Bulletin of the New York Mineralogical Club

Founded 1886 ♦ New York City, New York ♦ Incorporated 1937

Volume 128, No. 12 *Celebrating the International Year of Crystallography* December 2014

December 10th Meeting:
John Sanfaçon: "Crown Jewels of the World"

"Crown jewels" is the traditional English term for the elements in metalwork or jewellery of the royal regalia of a particular state. They are often only used for the coronation of a monarch and a few other ceremonial occasions, though the monarch may also be often shown wearing them in portraits, as they symbolize the power and continuity of the monarchy. Though additions to them may be made, since medieval times the existing items are typically passed down unchanged as they symbolize the continuity of the monarchy.

Typical items in Europe include crowns, scepters, orbs, swords, rings, all usually in gold and heavily decorated with jewels, in styles which go back to the Middle Ages and are normally very conservative to emphasize the continuity of the monarchy. Many crown jewels are kept in a museum setting except when in use, and can be seen by the public. The crown jewels of many former monarchies can also be seen in museums, and may still represent national cultural icons even for countries that are now republics, as for example in Hungary, where the Holy Crown of Hungary has been re-incorporated in the coat of arms of Hungary. Several countries outside Europe have crown jewels that are either in traditional forms for the country, or a synthesis of European and local forms and styles.

Come hear John Sanfaçon, a highly popular lecturer for our Club, present a slide show of national mineral treasures from around the world from the last 2000 years.

Send in Your 2015 Club Dues

It is time to send in your 2015 club membership dues! All memberships run from January 1 to December 31 of each year (with a few exceptions).**If your mailing label says "Status: 2014", you owe your 2015 dues.** Please take the time now to mail in your dues in order to prevent uninterrupted delivery of your bulletin. A handy form appears on page 12. Dues are $25 for individual, $35 for family. Mail to: Membership Coordinator, N.Y. Mineralogical Club, P.O. Box 77, Planetarium Station, NYC, NY 10024-0077.

Review: Fall 2014 NYC Gem, Mineral, Jewelry & Fossil Show

By Mitch Portnoy

The Fall 2014 NYC Gem & Mineral Show was held on the weekend of November 8-9, 2014 at the Holiday Inn Midtown Manhattan. Here are some of the highlights:

Booth setup remains easy and it was colorfully enhanced with posters and banners. The usual club and show information flyers were available to the public as well as postcards, calendars, etc.

Attendance was steady and regular on both days and was about the same as last year. I did notice many new faces, which I find encouraging.

There was a noticeable number of **children** at the show. They seemed to be quite enthusiastic about getting some free minerals or playing the mineral ID game.

Every **dealer** I spoke to remarked that he/she had had a terrific show and looked forward to returning in March 2015. Every dealer also contributed something to our June 2015 **Benefit Auction** or 2015 Banquet Silent Auction. (Next year's banquet will have a garnet theme.) See list on page five for some detail.

The highlight of the show for me was the large number of **new members** that we enrolled (7). Membership **renewals** for 2015 was also quite satisfactory (11).

On the other hand, **sales** of Club publications, note card sets, CD-ROMS, posters and floaty gemstone pens (which made a return!) was on the light side. Remember –we have no direct financial interest in the show; Tony Nikischer (Excalibur Minerals) gives us a valuable booth space (free) in exchange for show support. We sell some mineral/gem/club-related materials to help defray our show expenses.

We had a **lecture** on both days of the show. Both **Howard Heitner's** lecture on Saturday (*Fluorescence*) and **Vivien Gornitz's** lecture on Sunday (*Mineral Crystallography*) were adequately attended and well-received, based on the feedback I heard afterwards. It was nice having the **new sound system** available for use.

The next NYC show comes up soon, believe it or not! (March 7-8, 2015) If you have some ideas as to what we should do to enhance how or what we do as the NYC Club there, please let me know.

I wish to thank all of the volunteers who made this show such a success for us: **Diane Beckman, Richard Rossi, Mark Kucera, Howard Heitner, Roland Scal, Vivien Gornitz** as well as all the members who enthusiastically attended the Fall 2014 NYC Gem & Mineral Show.

Issue Highlights

President's Message

By Mitch Portnoy

A small quantity of the 2015 Club calendars (*Spectrum of Mineralogy*) are still available. If you out-of-town members or busy locals would like one, let me know and I will send you one (while supplies last). And if you owe your 2015 dues, this would be a good time to combine the actions, right?

