color change, gas production, or precipitation.

Students enjoyed the hands-on activities consisting of some of *Gamma's* more traditional demonstrations. The most popular were the lava lamps, created by the reaction between sodium bicarbonate, in Alka Seltzer, and water. The other experiments included invisible ink, which reappeared when grape juice neutralized the weakly basic baking soda, and Oobleck, which is a non-Newtonian fluid made from cornstarch and water. Overall, both events were a success.

Beta Psi Brothers Present at the St. Louis Area Undergraduate Research Symposium

Submitted by Jaime D. Sykes, *Beta Psi* 2013, and Savannah M. Haslett, *Beta Psi* 2012

The St. Louis Area Undergraduate Research Symposium is an annual conference, in its 10th year, which showcases the research of undergraduates in the greater St. Louis area. The symposium included Southern Illinois University Carbondale, Washington University, St. Louis University, and Southern Illinois University Edwardsville. The presence of undergraduate researchers from Southern Illinois University Carbondale was strong, and two *Beta Psi* brothers presented their senior research projects in the biological sciences category this spring.

Jaime Sykes, a senior studying biological anthropology and minoring in forensic science, presented her senior thesis work which examined the reliability of various measurement strategies which are used to analyze dental remains for various purposes within biological anthropology. Her research, which was funded by a Saluki Scholars Research Opportunity Assistantship, received the Rice Award for Undergraduate Research which is awarded to a student in anthropology whose research shows promise for peer-reviewed publication and professional presentation. Her research is currently in revision to be submitted to the American Journal of Physical Anthropology. She will begin

her graduate studies at the University of South Florida in the fall, where she will specialize in forensic anthropology and bioarchaeology.

Savannah Haslett is a senior studying zoology. Her research is within the field of physiological ecology. Her senior project entitled "Compounding effects of Ranavirus infection and metamorphosis on the nutrient stoichiometry of amphibians" provided evidence that concurrent metamorphosis and Ranavirus infection creates an increased energetic demand that attributes to an increased death rate among infected amphibians. This research was funded by a Research Enriched Academic Challenge (REACH) Award and will be submitted to Functional Ecology. Savannah is working in a waterfowl ecology lab and doing volunteer field work for her undergraduate lab. She is currently searching for graduate programs to enroll in.

We were proud to represent not only our institution, but also our Brotherhood as we presented our research at STLAURS. We demonstrated that Alpha Chi Sigma brothers are not only serious about their various professions and research, but also that the Brotherhood has a diverse range of brothers in various scientific fields. The Fraternity attracts potential brothers from many disciplines who all share a background in chemistry even if their respective sciences focus on different scientific questions. We at *Beta Psi* are proud of all of our brothers and our representation at STLAURS, and hope to increase our number of presenters in the next few years in order to demonstrate the academic strength of our Brotherhood as well as the diverse sciences we represent.

Beta Psi Continues Long-Standing University and Community Tradition

Submitted by Megan Czerniejewski, *Beta Psi* 2010

In 1974, the first ever Great Cardboard Boat Regatta transpired on Southern Illinois University's campus lake. Professor Richard Archer, a former professor of freshman Art and Design, decided to challenge his students to build boats out of cardboard as a final exam. Buckminster Fuller, a distinguished professor at the time, also had a hand in furthering the event by encouraging his students to 'do the most with the least' by building useable boats out of nothing more than corrugated cardboard held together by tape and/or one-part epoxies. The original regatta flourished through the years, but saw a decline in participation in the early 2000s as it lost some of its funding. In

(continued on page 63)



Beta Psi Brothers Savannah Haslett (L) and Jaime Sykes (R) present at STLAURS.

Beta Mu Chapter, Occidental College, Los Angeles, California

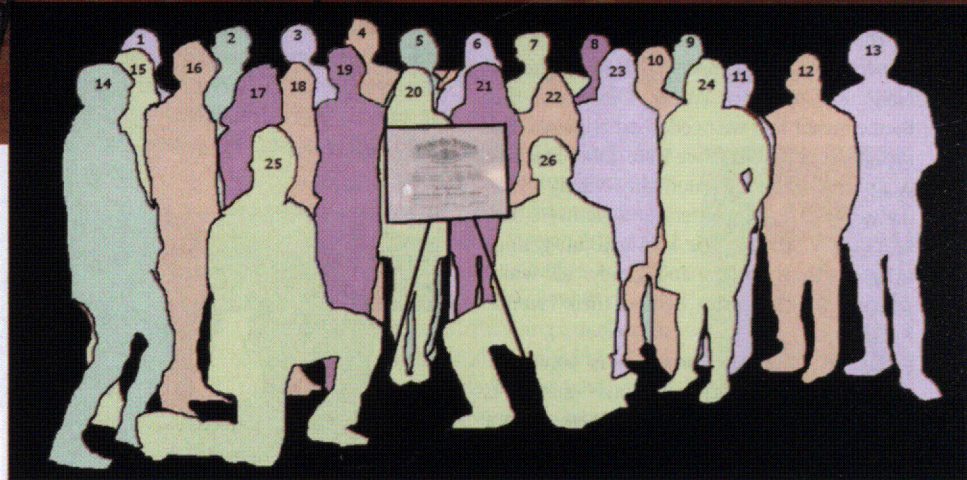
By D. Mitch Levings, Grand Historian
Photos by Derek Marin



Beta Mu and the Supreme Council

January 17, 2015, 10 years and 10 days after being designated inactive, Supreme Council Proposition 4528 restored Beta Mu Chapter at Occidental College in Los Angeles to the active chapter rolls. Unlike the legendary phoenix, an inactive collegiate chapter does not spontaneously rise from its ashes; reactivation takes a lot of work, organization and communication.

The spark of Beta Mu's reactivation started in November 2012 with a query from sophomore chemistry student Christopher Discolo. Chris asked what it would take to restore Alpha Chi Sigma to the Occidental campus. That inquiry set the wheels in motion with Expansion Director Jen Schnippert guiding the process of getting approvals from Occidental. With the local support of faculty members Don



1 Eduard Pey, 2 Christopher Discolo, 3 Samuel Luke Schulert, 4 Nick Thomas, 5 Lowell Bartlett, 6 Natalie Dwolet, 7 Alexander Rand, 8 Arvin Sookezian, 9 Griffin Mead, 10 Elya Shamskhov, 11 Franklin Maharaj, 12 Will Reeves, 13 Derek Ross, 14 Myles Groner, 15 Taryn Ng, 16 Preston Lee, 17 Mealani Kaiser, 18 Jenny Wang, 19 Robert Zhang, 20 Tina Zolfaghari, 21 Emma Spielfogel, 22 Julia DeRogatis, 23 Maya Herzig, 24 Helen Webster, 25 Kip Nalley, and 26 Mark Evaniak.

