

Minutes CESE Annual Meeting, June 25, 2011

Out-going president, Becky Reiss, geneticist and Associate Professor of Biology at New Mexico Institute of Mining and Technology, called the 15th annual CESE meeting to order on Saturday, June 25, 2011 at 1:15 p.m. in the auditorium of the new Science and Mathematics Learning Center at the University of New Mexico (UNM).

Dave Thomas began with a “magic trick.” He mixed several acids and bases together, so the audience could observe all the different color changes occurring with the resulting changes in the pH.

After Dave’s demonstration, Becky asked those in the audience to introduce themselves.

Following these introductions, Becky said CESE has a broad membership of scientists, educators, and parents. We are non-partisan. Our mission is to improve science education. We worked to defeat HB 302 in the last New Mexico legislative session, a bill that would have allowed the teaching of creationism as science. It stated:

RELATING TO PUBLIC EDUCATION; PROVIDING FOR PROTECTION OF
TEACHERS AND STUDENTS REGARDING THE TEACHING OF
CONTROVERSIAL SCIENTIFIC TOPICS.

"Controversial scientific topics" included “biological origins, biological evolution, causes of climate change, human cloning and other scientific topics that are often viewed by society as controversial.”

The exact wording of the bill appears at:

<http://www.nmlegis.gov/Sessions/11%20Regular/bills/house/HB0302.html>

Becky thanked those involved in defeating this bill and said that challenges remain.

Genetics is undergoing a paradigm shift, Becky explained. It is often muddled by ads. Corporations don’t have DNA, as it is a molecule in living organisms. DNA, RNA, lipids, and chromosomes are all important, chromosomes most important in heredity.

New Mexico is a leader in personalized medicine and DNA research. We can’t have speakers declaring that DNA is too complicated to understand, as was stated by a creationist at a meeting Becky attended. We need an educated citizenry to promote science.

Becky then introduced next year’s slate of officers:

Terry Dunbar, president
Matt Nyman, vice-president
Marilyn Savitt-Kring, secretary

Jerry Shelton, treasurer
Becky Reiss, past president

Board members at large:

Marshall Berman, Steve Brugge, Cindy Chapman, Lisa Durkin, Jack Jekowski, Kim Johnson, Marvin Moss, Ken Whiton, and Dave Thomas.

There were no new nominations. The slate was approved, and Becky handed the presidential gavel to Terry Dunbar. Terry was pleased to see so many teachers in the audience. Terry has been a teacher for 30 years, and he is now working at El Camino Real Academy in the South Valley. The text of Terry's speech follows:

"I think all or nearly all of you here today have done two things in the last 24 hours. You've bathed or taken a shower, and you've also used an electrical device, probably several electrical devices – electric lighting, microwave, hair drier. But what if you couldn't count on doing either of these things at home? What if I told you that there is a community here in Albuquerque that doesn't have running water or electricity? I'm talking about a squatter's camp. In Spanish, it's called a *colonia*, like those on the outskirts of Ciudad Juarez. It's Pajarito Mesa in the South Valley.

"Some of the students at our school live there. I want to tell you about one of them. We'll call him Alex. Alex was in tenth grade this year. Early in the year I noticed that he had tremendous insight into the math problems we were doing. Another teacher who had been working with him noticed the same thing. We recommended him for the gifted program. He was tested and qualified as a gifted student. He's an English Language Learner and has had various problems in school, mostly attendance and discipline issues. There were rumors that he was selling drugs to support himself. After the testing, he mentioned to one of his teachers that it was the first time anyone had told him he was smart.

"I wish that I could tell you that it was the beginning of great success for this young man. Not so. He was having attendance problems last fall, only coming to school about three times a week. Around mid-year, he quit all together. He had gotten his girlfriend pregnant, and they had a baby in April. She quit coming to school also, shortly before the baby was born. I talked to him shortly after their child was born, and he told me he wanted to come back to school, earn his credits, and graduate.