The International Year of Crystallography is about to come to an end and so will the series of crystallography games that have been featured at the meetings.

But 2015 has been declared the *International Year of Light* and I have developed a series of mineral/gem ID games relating to this theme. These will be played at the meetings throughout 2015.

INTERNATIONAL YEAR OF LIGHT 2015

In anticipation of this global celebration, all the good members who received their Bulletins thru email also were sent an attachment of an historic article by Kunz relating to fluorescent minerals. An introduction by **Dick Bostwick** appears on the next page.

Receive Your Bulletin Electronically!

Advantages

- Early Arrival
- Pristine Condition
- Full-Color Version
- Electronic Storage
- Club Saves Money
- Receive Special Mailings
- Go Green!

Requires

- Email Request to Mitch (mitchpnyc@aol.com)
- Adobe Reader (Free)

Optional

- Printer (B/W or Color)

Club Meeting Minutes for November 12, 2014

By Vivien Gornitz, *Secretary*

Attendance: 41

President Mitch Portnoy presided.

Announcements

- After the monthly raffle, **Naomi Sarna** was congratulated on her continued success in AGTA's gemstone carving and jewelry competition.
- Mitch pointed out items, both free and for sale, that were available this evening.
- There were brief discussions about the recent banquet and NYC mineral show.
- A "Brown Minerals" game was played, reflecting the evening's lecture. The prize was a specimen of Baltic Brown.

Special Lecture: Sidney Horenstein: "Baltic Brown"

Sidney Horenstein is a popular speaker at our meetings and he did not disappoint. After showing that Baltic Brown was a type of *rapakivi* (a Finnish word meaning crumbly) granite and giving a comprehensive overview of its uses and history as well as how, where and why this granite forms, he explained the problems with the overall definition of granite.

Happy Holidays to All Members!

New Club Acquisition!

- **Fender Passport Conference – Self-Contained Portable Audio System**
- Thanks to **Naomi Sarna**!

Welcome New Members!

Meredith Blackwell. . . . . Manalapan, NJ
Joan Deignan. . . . . Bronx, NY
Sam Gelman. . . . . Woodside, NY
Antoinette McLain. . . . . NYC, NY
Stephen Milne. . . . . NYC, NY
Kristall O'Neill-Richardson. . . NYC, NY
Joe Sarneski. . . . . Fairfield, CT
Robin Sternberg. . . . . NYC, NY

Members in the News

- **Vivien Gornitz** was one of the presenters at the 2014 GSA Annual Meeting in Vancouver, British Columbia in late October. Her topic: *Toward a More Aquatic Future: Rising Seas and Coastal Storms in NYC.*
- At the same event, **Roland Scal** presented the paper *Developing an Active Learning Gemology Studio Course for Non-Science Majors.*
- **Eric Hoffman** lectured on *"Jade, The Stone of Emperors"* for the Baltimore Bead Society on October 14, 2104
- **Diana Jarrett** presented *"Diamonds in Living Color"* to a capacity crowd at a local country club's sumptuous banquet hall to the University Park Women's Club on October 29, 2014.
- *Digging Gold in Alaska* was presented by **Steve Okulewicz** at the Morris Museum on Thursday, November 20, 2014. We will try to arrange for Steve to repeat this presentation to the NYMC sometime in the future.

2015 EFMLS/AFMS Bulletin Article Contest Submissions

The following 2014 works were submitted to the EFMLS for judging in the 2015 BEAC. Results will be announced at the EFMLS convention at the end of March 2015.

Category: Advanced Articles

- *Diamonds: A Long Journey from the Deep* by Vivien Gornitz (6/14)
- *Uncovering Fabergé* by Diana Jarrett (8/14)
- *Argyle Mine Colored Diamonds* by Branko Deljanin (9/14)

Category: Regular Articles

- *Braggite* by Mitch Portnoy (1/14)
- *Famous Rubies That Aren't* by Mitch Portnoy (10/14)
- *What Went Down in Tucson 2014* by Diana Jarrett (12/14)

Category: Poetry

- *True Story* by Otis Kidwell Burger (12/14)

Category: Written Features

- *A Dazzling Display (Bulgari Exhibit)* by Diana Jarrett (1/14)
- *Dioptase, Hemimorphite & Wulfenite* by Bill Shelton (4/14)
- *A Cursed Jade Specimen* by Mitch Portnoy (9/14)

Category: Special Publications

- *Stamp Album of the New York Mineralogical Club* by Mitch Portnoy
- *Introduction to Mineral Crystallography* by Vivien Gornitz

The World of Minerals

The *World of Minerals* is a monthly column written by Dr. Vivien Gornitz on timely and interesting topics related to geology, gemology, mineralogy, mineral history, etc.