Deardorff (Beta Tau) and Chris Craney (Beta Mu), Chris and four other chemistry students were directed to reach out to the Beta Gamma Chapter at nearby UCLA. The neighboring chapter eagerly accepted the request for help. Meanwhile, on the Occidental campus, interest started to build, and the original five students were joined by two more. Pledge instruction for

the Occidental undergrads began at UCLA. Every other week they would traverse the 405 Freeway, arriving at UCLA to participate in pledge meetings and programs. Undergraduate students Christopher A. Discolo, Nick S. Thomas, Griffin J. Mead, Elya A. Shamskhov, Shannon N. Owens, Franklin R. Maharaj and Professor Derek Ross were initiated by Beta

Beta Gamma on May 30, 2013. With this core group established at Occidental, the next step was for them to organize locally. The group was officially designated a colony of *Beta Gamma* on January 18, 2014. As a colony, the group attracted more members and made their presence known within the chemistry department and in the local community. On campus they obtained a franchise to sell laboratory safety gear and organic chemistry model kits. Within the community, they participated in the Occidental College Science Olympiad for local middle and high schools in Los Angeles. They also formed a partnership with Saint Rita Middle School to judge science fairs. In partnership with the Los Angeles Professional Chapter and the chemistry department, they organized a Boy Scout Chemistry Merit Badge workshop. A petition to reactivate was prepared and submitted to the Supreme Council late in the fall of 2014 with approval granted in January 2015.

With *Beta Mu* an active chapter again, the planning began to welcome them back in grand style with a charter return and celebration with the Grand Chapter officers. April 25, 2015, was selected for the date, and Grand Master of Ceremonies Kip Nalley coordinated arrangements for the event with *Beta Mu* Master Alchemist Preston Lee and Chapter Advisor Derek Ross. The GMC flew into Los Angeles on Thursday, April 23, and was soon joined by GMA Mark Evaniak. On Friday, April 24, the GMA and GMC got better acquainted with the Chapter Advisor and chapter members over lunch. Friday evening, GCA Helen Webster joined the other SC members in witnessing a *Beta Mu* initiation ceremony and welcoming the newly initiated brothers. On Saturday, the GMA, GCA and MC took advantage of being in LA by taking a field trip to see the La Brea tar pits and the space shuttle before heading back to Occidental for the installation banquet. The Dumke West room of the Swan building on the campus of Occidental College was the venue for a southwestern buffet and Extraordinary Session of the Grand Chapter. GMA Mark Evaniak opened the session and turned the lecture over to GMC Kip Nalley who introduced a number of speakers. Remarks were given by *Beta Mu* alumni Griffin Mead and Elya Shamskhou; new initiate Robert Zhang; collegiate brothers Chris Discolo, Nick Thomas, Maya Herzig; and chapter MA Preston Lee. Next, Southwestern District Counselor Derek Marin, GCA Webster, GMC Nalley and GMA Evaniak formally welcomed *Beta Mu* back into active status. As a final act before closing the Extraordinary Session, GMA Evaniak returned the *Beta Mu* Charter to MA Preston Lee. On Sunday, GMA Mark left early while GMC Kip

Certificates of Appreciation for the Beta Mu Reactivation

Derek Marin— For his guidance and mentorship of the *Beta Mu* Chapter as District Counselor during the colonization efforts at Occidental College.

Beta Gamma Chapter— For their support and encouragement given to the *Beta Mu* Chapter during the colonization efforts at Occidental College.

Derek Ross— For his guidance and active involvement within the *Beta Mu* Chapter during the colonization efforts at Occidental College.

Don Deardorff and **Chris Craney**— For their guidance and wisdom given to the *Beta Mu* Chapter during the colonization efforts at Occidental College.

Christopher Discolo— For his incredible dedication, determination, and leadership invested in the *Beta Mu* Chapter as a Master Alchemist and Master of Ceremonies.

Nicholas Thomas— For his admirable efforts as Vice Master Alchemist in the recruitment and training of new members at Occidental College who have helped elevate *Beta Mu* to chapter status.

Shannon Owens— For her dedication and organization of initiation ceremonies invested in the *Beta Mu* Chapter as a Master of Ceremonies.

Griffin Mead— For his dedication and hard work as Treasurer invested in *Beta Mu*'s finances during its transition to chapter status.

Franklin Maharaj— For his dedication and organization invested toward initiation ceremonies of *Beta Mu* Chapter as a Master of Ceremonies.

Elya Shamskhou— For his admirable efforts as Vice Master Alchemist in the recruitment and training of new members at Occidental College who have helped elevate *Beta Mu* to chapter status.

Michael Patton— For his initiative and dedication to reactivation of the *Beta Mu* Chapter as one of the initial members of the *Beta Mu* Colony.

Preston Lee— For his hard work and dedication to the reactivation of the *Beta Mu* Chapter as Master Alchemist and for coordinating a successful reactivation ceremony.

and GCA Helen made a tourist run to the Santa Monica pier, had lunch in Santa Monica, and viewed the ocean from Venice Beach before heading home

This marks the second time that *Beta Mu* has been reactivated. Chartered in 1954, the chapter went inactive in the spring of 1972. The chapter was reactivated in the spring of 1982, only to go inactive again in 2005.

Prior to its association with Alpha Chi Sigma, Occidental College had a long-standing chemistry club with the stated purpose of preparing its members for the transition from college to the various fields of chemistry. In 1949, the Chemistry Club became aware of Alpha Chi Sigma and decided there would be advantages to associating with a national chemistry fraternity. Looking to UCLA as an example, Chemistry Club changed its name to Omega Chi Sigma, and started patterning their

activities after what *Beta Gamma* was doing. Despite a lot of talk and planning at the local level, it took more than three years for Omega Chi Sigma to finally reach out to the National Office. Once contact was established, the Supreme Council flew into action. Past GMA Marion Dice and GR John Kuebler were dispatched to Occidental to inspect the university and meet with members of Omega Chi Sigma. With a favorable report from Dice and Kuebler, the Supreme Council approached *Beta Gamma* Chapter to sponsor Omega Chi Sigma as a colony. In order to be a colony of a fraternity from a different university, Occidental College required Omega Chi Sigma to make several organizational changes—even change its name. With the requirements of Occidental College satisfied, the group, now called the Alpha Chi Club, was ready to become a *Beta Gamma* Colony. The UCLA chemistry depart-

ment was supportive and the *Beta Gamma* Chapter was ready to guide the Occidental group, but when the paperwork reached the UCLA administration, the process was abruptly stopped. According to University of California Regulation 17, a university organization could not be responsible for a group whose members were not all "bona fide students recognized by the university." Regulation 17 was enacted by the UCLA Regents to prevent the infiltration of communistic influences on campus organizations, and the UCLA administration held firm that *Beta Gamma* Chapter could not sponsor a colony at Occidental. After several attempts to work through the UCLA administration, the colony route was abandoned and the Alpha Chi Club worked directly with Pacific District Counselor Reed Brantley (who also happened to be the head of Occidental's chemistry department), the National Office and the Supreme Council to prepare a petition for an Alpha Chi Sigma Charter. The petition was transmitted to the subordinate chapters in February 1954, approved in April 1954, and an installation date of May 23, 1954, was set. GMA Griffin convened an extraordinary session of the Grand Chapter for the purpose of installing a new chapter, designated *Beta Mu* of Alpha Chi Sigma. A large delegation of brothers from *Beta Gamma*, *Sigma* (Berkeley), *Alpha Alpha* (Stanford) and other chapters conducted an initiation ceremony for 24 candidates. It is worth mentioning that in addition to the 24 Occidental candidates, the delegation from *Sigma* drove the 450 miles to Los Angeles with a pledge of their own to be initiated at the Grand Chapter installation. At the conclusion of the initiation, Ken Edwards was sworn in as the chapter's first Master Alchemist. Brother Edwards then swore in the remainder of the officers. The installation banquet was held at Marino House on Mission Street in San Marino.