"What does this have to do with math and science education? We have a law called *No Child Left Behind* (NCLB) that says that all students must score "proficient" on standardized tests by 2014 -- all students, in all categories. Goals were set in the early 2000's, when the law was passed, and those schools that did not have enough students scoring high enough did not achieve *Adequate Yearly Progress* (AYP). The bar was raised every year, so now that we are getting closer to 2014, when all students, in all schools, must score "proficient," the majority of schools in Albuquerque have not made

AYP. Dire consequences ensue for those schools that do not make AYP for several years in a row. We teachers call this the shame and blame approach.

“We see schools being blamed for the ills of society. We read trash talk about teachers who want to avoid accountability. The Governor has said she wants to have a system for evaluating teachers, so that those teachers whose students don’t score “proficient” can be rooted out, shamed, and fired. I call it the neutron bomb approach to school reform. Save the buildings. Wipe out the people.

“You’re looking at one educator who wants to see accountability, but would like it to be fair. If we’re not careful, a system may be put in place that evaluates teachers equally across the state, but is applied to teachers who work in situations that are anything but equal. We in CESE have analyzed statistics and found a way to factor in the differences in demographics so that teachers and schools can be compared in a fair way.

“Alex, despite his innate talent, is not likely to excel in school. Others, because of issues of poverty and home environments, do not achieve at the same level as students from better backgrounds. We know that achievement in school is strongly correlated with culture and parents’ income. Disadvantaged students tend to cluster in some schools. Other schools tend to have affluent, Anglo populations. We all hope that some method can be found to improve the school performance of the disadvantaged students. Based on the analysis that we in CESE have done, we can say that the solution has not been found yet. Improvement has occurred in some schools, but it has been inconsistent. In the meantime, we need a system that recognizes the dramatic differences between schools, and the very different teaching conditions that ensue from those differences.

“The schools can to a certain extent be agents of social mobility for disadvantaged students. But they cannot solve all of society’s ills and should not be expected to. Trashing teachers and administrators is not the way to move forward. If you are outraged by what is happening, get involved with CESE or other organizations. Write letters to the editor. Let’s make sure that educational reform is done in a sensible manner.”

Terry thanked everyone in the audience for their time and introduced our guest speaker, Sam Kean, the author of *The Disappearing Spoon*, a best selling book about how the periodic table came to be.

Sam began by relating his childhood bouts with strep throat, how he tended to talk with things in his mouth, resulting in broken mercury thermometers. He watched his mother gather up the balls of mercury on the floor with a toothpick. They would then collide with each into one bigger ball. This was the beginning of his interest in chemistry.

The chemical symbols now used in the periodic chart are remnants of the influence of Latin, Greek, and the history of alchemy.

There are connections to U.S. history also, Sam explained. Lewis and Clark traveled with 600 mercury laxatives that were connected to “Dr. Rush’s Bilious Pills.” They were

named after Benjamin Rush, a signer of the Declaration of Independence and a doctor at the time who treated his yellow fever patients with a mercury-chloride sludge, administered orally. This concoction was an extremely powerful laxative that modern-day archaeologists were able to track down in Lewis and Clark's campsites, as the mercury deposits remained in the soil, perhaps because Dr. Rush's "Thunderclappers" worked a bit too well. Sam gathered this and many of these stories together to produce his book.

Aluminum, Sam continued, used to be very valuable, mainly because it was historically difficult to obtain in its pure form. In its natural state, it is always bonded to something, usually oxygen. Because of the previous difficulty in purifying it, it was very valuable. Obtaining it was a status symbol, often reserved for the affluent and powerful.

To show off its industrial prowess, American engineers capped the Washington Monument with a six-pound pyramid of pure aluminum. The U.S. was bragging at the time, indicating that it could afford to put it up there.

In the late 1880's, a cheap and easy process was discovered that extracted the pure metal from its contaminants. This discovery crashed the aluminum market, as aluminum was now easily available and everywhere. The periodic chart can tell a story, Sam continued.