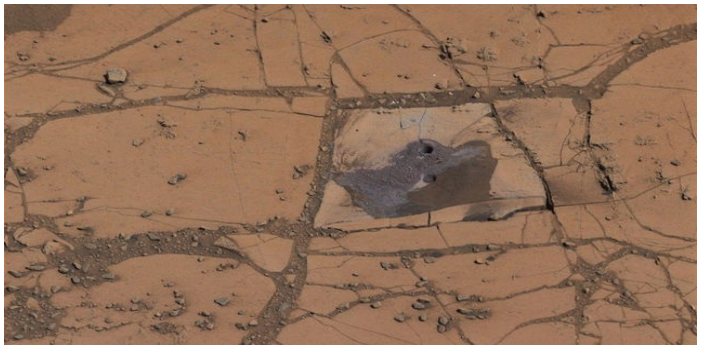
Vivien is on a holiday break!
Back next month!

Mars Rover Curiosity Finds First Mineral Match

By PTI (From November 5, 2014)

NASA's Mars rover Curiosity has discovered the first mineral match from the Martian surface, the US space agency has announced.

Reddish rock powder from the first hole drilled into a Martian mountain by Curiosity has yielded the mission's first confirmation of a mineral mapped from orbit.



This image shows the first holes drilled by NASA's Mars rover Curiosity at Mount Sharp. The loose material near the drill holes is drill tailings and an accumulation of dust that slid down the rock during drilling.

"This connects us with the mineral identifications from orbit, which can now help guide our investigations as we climb the slope and test hypotheses derived from the orbital mapping," said Curiosity Project Scientist John Grotzinger, of the California Institute of Technology in Pasadena.

Curiosity collected the powder by drilling into a rock outcrop at the base of Mount Sharp in late September. The robotic arm delivered a pinch of the sample to the Chemistry and Mineralogy (CheMin) instrument inside the rover.

This sample, from a target called "Confidence Hills" within the "Pahrump Hills" outcrop, contained much more hematite than any rock or soil sample previously analyzed by CheMin during the two-year-old mission.

Hematite is an iron-oxide mineral that gives clues about ancient environmental conditions from when it formed.

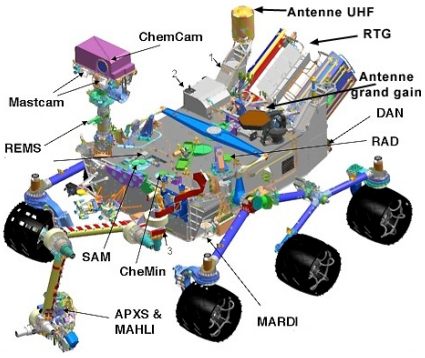
In observations reported in 2010, a mineral-mapping instrument on NASA's Mars Reconnaissance Orbiter provided evidence of Hematite in the geological unit that includes the Pahrump Hills outcrop.

The landing site is inside Gale Crater, an impact basin about 154 kilometers in diameter with the layered Mount Sharp rising about five kilometers high in the center.

"We've reached the part of the crater where we have the mineralogical information that was important in selection of Gale Crater as the landing site," said Ralph Milliken of Brown University, Providence, Rhode Island.

"We're now on a path where the orbital data can help us predict what minerals we'll find and make good choices about where to drill. Analyses like these will help us place rover-scale observations into the broader geologic history of Gale that we see from orbital data," said Milliken.

Much of Curiosity's first year on Mars was spent investigating outcrops in a low area of Gale Crater called 'Yellowknife Bay,' near the spot where the rover landed.



The rover found an ancient lakebed. Rocks there held evidence of wet environmental conditions billions of years ago that offered ingredients and an energy source favorable for microbial life, if Mars ever had microbes.

Clay minerals of interest in those rocks at Yellowknife Bay had not been detected from orbit, possibly due to dust coatings tha7t interfere with CRISM's view of them.

The rover spent much of the mission's second year driving from Yellowknife Bay to the base of Mount Sharp.

The sample is only partially oxidized, and preservation of magnetite and olivine indicates a gradient of oxidation levels.