Beta Mu was installed just in time to send Don Smith to East Lansing, Michigan, as its delegate to the 22nd Biennial Conclave. The Conclave in East Lansing has gone down in record as the Fraternity's most contentious ever in terms of legislation. After several tense legislative sessions with Conclave motions debated either into defeat or withdrawal, Brother Smith seconded a motion by *Alpha Chi* Delegate Dan Wise. The proposal required any member enrolled at an institution where an Alpha Chi Sigma chapter was active, to be an active member of that chapter. The discussion got so bogged down in debate that the Grand Recorder had difficulty sorting all the amendments to amendments to the motion. Finally, after a fairly heated exchange, *Alpha Iota*



Beta Mu Reactivation, April 25, 2015

Delegate Richard Snyder chastised the Conclave for being "completely ridiculous, putting in picayune amendments, clauses and changes." To this, an exasperated Don Smith stated that since the resolution had been emasculated and no longer met the intent, it should just be withdrawn. In response to that, the Conclave broke out in applause. The applause was short-lived though, because Brother Smith had only seconded the motion. The GMA ruled that only the mover of the motion, Brother Wise, could withdraw the motion and he had already left the Conclave. After more debate on how to kill the motion, Brother Smith suggested that a vote be postponed indefinitely and let the motion die for lack of vote at the end of Conclave. More applause, and the motion was postponed.

Despite the rather rude introduction to Grand Chapter politics, *Beta Mu* grew and thrived. Throughout the 1950s and '60s, *Beta Mu* maintained a high profile on campus and within the chemistry department. They were known for their training sessions on slide rule fundamentals and chemistry laboratory safety. One of the driving forces behind the chapter's success was the involvement of chemistry department chairman Reed Brantley. When Brother Brantley relocated to Hawaii in 1966, chapter activities began to decline. Also working to the chapter's disadvantage was the anti-establishment attitudes of campus society, especially in California. By the late 1960s and early '70s, fraternal organizations, even professional ones, became unpopular symbols of structure and unenlightened thinking. In the new free-thinking environment, fraternities

had a difficult time recruiting new members. In spring 1972, Alpha Chi Sigma lost five chapters due to their inability to attract and retain new members. *Beta Mu* was one of the five.

Beta Mu's inactive status lasted about 10 years. On April 3, 1982, the Supreme Council restored *Beta Mu* to active status. The motivation for reactivation came when *Beta Tau* Brother Don Deardorff joined the Occidental chemistry faculty. He recruited *Beta Mu* alumni Ken Edwards and Robert Nakamura, along with DC Ken Erickson, to make presentations to chemistry classes promoting Alpha Chi Sigma. Their efforts paid off, and 10 Occidental students were initiated by a ritual team from UCLA's *Beta Gamma* Chapter. Almost immediately upon reactivation, *Beta Mu* teamed up with *Beta Gamma* Chapter to help with the May 29, 1982, installation of *Gamma Zeta* Chapter at California Polytechnic State University at San Luis Obispo ("Cal Poly" to most). The installation was performed in Los Angeles with 24 Cal Poly candidates initiated by the combined Los Angeles chapters.

The chapter stayed strong and active through the 1980s and '90s, but began to falter again with the turn of the century. Attrition had caught up with the chapter, with members graduating faster than they were being initiated. The last contact the National Office had with the chapter was during the spring of 2003 when they reported they had inadequate membership to fill the offices required by the constitution. With no evidence of any collegiate members still on campus, on January 7, 2005, the Supreme Council declared *Beta Mu* inactive for the second time. ◉

Risk Management Policy

Adopted by the Supreme Council on June 13, 2010.

Its Three Objects guide Alpha Chi Sigma, the Professional Chemistry Fraternity. The National Fraternity, as a resource and support organization, provides the following Risk Management Policy to govern its own events and to guide its chapters as they conduct local events. The responsibility for implementing this policy at local chapter events remains with the local chapters. In addition, members are responsible for their and their guests' compliance with this policy.

ALCOHOL AND DRUGS

1. The possession, use and/or consumption of ALCOHOLIC BEVERAGES, while on chapter premises, or during an official Fraternity event, or in any situation sponsored or endorsed by the chapter, must be in compliance with any and all applicable laws and regulations, whether they be those of the state, province, county, city or educational institution.
2. No alcoholic beverages shall be purchased through the Fraternity or chapter treasury, nor shall purchase of such beverages for members or guests be undertaken or coordinated by any member in the name of or on behalf of the Fraternity or chapter. The purchase and/or use of a bulk quantity of alcoholic beverages, e.g., kegs, is against Fraternity policy.
3. The Fraternity's name shall not be associated with any event co-sponsored with an alcohol distributor, charitable organization or tavern/bar where alcohol is given away, sold or otherwise provided to those present.
4. No alcohol shall be present at any rushing, pledging, or initiation event or at any pledge or chapter meeting.
5. It is against Fraternity policy to sponsor events at which non-members of the Fraternity, unless specifically invited, have unrestricted access to alcohol.
6. No member shall permit, tolerate, encourage or participate in "drinking games" while on chapter premises during a Fraternity event, or at any event sponsored or endorsed by a chapter.
7. The possession, sale and/or use of any ILLEGAL DRUGS or CONTROLLED SUBSTANCES at any chapter house, at any Fraternity sponsored event, or at any event that an observer would associate with the Fraternity, is strictly against Fraternity policy.

8. Any function where alcoholic beverages are present shall also have non-alcoholic beverages and food available.

9. Events at which alcohol is available shall have a guest list, with all attendees registered and with age verification at the door. Any alcohol present is the responsibility of the individual who provides it. A safe ride home program should be provided.

10. It is recommended that events where alcoholic beverages are present be conducted at establishments licensed for the sale and service of such beverages.

11. This policy shall be an integral part of membership training materials. It should also be posted at the door of all parties. Each guest should sign in when they arrive indicating that they have read, understood, and agreed to follow these regulations.

12. Any violation of this policy may be the subject of discipline by a local chapter or by the National Fraternity if it is aware of the violation. If Alpha Chi Sigma receives information alleging a violation of the Risk Management Policy by a chapter, it will conduct an investigation appropriate to the circumstances and take any necessary action. The investigation will give the chapter an opportunity to respond to the allegations.