Not well known, but a World War I battle took place at a molybdenum mine in the Rocky Mountains of Colorado. Germany needed this element to strengthen its steel. However, it had no supply of its own and was running out of what it did have. The only known supplier was a bankrupt, nearly abandoned mine on Bartlett Mountain in Colorado. The owner of this mine found a new technique for extracting molybdenum that crashed the worldwide market. This discovery wasn't really noticed, except by an international mining company based in Germany with a branch in New York. As soon as this German company learned this, they ordered their top man in Colorado to seize Bartlett Mountain.

In March of 1919, the molybdenum prices fell when tungsten replaced it in steel production. In World War II, Germany coveted tungsten, a heavier atom than molybdenum, for making machinery and armor-piercing missiles. The Nazis used up its reserve during WWII, then got more from trade with neutral Portugal.

Between the late 1930's and the early 1960's, Glenn Seaborg and his colleagues at the University of California at Berkeley made over the entire periodic table. They not only added elements; they realized some elements, like actinium didn't fit into the scheme that existed previously. By the 1970's scientists had designed more than 700 variations of the periodic chart. Seaborg and a colleague Al Ghiorso also discovered more elements than anyone in history and extended the periodic table by almost one-sixth.

The U.S. scientific community was attempting to name these new elements after states, such as Alabamine, Illinium, and Virginium. European scientists renamed these elements, so these names did not appear on the periodic chart.

Joseph Stalin, who came to power in 1929, considered himself an expert in science. He divided science into “bourgeois and proletarian.” He didn’t accept quantum mechanics, relativity, and genetics. He considered “liquidating” bourgeois physicists who rejected Communist ideology, but relented when it was pointed out that this action might hurt the Soviet nuclear weapons program -- “Leave (physicists) in peace. We can always shoot them later,” Stalin said.

The U.S., Germany, and the Soviet Union were fighting over the right to name elements, not to discover them. The U.S. tried to name an element after Glenn Seaborg, but this was controversial, as an element can’t be named after a living person. However, the U.S. team won, and in 1996, element 106 was named seaborgium, after Glenn Seaborg. An elderly Seaborg was photographed in front of a periodic chart – he was pointing towards the element named after him.

Mark Twain wrote a short story, considered science fiction by today’s standards, called “Sold to Satan,” about the perils of the periodic table. Six years before this story, Marie Curie’s work with radioactive elements had rocked the scientific community. Twain was probably aware of her work, as it was incorporated into this story.

Another scientist, Gyorgy Hevesy was assigned the task of separating radioactive atoms from non-radioactive atoms inside lead. It was impossible because it was assumed that the radioactive atoms, known as radium-D were a separate substance. Radium-D, as it turned out, was radioactive lead and could not be separated chemically from non-radioactive lead. He wasted two years on this project.

Hevesy lived in a boarding house. He suspected that meat was recycled from one day to the next and set out to prove it. He gathered some leftovers and sprinkled radioactive lead on them. The next day Hevesy waved a newfangled Geiger counter over that night’s goulash, and the meat clicked. Hevesy’s career blossomed after discovering elemental tracers.

He left Nazi Germany for Copenhagen. To hide the gold Nobel Prize medals won by Jewish German scientists, Max von Laue and James Franck, that were taken out of Germany (a crime at the time), Hevesy used a caustic mix of nitric and hydrochloric acids to dissolve the gold. After WWII, Hevesy returned to his laboratory and found the beaker undisturbed on a shelf. He precipitated out the gold, and the Swedish Academy recast the medals for them. After years of political turmoil, Hevesy also won a Nobel Prize in 1943 for his work.

The periodic table has changed in the last few decades, as new elements are being created in labs. Element 117 was added about a year ago, and it “squared off” the periodic table.

Sam concluded by suggesting that the periodic table might be the way to communicate with extraterrestrial life.

After his presentation, we adjourned for refreshments.

Respectfully submitted,

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