"That gradient could have provided a chemical energy source for microbes," researchers said.

Introduction to this Month's Special Attachment:
George Kunz Grooves on Fluorescent Minerals
By Richard Bostwick

I don't know if you have seen this 1903 paper by Kunz and Baskerville, but it's famous among "my people" for a number of reasons, including that it was the first (and probably the last) examination under "invisible rays" of just about every mineral specimen in the American Museum of Natural History, and many of its diamonds and gemstones including kunzite, which not coincidentally has a starring role.

In many ways it's a fascinating period piece, and even with the restraint and discipline you'd expect of these gents in a scientific paper, their feelings sometimes show.

Hobbyists today no longer use radium bromide, X-rays, or the iron arc to excite fluorescence – these were the heroic days of science – but you get the feeling that Kunz and Baskerville must have had fun zapping rocks.

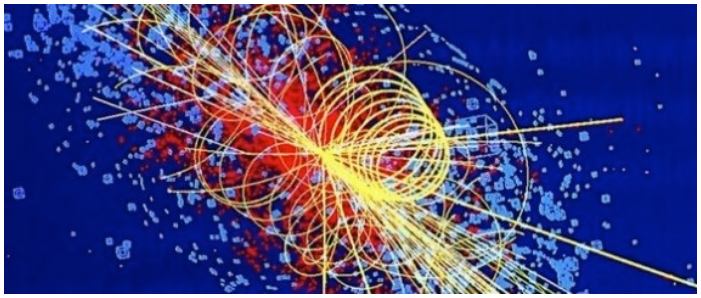
It might have been interesting to recreate K & B's experience with kunzite for the 125th anniversary NYMC banquet, but it is difficult to borrow a vial of radium bromide nowadays, even for a scientifically valid demonstration, and some of the club fussbudgets might have objected to your waving an X-ray tube in their general direction. However, there are still a few functional iron arc units out there (I have one), and kunzite is also fluorescent and phosphorescent under the mercury-arc units in general use.

Tema (Hecht) found this article using a search engine at the New York Public Library. Yay for her!

Higgs Boson May Be Composed of Tiny 'Techni-Quark' Particles

By Katia Moskvitch

The Higgs boson — a particle thought to explain how other particles get their mass — is tiny, but it may not be the tiniest particle yet. Theories have long predicted the existence of even smaller particles that might make up the Higgs, and recent research suggests these pip-squeaks, dubbed techni-quarks, are likely lurking in the universe.



Scientists suspect tiny so-called techni-quarks may make up the Higgs boson particle. Shown here, a simulation of a particle collision in which a Higgs boson is produced.

However, it will take the upgrade of the Large Hadron Collider (LHC) — the world's most powerful particle accelerator — or the next generation of colliders to spot these Higgs components, saidThomas Ryttov, a particle physicist at the University of Southern Denmark.

"We have nailed it down to only a few theories that have the right properties and characteristics to explain the Higgs particle and the Higgs mechanism," Ryttov said.

The Higgs boson was discovered in 2012 at the Large Hadron Collider at CERN, in Switzerland. Scientists Peter Higgs, from the United Kingdom, and Francois Englert from Belgium — who both worked on the theory of the Higgs — received the 2013 Nobel Prize for physics for their research.

Naturalness Problem

But there is a problem with just a single fundamental Higgs.

This particle is supposed to explain why the most basic building blocks of matter have mass. However,the vacuum — as physicists understand it through the framework of quantum field theory, the mathematical theory on which all results in particle physics are based— is not empty, but consists of a multitude of invisible "virtual" particles that constantly pop in and out of existence. Virtual pairs of particles are created and then quickly annihilated.

When Higgs particles pass through the vacuum, they are supposed to interact with all of these virtual particles while, in the process, increasing their own mass to huge values — some 100 million billion times greater than the one measured at the LHC. Therefore, their mass should then be comparable to what is known as the Planck mass, which is the fundamental unit of mass in the system of Planck units, equal to 2.18 × 108 kilograms.

"The question is, then, why the Higgs' measured mass is so much lighter than the Planck mass," Ryttov said. "This is exactly the problem."

For this mass increase not to happen, the reigning theory of particle physics — called the Standard Model — requires a high degree of fine-tuning, to correct for the differences in the measured Higgs mass and its so-called "bare mass," or the heavier mass.