HAZING

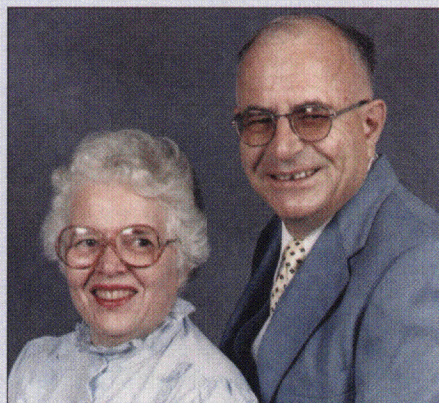
The Fraternity does not tolerate or condone any manner of hazing. Hazing activities are defined as: "Any action taken or situation created intentionally, whether on or off Fraternity premises, to produce mental or physical discomfort, embarrassment, harassment or ridicule." Such activities include, but are not limited to: the use of alcohol; paddling in any form; creation of excessive fatigue; physical or psychological shocks; and any other activities inconsistent with Fraternity Law, ritual or policy, or with the applicable laws and regulations of the state, province, county, city, or educational institution.

SEXUAL ABUSE

The Fraternity does not tolerate or condone any form of sexually abusive behavior, whether physical, mental, or emotional, on the part of its members. This includes any actions that are demeaning to any person or group, including but not limited to date rape, gang rape, or verbal harassment.

IN MEMORIAM

BACKSTROM, Frank M., *Alpha Sigma* 1952
 COON, Joseph M., *Beta Delta* 1938
 CYWINSKI, Norbert F., *Alpha* 1952
 EVANS, James D., *Nu* 1963
 GEARHART, Jerrold Jerome, *Beta Alpha* 1947
 HAUER, Harold, *Beta Nu* 1964
 KULKARNI, Sharad R., *Beta Pi* 1962
 NICOLAISEN, Bernard H., *Gamma* 1940
 SCHELHORN, Frederick B., *Alpha Iota* 1938
 TAYLOR, Terry, *Beta* 1941
 WARING, James R., *Beta Nu* 1954
 WAUGH, Richard C., *Alpha Sigma* 1934



Norbert and Elizabeth Cywinski

Norbert CYWINSKI, *Alpha* 1952, was the fourth of nine children, and the oldest surviving son, born to Charles and Catherine Cywinski on the family dairy farm and ranch in De Pere, Wisconsin. Due to his persistence in following his beloved older sister Dorothy to school, the teacher persuaded his parents to allow Norbert to begin elementary school at the age of 4. When not assisting on the family farm, Norbert's father consigned him to repair tractors on farms throughout the region to bring income to the family. Norbert explained that although he considered himself to be a mechanic, he aspired to be a chemist because, "The chemistry teacher was the only man at the high school, and so I thought if I wanted a professional career, that was the choice."

Norbert graduated from high school at the age of 16 and enlisted in the United States Marine Corps (USMC) before the end of World War II. He served as a staff sergeant with specialties as a riflery instructor and amphibian tractor instructor during 1946–48, went into the Marines Corps Reserve and began undergraduate education, and then returned to active duty 1950–51. Norbert completed a Bachelor of Science degree (B.S.) in chemistry at University of Wisconsin-Madison in 1954. He worked as a taxi driver in Chicago to begin his graduate studies, and received several doctoral fellowships from chemical and oil companies to complete doctoral studies in organic chemistry.

Norbert's first job as a research chemist was for Phillips Petroleum Company in Bartlesville, Oklahoma, from 1959–1965. One day he saw the

company journalist in the company cafeteria and told his co-workers he wanted to meet her. Norbert and Elizabeth Sue Warren married in December 1961. They had one daughter. In 1962, Norbert was awarded his Ph.D. degree from Northwestern University (Evanston).

Norbert worked as a staff research chemist and then senior research chemist for El Paso Products from 1965 to 1983. He authored 17 patents on chemical processes in the United States and two in Germany. From 1986 to 1998, he worked as a chemist at Southwest Analytical Chemistry (Sachem) in Austin; and consulted for them for some time afterward.

Harold HAUER, *Beta Nu* 1964, of Hilton Head Island, South Carolina, died Sunday, July 19, 2015, at his home. He was born April 26, 1942, in New York City. Harold grew up in the Bronx and graduated from The City College of New York with a B.S. in chemistry in 1962 and later earned his Ph.D. in analytical chemistry from Purdue University in West Lafayette, Indiana, in 1970.

Harold began working as an analytical chemist at Hercules Incorporated in Wilmington, Delaware, in 1969 and co-authored three patents relating to chemical analysis instrumentation during his 34-year tenure. He retired as a Research Fellow in 2003. He was a 50-year member of the American Chemical Society and Alpha Chi Sigma.

While living in Delaware, Harold found ways to express his love for the arts, volunteering, and food. He and his wife, Helen, were season ticket holders at the Delaware Theater Company for many years. He designed sets for the Chapel Street Players in the 1970s and performed a self-written monologue, "A Jew's View of Christmas" to good reviews. Using his set designing knowledge, Harold transformed his daughter's high school entrance into a pirate ship and a hallway into the deck of a cruise ship for two after-prom celebrations. For four years, Harold served as president of his daughter's Montessori school, and he regularly volunteered to be a judge at the Delaware Regional Science Fair. Harold loved good food and enjoyed making dishes that were complex, appealing to his analytical nature. Perhaps the most well-known and loved of these dishes were his sourdough pancakes.



Harold Hauer at a local school in South Carolina

After retiring to Hilton Head Island, South Carolina, in 2004, where he and his family had vacationed for years, Harold led a very active life as a teacher for Lifelong Learning of Hilton Head Island from 2006–2014, and as a member of the Board of Directors for the World Affairs Council of Hilton Head Island and Lifelong Learning of Hilton Head. As president of the Judging Committee of Sea Island Regional Science Fair (SIRSF), he gave generously of his time to many science fairs as a judge in Beaufort County. Harold loved learning and sharing his knowledge with others. He gave chemistry demonstrations at local schools, enjoyed conducting science experiments with his granddaughter, and will fondly be remembered as a teacher at Congregation Beth Yam religious school for his devotion to the students.

Harold is survived by his wife Helen Schoen Hauer.



Kimberly "Bubbles" Michalek, *Pi* 2000

Kimberly D. MICHALEK, *Pi* 2000, better known as "Bubbles," departed this world on August 6, 2015. A certified scuba diver, she was diving with her brother near Hastings Reef, part of Australia's Great Barrier Reef, when she encountered difficulties. Paramedics were dispatched to the boat, yet despite the best efforts of first responders and rescue personnel, Bubbles was pronounced dead at the scene. An environmental chemist, she was initiated into *Pi* Chapter at Syracuse in 2000. She served as Chapter MA and participated in numerous outreach activities, including the reactivation of *Nu* Chapter at Penn State. She attended the 2000, 2002 and 2004 Conclaves.

Bubbles made her home in Anchorage, Alaska, and was working an assignment in Soyo, Angola. She was a world traveler and embraced adventure with a passion unlike anyone else. She could be found mountain climbing in Mexico or scaling El Capitan in Yosemite National Park, to spelunking the caves of New York. She was an avid skydiver and scuba diver. Camping and hiking were among her hobbies. She lived her life to its fullest and was an inspiration to all who knew her. Memorials were held in Anchorage, New York and Angola. The Facebook page, Memories Of Kim Bubz Michalek, received posts from all over the world. She will be missed.

Ryan **WISSMANN**, *Gamma Theta 2013*, married Alison Kleiner, *Gamma Theta 2012*, on October 18, 2014.

Dr. Nadim **KODSI**, *Alpha Rho 1994*, and his wife are expecting their first child.

Alan **MARCUS**, *Alpha 1968*, is serving as the Interim Head of the Department of Chemistry at Mississippi State University.

Ten brothers in the 2015 class of ACS Fellows

On Monday, August 25, at the 250th American Chemical Society meeting (Boston, MA), the 2015 class of ACS Fellows was installed.

A group of 10 Alpha Chi Sigma brothers were among the 78 new Fellows: George P. Cobb III, *Gamma Delta 1981*; Brian P. Coppola, *GE, Alpha Beta 1988*; Robert-Michael de Groot, *Beta Mu 1986*; Mark D. Frishberg, *Gamma 1967*; Martin Gruebele, *Zeta 1994*; Lanny S. Liebeskind, *Gamma Beta 1979*; Leonard R. MacGillivray, *Alpha Theta 2003*; John M. Mali, *Delta 1977*; Dawn Mason, *Delta 1990*; R. Lee Penn, *Beta 2002*.

A Note for Contributors

We certainly appreciate the added appeal of pictures in *The HEXAGON*. When taking photos for submission, please:

- Always use a flash indoors.
- Do not edit or alter your images. *The HEXAGON* production staff can and will determine if an image needs color correcting or additional processing.
- Set your digital camera quality to its highest setting with the least compression. Photos that are less than 8 inches wide at 72 dpi, or that have a file size of under 1 megabyte, may be too small for print production.
- Please send us the image file that is directly from the camera. Photos that are extracted from iPhoto albums, Facebook pages or Word documents have file sizes that have been compromised.
- Print photos are welcome!



ABOVE: Beta Psi brothers help in the outreach tent at the Regatta.

RIGHT: A group tries to stay afloat during the Cardboard Boat Regatta.



(continued from page 57)

2010, Brother Derek Burnet and the *Beta Psi* Chapter took over the, then floundering, regatta.

This year marked the 42nd annual and the 6th event hosted by *Beta Psi*. Thirty-six boats raced across campus lake in four different divisions—oar-powered boats, mechanically powered boats, instant boats and youth boats. Nearly 1,500 onlookers crowded the lakeshore to cheer them on or to make the course more challenging by launching water balloons at the racers. Despite what many think, this is not a fundraiser for the chapter—all of the proceeds go toward furthering the event in the future. This event is fun and educational for all, making *Beta Psi's* months of hard work and planning worthwhile. We do it for the community, for Southern Illinois University and for science.

No matter the age of the participants or what kind of boat they built, everyone has to solve the same problem—how do you make corrugated cardboard float with people in it? It all comes down to Archimedes' principle, which states that the upward buoyant force exerted on an object immersed in a fluid is equal to the weight of fluid the body displaces. Some people meticulously work the calculations while others leave it up to chance. Regardless, it encourages participants to develop problem-solving skills. We also set up a science-outreach demonstration tent and invited bystanders to learn about different scientific properties of water. This event provides a unique opportunity for *Beta Psi* to collaborate with the local community and Southern Illinois University to keep up a long-standing tradition while furthering the second object along the way. ○

NEW INITIATES

ALPHA

Dominic W. Cheung
Anna K. Grassy
Alice K. Horein
Graeme S. Jacobson
Lillian M. Koch
Eric J. Lang
Anastasiya Sapatynska
Lauryn M. Siebold
Chelsea A. Simek
Sylvia G. Speidel
Luke J. Stoutenborough
Owen T. Walcott
Ross W. Wick
Jacob L. Zasada

BETA

Collin J. Bornhoft
Megan M. Cichos
Cody S. Hobbs
Doreen G. Leopold
Justin C. Liebelt
Russell A. Meyer
Rachel M. Moniz
Evan Song
William B. Tolman

GAMMA

Spencer T. Burton
Olivia J. Dahm
Jessica L. Eiermann
Emily M. Glasser
Seth M. Goldberg
Hanke Gu
Yichen Li
Christopher R. Lukowski

DELTA

Paige M. Berry
Zoe A. Boomgarden
Kaitlyn E. Chetney
Hailee R. Cox
Shravan R. Dommaraju
Connor F. Fraser
Amelia G. Gooch
Cameron J. Grahl
Kaylin J. Holmes
Leslie Jackson
Ali M. Kahveci
Taylor L. Lenz
Kaylee Libbert
Allison B. Mikesell
Patrick J. Napier
Christopher E. Posey
Samantha J. See
Aaron M. Smith
Parker N. Smith
Mary Madeline S. Willis

EPSILON

Sean A. Buehler
Mikayla J. Burrell
Jorge E. Campana Paez
Sarah M. Coghlan
Megan A. Coghlan
Laura R. Daily
Luis A. Dominguez
Steve A. Feldhake
Eashan Kumar

Elizabeth A. Laskowski

Jason R. Leib
Peter M. Leonard
Kaley L. Liang
Omeed Malek
Brian A. Moreno
Mo T. Nguyen
Kendall C. Noel
Richa B. Patel
Kyla M. Regadanz
Joseph M. Sakowski
Michael C. Spors
Gregory T. Sprout
Humza R. Syed
Athena M. Tran
Robert L. Whitaker

ZETA

Sean M. Anderson
Julia Antonson
Annesha R. Banerjee
Rohit Bhonagiri
Devon J. Boland
Royce Y. Chen
Janice Choo
Drew Donnelly
Nicole Fisher
Marina C. Galluzzo
Daniel J. Gross
Brianna L. Harper
Brian E. Hartnett
Vaibhav Jariwala
Dan Jeffries
Bryce L. Kille
Hun Kim
Michael Koerner
Kara K. Lane
Karena R. Lange
Wen Xuan Law
HyoungBin Lee
Dylan Luzbetak
Daniel P. MacDonald
Jennifer E. Main
Ruben Martinez
Janayah A. McClellan
Danielle Mensah
Emma R. Moore
Devi Patel
Aaron J. Polk
Matthew J. Purcell
June R. Qian
Frances Roth
Kenny Shin
Emily Smiarowski
Alejandro Torres
Lindsey A. Tucker

IOTA

Elizabeth A. Bohnet
Miranda N. Chastain
Charles A. Childs
Bryce D. Currey
Noah J. Eckstein
Devin A. Haupt
Lucas M. Huston
Nicolae C. Iovanac
Zabrina K. Johnson
Jessica D. Kohl
Bradley C. Mobley
Jennifer A. Mobley

Michael J. Plaskett
John M. Rupp
Nick E. Saulcy
Kyle L. Smerigan
Stephen J. Varkoly
Rachel K. Weber
Katerina M. Williams

MU

Steven Arias
Rico Brea
Kimberly R. Celona
Conor M. Corless
Steven R. Dastous
Thanh N. Dinh
Madison J. Dombrowski
Marina C. Garwood
Cynthia R. Gerber
Timothy A. Goddard
Harrison W. LeFlem
Molly S. Ruprecht
Tierney R. Standing
Tracy Yeung