This need to fine-tune is known as the naturalness problem — "a thorn in the eye of theoretical particle physicists," Ryttov said. "The theory is not as beautiful and elegant as we would expect from a theory that, in principle, should describe all matter at the most fundamental level. The Standard Model needs a tremendous amount of fine-tuning," he added.

To remove the need for fine-tuning and still answer the Higgs-mass question, physicists have suggested extensions of the Standard Model, the most popular of which is supersymmetry. This theory proposes a heavier superparticle, or "sparticle," for every particle in the Standard Model. Sparticles would then cancel out the effect of the virtual particles in the vacuum, bringing down the Higgs mass and removing the need for any fine-tuning.

None of these hypothetical supersymmetric particles have been observed so far, though.

Going Smaller

But there are many theoretical indications that the Higgs particle could be a composite one — made of some other, smaller, particles, called techni-quarks, Ryttov said. "The problem evaporates if the Higgs particle is composed of smaller bricks of nature that bind together via a new force — the technicolor force— to form the Higgs, similar to quarks binding together to form protons and neutrons," he said.

Here's how techni-quarks would solve the mass issue: Huge corrections to the mass of the Higgs in the Standard Model are needed because it is supposed to be a fundamental particle — in other words, not made of something else — with vanishing, or zero, spin. [Wacky Physics: The Coolest Little Particles in Nature]

Techni-quarks are particles with a spin of one half, Ryttov said, so by combining two techni-quarks, it is possible to make a composite particle with vanishing spin, such as the Higgs. "It turns out that theories with only techni-quarks have no naturalness problem," Ryttov said.

The idea of techni-quarks has been around since the late 1970s, but recently, there have been several important developments and refinements of the original models.

In their latest paper, detailed on the prepublish site Arxiv, Ryttov and his colleagues have argued once again that the Higgs must have an inner structure, nailing down a handful of theories that "have the right properties to fix the problem of fine-tuning in the Standard Model and bring the subatomic world into harmony again," the researchers said.

To do so, Ryttov has examined a number of theories dealing with a composite Higgs, to see whether there could be any weaknesses in them that have been overlooked. However, "They all came out strong, indicating that there could be something real about a Higgs made out of yet more building blocks," he said.

Understanding Dark Matter

Theoretical physicist Kimmo Tuominen of the University of Helsinki in Finland, who was not involved in Ryttov's work, said the Danish physicist's paper strengthened the foundation of the earlier models, increasing their appeal as a description of nature.

And although the inner structure of the Higgs is still speculative, "techni-quarks remain a viable possibility that should be thoroughly studied" in future experiments, he told Live Science.

Once the LHC is woken up in 2015, following its nap during a technical upgrade, it will be capable of operating at a maximum collision energy of 14 tera-electronvolts (TeV) — and probing the nature of the Higgs particle in detail will be one of the collider's main aims.

"Gathering more data at higher collision energies will allow [us] to test technicolor models further," Tuominen said. "If it were discovered that the Higgs particle is composed of more elementary constituents, it would imply that there is a new fundamental force, and these theories could then also provide an understanding of dark matter."

Source: LiveScience.com April 4, 2014

Dealer Donations from the Fall 2014 Mineral Show

Every dealer at the New York City Gem & Mineral Show expressed their thanks to us with a donation of a mineral, gem, publication, piece of jewelry or lapidary art, etc. These items will (for the most part) be offered at the June 2015 Benefit Auction. Some will be offered next month at the Special Sale in January 2015. – Mitch

- **Amazon Imports**
  (3) Faceted Sapphires, 3 colors. . . . . Brazil
- **Aurora Mineral Corp**
  Fossil Fish. . . . . Wyoming
- **AYS International**
  Hematite Earrings and Necklace. . . . . NA
- **Bary Gems**
  "Jade" (*Bowenite*) Bead Earrings. . . . . Afghanistan
- **John Betts Fine Minerals**
  Barite.. . . . . England
- **China South Seas**
  Crystal & Silver Necklace.. . . . . China
- **Crystal Circle**
  (3) Garnet Specimens. . . . . Misc
- **Excalibur Minerals**
  10x Worldwide Minerals.. . . . . Misc
- **Garriti Lapidary**
  (2) Cameos. . . . . NA
- **Gems Art Studio**
  (5) Mineral Specimens. . . . . Russia
- **Highland Rock & Fossil**
  China Garnets, Fossils, & More!.. . . . . Misc
- **Hunza Minerals**
  Large Feldspar Crystal with Aquamarine. . . . . Pakistan
- **Khyber Minerals**
  Faden Quartz.. . . . . Pakistan
- **Mahalo Minerals**
  Celestite.. . . . . Madagascar
- **Malachite & Gems of Africa**
  Velvet Malachite Specimen.. . . . . Congo
- **Margola Corp**
  Mounted Amethyst Stalactite Slice. . . . . Uruguay
- **Raj Minerals**
  Polished Ruby in Matrix. . . . . India
- **Rocko Minerals**
  Orange Quartz. . . . . South Africa
- **Howard Schlansker**
  Garnet-Related Items.. . . . . Misc
- **Somethings/Carolyn Lee**
  Huge Selection of Jewelry!. . . . . Misc