PI

Adeola R. Ajayi
Antoaneta A. Andonova
Leila Gheith
Albanie K. Hendrickson-
Stives
Megan E. Huewe
Asim Iqbal
Jane M. Kim
Sandre K. Kirton
Jason Lam
Raychel M. Lewis
Alexis G. Mitchell-Dugan
Mikaela T. Panza
Farhan Rahman
Naomi Rivera Robles
Charles W. Ryan
Lena M. Seegars
Han Bong Shin

RHO

Aravindhkrishna Ajithkumar
Aditya Anerao
Jessica I. Beynor
Brigitte R. Butler
Samuel K. Chao
Yutong Chen
John E. Darges
James R. Dean
Kevin Edwards
Jose Carlo M. Esteban
Maria C. Gelabert
Grace Guo
Edward J. Hackim
Alexa D. Hann-Caruthers
Clifton Harris
Scout M. Howard
Sungwon Hwang
Christina M. Jackson
Manasvi Khullar
Anna-kay D. Knight
Jessica K. Logan
Tyler W. McGregor
Ashleigh Miller
Veronica J. Mirabent
Allison L. Mossinghoff
Elizabeth A. Neal
Denise J. Peppers
Haley C. Pressley
Evan W. Reynolds
Sandra E. Spencer
Morgan T. Turnow

Savannah T. Waldrop
Justin B. Ward
Melanie C. Washington
Davey West
Andrew N. White
Lindsay C. Wickersham
Alfre Wimberley
Tailong Xu

SIGMA

Zoe C. Adams
Roger Chang
LvXiao Chen
Kevin A. Fong
Virginia G. Garda
Charlene N. Gibbert
Katerina D. Harnetiaux
Kevin Ko
Rian C. Kormos
Anthony P. Martinez
Sanum N. Patel
Sajan C. Patel
Mason C. Scott
Suresh Sharma
Neil Shieh
Yujia Tao
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 Daniel Giraldo Herrera
 Casey J. Gringer
 Zhenhuo Hong
 Julia A. Hotinger
 Allen R. Jones
 Ronald M. Joseph
 Declan T. Kingston
 Ashlee M. Lambert
 Kelly H. Luong
 Kyle P. Mahoney
 Kelly M. Malone
 David S. Meier
 Brook J. Misailidis
 Thuy A. Nguyen
 Sara K. O'Malley
 Ben P. Pinkston
 Matthew Ray
 Brian A. Roberts
 Nina R. Rosso
 Paulene A. Sappo
 Liane E. Stanton
 Matthew L. Sun
 Han T. Truong
 Yushi Wang

GAMMA XI

Delaney G. Beals
 Ethan J. Becherer
 Garrett M. Becker
 Christopher R. Cain
 Liam M. Dalton
 Eleni R. Doerr
 Matthew T. Peszko
 Rachel E. Scroggins
 Megan L. Whitener

GAMMA TAU

Ericka Culp
 Alexis Derr
 Joseph Falcone
 Jared Fee
 Emily Groegler
 Mara Menk
 Jonathan Moschgat
 Margaret Progin
 Stephanie Zimmerman

GAMMA UPSILON

Caroline J. Cwalina
 Brittany A. West

GAMMA PHI

Emily E. Bonacquiti
 Jennifer M. Empey
 Olivia N. Mann

GAMMA CHI

Paula M. Amburgey
 Summer M. Astleford
 Ciara R. Boyd
 Olivia K. Colella
 Adam G. Diehl
 Jessica M. Hoak
 Katelyn M. Jones
 Samuel R. King
 Hailey N. Kintz
 Alexon C. Munson-Catt
 Whitney J. Price
 Bryan M. Stewart
 Lindsey P. Wheeler
 James B. Wigglesworth

GAMMA PSI

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 Alex T. Hanes
 Jeremiah T. Hendra
 Lori L. Kesling
 Vincent Kowalski

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 Rina G. Bhalodi
 Michelle S. DiFrancesco
 Austin D. Eggleston
 Maddy Faraco
 Eleni C. Farrell
 Megan Fuller
 Yulissa Y. Gomez
 Giftin Manilal
 Christin Manilal
 Emilie Y. Nazario
 Samantha J. Pearson
 Emily C. Petillo
 Mtesa I. Ramsey
 Samantha Ryder
 Barbara S. Suening

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 Austin H. Atkinson
 Ra'Kel B. Brown
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 Cassandra B. Brooks
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 Julia E. Jones
 Christine M. Joyce
 Kaitlin M. Kuznacic
 Ryan Mathews
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 Emily Guo
 Annabel J. Kuhn
 Erika A. Lee
 Grace W. Lei
 Matthew Mirek
 Claire H. Rodman
 Jennifer Tsui

UC-IRVINE COLONY OF BETA GAMMA

Emily Gong
 Mindy Ngo
 Carl V. Olson
 Eric O. Potma
 Matthew W. Xie
 Jacqueline J. Zou

100 years ago... Fall 1915

The Grand Recorder Treasurer reported that for the previous year (September 14, 1914–September 14, 1915) the Fraternity had receipts and assets of \$3,734.28 against disbursements and liabilities of \$2,822.17, leaving a net balance of \$912.11.

With the consolidation of the offices of Grand Recorder and Grand Treasurer in 1914, the Grand Recorder Treasurer's office became the general business center of the Fraternity. This consolidation allowed the Fraternity to hire its first stenographer. Miss Violet E. Olsen was employed by GRT in October. *Omega* Chapter at the University of Pittsburgh was installed in June of 1915. Also during the fall of 1915, senior chemistry student Paul Manning led the formation of the Stanford University Chemical Association, which would later become *Alpha Alpha* Chapter.

75 years ago... Fall 1940

The Supreme Council agreed to excuse unpaid Grand Chapter dues for brothers drafted into military service or called up from active reserve status. They did so with the understanding that after his tour of duty, should a soldier return to college as an undergraduate, he would resume paying normal undergraduate dues.

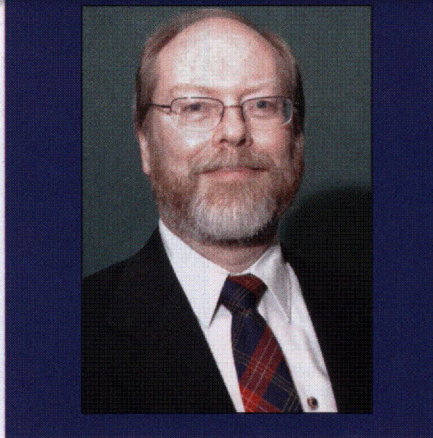
Chi Chapter, at Yale, was awarded a \$25 grant to be used to sponsor a lecture from Princeton's Dr. Hugh Taylor. The topic of Dr. Taylor's lecture was "Petroleum: The Raw Material for New Catalytic Processes."

Seventy-seven brothers attended the 13th Alpha Chi Sigma Professional Conference. The luncheon meeting was held during the American Chemical Society Fall Meeting, in Detroit. The next evening, 137 members attended the Alpha Chi Sigma Dinner. The evening program concluded with drawings for more than 100 door prizes that were donated by various chemical companies from the Detroit area.

Alpha Chi Sigma assumed sponsorship of the \$1,000 ACS Award in Pure Chemistry. The award was initiated in 1931, but was about to be dropped for lack of a sponsor. Brother Stewart Kurtz successfully headed a pledge drive to collect enough money to fund the award, and arranged a three-year contract for award sponsorship.

50 years ago... Fall 1965

On October 30, in Manhattan, Kansas, GMA Burton Tiffany convened a special session of the Grand Chapter to conduct the transition of Kappa Colony into *Beta Rho* Chapter. GMC Mack Barlow supervised the initiation of the first 11 *Beta Rho* brothers in a ceremony conducted by members from *Kappa* and *Alpha Tau*. After the initiation, the first meeting of *Beta Rho* was called to order, with the first item on the agenda being officer elections. GMA Tiffany installed Wendell Burch as the first MA, who in turn installed the rest of the officers. The installation banquet was held at the Officers Club at Fort Riley. Among the many brothers present for the initiation and installation banquet



D. Mitch Levings, OA, Grand Historian
Beta Delta 1975

were four brothers from *Eta* Chapter at the University of Colorado who made the 1,000-mile trek, arriving just two hours before the initiation. Douglas Schmidt, Jack Glatleider, John Randall and William Roberts were offered lodging but the quartet preferred to jump back in their Volkswagen and return to Bolder at the conclusion of the banquet.

The John R. Kuebler Award was presented to Fraternity founder J. H. Mathews during the Fall ACS meeting held in Atlantic City. Brother Mathews entertained the \$7.50 a plate crowd with the story of how he and Joe Holty conceived and implemented the idea of a fraternity for chemistry students.

Zeta Chapter was just putting the final touches on a major renovation of the chapter house. Improvements included the addition of two new rooms, replacement of the roof, windows and a complete remodeling of the bathrooms.

The Supreme Council authorized the Grand Recorder to replace the Fraternity's 40-year-old adding machine. The cost for a new Olivetti adding machine was estimated to be around \$175.

25 years ago... Fall 1990

A new feature made its premiere in the fall edition of *The HEXAGON*. A compilation of historical events, chronicled by the newly appointed Grand Historian, bore the name Looking Back...The motivation behind the column was to set a pace for conducting research for a centennial history book to be published in 2002. The hope was that Looking Back would appear in each issue of *The HEXAGON* until ending its run in 2003 (*GE NOTE: No End In Sight!*)

On September 25, University of Texas chemistry student Lisa Saunders, with the support of the Supreme Council, established The UT Alchemists, a chemistry club with the stated purpose of reactivating *Beta Theta* Chapter. *Beta Theta's* last member had left school in 1984 and the chapter was declared inactive in 1985. Saunders, intrigued by a plaque in the Chemistry Building, teamed up with Scott Bushman, a transfer student from Michigan and member of *Alpha*

Beta Chapter, to create The UT Alchemists along the same lines as a chapter of Alpha Chi Sigma.

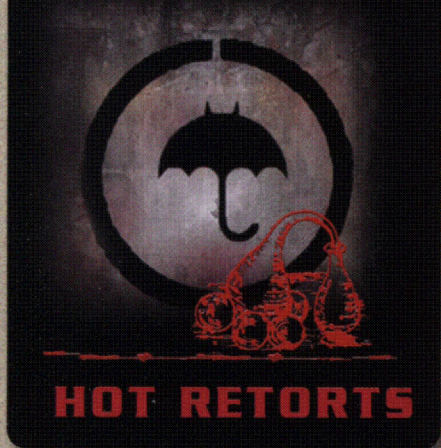
After a great deal of time and effort, particularly on the part of Harold Cowan, using a fully loaded 386-class computer, the Fraternity's new data management system became fully functional and productive.

10 years ago... Fall 2005

On August 29, Hurricane Katrina slammed into the upper Gulf Coast, causing significant destruction to the entire region. The devastation in the New Orleans area caused an extended closure of many area businesses, including universities. The brothers of Loyola's *Gamma Rho* came through the category 3 storm unharmed, but many had to relocate to other universities for the semester. Brothers from around the country posted on the Fraternity's website their universities' policies on taking in displaced students along with offers to help find housing and other assistance. A scheduled October installation ceremony for *Gamma Rho* Chapter had to be postponed until the university returned to a normal schedule. *Gamma Rho* had authorization from the Supreme Council to pledge and initiate qualified candidates from nearby Xavier University, Dillard University and Tulane University, but with all the area universities closed, *Gamma Rho* wouldn't be using their authority. The Supreme Council waived all fees for a displaced student from Tulane. Christina Carpenter relocated to the University of Arkansas, where she pledged and was initiated by *Alpha Sigma* Chapter.

While Hurricane Katrina caused the cancellation of the Southeastern District Meeting, District Conclaves were held in parts farther north. In September, the chapters of the North Central District met at the National Office Building in Indianapolis. Organized by Indianapolis Professional Chapter President Christy Gesell with Chuck Carroll, about 60 brothers spent the day participating in discussions on topics from ritual to fundraising to relations with the National Office. A few weeks later, the Central District held their second District Conclave of 2005. The fall event was held in St. Louis and hosted by *Alpha Epsilon* Chapter. Like the North Central District Conclave, about 60 brothers were in attendance and spent the day participating in a wide variety of topics. At the end of the day, the meeting moved to Saratoga Lanes for the dual purpose of bowling and bonding.

To increase efficiency and reduce postage costs, GR Pat Johanns ceased mailing *The Chrome and Blue* to chapter officers and instead published the document in pdf format and posted it to the Alpha Chi Sigma national website. Where *The Chrome and Blue* was traditionally sent to a limited mail list, having it posted on the worldwide web distributed it to a much wider audience who now had access to the information. The new electronic format allowed more information, more graphics and liberal use of colors to be incorporated in the Grand Recorder's monthly communication. ☉



Why is explaining a joke like dissecting a frog?

There are 10 kinds of people in this world:
Those who understand binary and those who do not.
The barman says, "I'm very sorry, but we don't serve tachyons."
A tachyon walks into a bar.

A neutrino enters a bar. The bartender asks, "Can I get you something?"
The neutrino says, "Nope, I'm just passing through."

What do you do with a dead chemist?
Barium!

A neutron walks into a bar and asks: "How much for a drink?"
Barman says, "For you? No charge."

$f(x)=2x+1$ walks into a bar and asks for a drink.
The barman says "I'm sorry, we don't cater for functions."

There are two types of people in the world:
Those who can extrapolate from incomplete data.

Why is a tert-butyl group so selfish?
Because it's all Me, Me, Me!

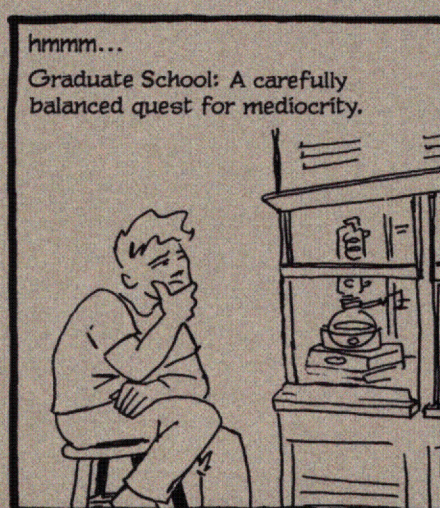
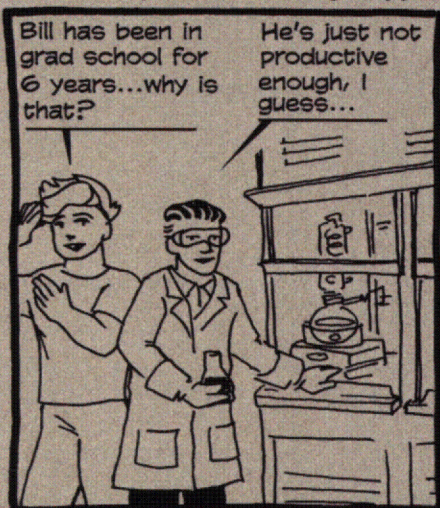
Three chemists are on a northbound train to Scotland. Soon after crossing the border, they spot a black sheep in a field. The biochemist says, "Look! Scottish sheep are black." The analytical chemist tut-tuts and corrects the biochemist, "You mean some Scottish sheep are black." The physical chemist glares at both of

them. "No, no, no! There is at least one sheep in Scotland, at least one side of which appears black from where we are sitting."

A bit farther along the trip, the chemists have switched to a car (presumably still arguing about the sheep in Scotland). They stop at a field full of sheep and get out of the car in front of a shepherd. One of the chemists, I suppose it was the analytical chemist, asks, "If I tell you how many sheep you have, will you give me one?" The shepherd agrees. Off to the side, the biochemist picks up her 4G phone, checks her position by GPS, goes on to access the website of a commercial satellite operator, ordering a hi-def photo of the area they are in. Sending back to the lab, the photo is analyzed, data are entered into a database, and the staff runs a couple of programs and gets back the result. They consult, and triumphantly announce: "You have exactly 1,546 sheep! And now you have one less." The physical chemist then grabs one of the animals and puts it in the trunk of the car. The shepherd nonchalantly replies, "If I tell you what your jobs are, will you give it back to me?" The chemists agree and the shepherd tells them, "You are all clearly scientists." "How did you know?" asks one of them. The shepherd replies: "Easy. You arrive unasked, you demand to be paid for a question to which I already know the answer, without having been commissioned, and you only have a vague idea of what you are talking about. Now, give me back my dog."

Explaining a joke is like dissecting a frog: you understand it better, but the frog dies.

Under the Hood by Coppola and Konster



LITHO/Brain P. Coppola and Reed G. Konster



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EPSILON-Indiana University
Bloomington, IN

ZETA-University of Illinois
Urbana, IL

IOTA-Rose-Hulman Institute of Technology
Terre Haute, IN

MU-University of New Hampshire
Durham, NH

PI-Syracuse University
Syracuse, NY

RHO-University of North Carolina
Chapel Hill, NC

SIGMA*-University of California-Berkeley
Berkeley, CA

TAU*-Cornell University
Ithaca, NY

ALPHA ALPHA-Stanford University
Stanford, CA

ALPHA BETA*-University of Michigan
Ann Arbor, MI

ALPHA EPSILON-Washington University
Saint Louis, MO

ALPHA THETA*-University of Iowa
Iowa City, IA

ALPHA KAPPA*-University of Virginia
Charlottesville, VA

ALPHA PI-George Washington University
Washington, DC

ALPHA RHO-University of Maryland
College Park, MD

ALPHA SIGMA-University of Arkansas
Fayetteville, AR

ALPHA UPSILON-Michigan State Univ.
East Lansing, MI

ALPHA OMEGA-Georgia Institute of Tech
Atlanta, GA

BETA GAMMA-Univ. of California-LA
Los Angeles, CA

BETA DELTA-Missouri University of Science & Technology
Rolla, MO

BETA IOTA-University of Florida
Gainesville, FL

BETA ETA-University of North Texas
Denton, TX

BETA MU-Occidental College
Los Angeles, CA

BETA NU*-Purdue University
West Lafayette, IN

BETA PI-University of the Pacific
Stockton, CA

BETA RHO-Kansas State University
Manhattan, KS

BETA SIGMA-Rochester Institute of Tech.
Rochester, NY

BETA TAU-University of Arizona
Tucson, AZ

BETA PHI-South Dakota School of Mines & Tech
Rapid City, SD

BETA CHI*-Hampden-Sydney College
Hampden-Sydney, VA

BETA PSI-Southern Illinois University
Carbondale, IL

GAMMA BETA-Florida State University
Tallahassee, FL

GAMMA DELTA-The College of Charleston
Charleston, SC

GAMMA ZETA-California Polytechnic State University
San Luis Obispo, CA

GAMMA ETA-Marshall University
Huntington, WV

GAMMA THETA-Truman State University
Kirksville, MO

GAMMA IOTA-Virginia Polytechnic
Blacksburg, VA

GAMMA KAPPA-James Madison Univ.
Harrisonburg, VA

GAMMA NU-Ohio University
Athens, OH

GAMMA XI-North Carolina State Univ.
Raleigh, NC

GAMMA OMICRON-Lehigh University
Bethlehem, PA

GAMMA TAU-Indiana University of Pennsylvania
Indiana, PA

GAMMA UPSILON-Duquesne University
Pittsburgh, PA

GAMMA PHI-University of Buffalo
Buffalo, NY

GAMMA CHI-Longwood University
Farmville, VA

GAMMA PSI-University of Toledo
Toledo, OH

GAMMA OMEGA-Widener University
Chester, PA

DELTA ALPHA-Univ. of Rhode Island
Kingston, RI

DELTA BETA-Alcorn State University
Alcorn State, MS

DELTA GAMMA-Georgia Southern University
Statesboro, GA

DELTA DELTA-Southeast Missouri State University
Cape Girardeau, MO

COLONIES

COLONY OF MU-Boston University
Boston, MA

ALBION COLLEGE COLONY OF ALPHA BETA-Albion College
Albion, MI

UC-IRVINE COLONY OF BETA GAMMA-University of California-Irvine
Irvine, CA

COLONY OF GAMMA DELTA-University of Tampa
Tampa, FL

COLONY OF DELTA BETA-University of New Orleans
New Orleans, LA

PHILADELPHIA U COLONY OF GAMMA OMEGA-Philadelphia University
Philadelphia, PA

WINTHROP U COLONY OF RHO-Winthrop University
Rock Hill, SC

KAPPA COLONY OF BETA RHO-University of Kansas
Lawrence, KS

PHILADELPHIA U COLONY OF GAMMA OMEGA-Philadelphia University
Philadelphia, PA

WINTHROP U COLONY OF RHO-Winthrop University
Rock Hill, SC

KAPPA COLONY OF BETA RHO-University of Kansas
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