Clearly we will have wonderful items offered at next year's benefit auction!

How Did Earth's Tectonic Plates Form?

By Jessica Morrison

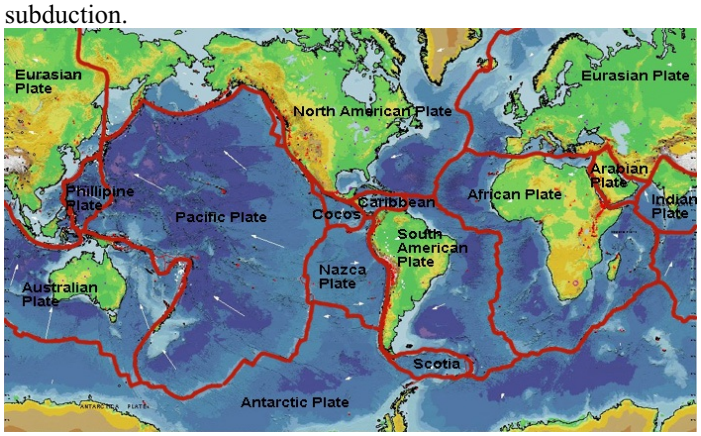
Earth's tectonic plates may have taken as long as 1 billion years to form, researchers report today in *Nature*.

The plates — interlocking slabs of crust that float on Earth's viscous upper mantle — were created by a process similar to the subduction seen today when one plate dives below another, the report says.

Starting roughly 4 billion years ago, cooler parts of Earth's crust were pulled downwards into the warmer upper mantle, damaging and weakening the surrounding crust. The process happened again and again, the authors say, until the weak areas formed plate boundaries. Other researchers have estimated that a global tectonic plate system emerged around 3 billion years ago.

The finding offers a possible answer to an enduring puzzle in geology: how Earth's tectonic plates emerged. The subsequent movement of the plates has erased much of the evidence of their origin, says Paul Tackley, a geophysicist at Swiss Federal Institute of Technology (ETH) in Zurich, Switzerland.

Prior studies suggested the age of the plates, based on evidence of subduction gathered from minerals preserved in ancient rocks. The oldest such specimens are 4-billion-year-old zircons found in the Jack Hills of Australia, which appear to have formed at temperatures and pressures that are indicative of subduction.



Earth's tectonic plates. Plate boundaries are shown in red.

Grains of Time

To go a step further and investigate how the plates formed, the study's authors developed a computer model of Earth's crust as it may have existed billions of years ago, on the basis of mineral grains found in mantle rock. The model included a low-pressure zone at the base of the crust, which caused a piece of the crust to sink into the upper mantle — mimicking conditions thought to have occurred early in Earth's history.

As the process repeated over time, it created a large tectonic plate with an active subduction zone. Over a much longer period, the same process could have created many tectonic plates, says co-author David Bercovici, a geophysicist at Yale University in New Haven, Connecticut. "We've got a physical mechanism to explain how it could have happened," he says.

This stands in contrast to conditions on Venus, where similar subduction occurs but has not produced tectonic plates. Conditions on Venus are much warmer, allowing the crust to better heal after a piece sinks down into the mantle. Bercovici's model suggests that early subduction created weak spots in Earth's crust that are now plate boundaries. Plate tectonics is defined by the idea that strong plates are separated by weak boundaries, and action at those boundaries creates geological phenomena such as volcanoes, mountains and earthquakes, he notes.

"They produce a model that plausibly explains what we see," says Michael Brown, a petrologist at the University of Maryland in College Park. It shows how to start subduction and how that could have progressed to global tectonics, and it provides an amount of time between the two — 1 billion years — that is consistent with the rock record, he adds.

Robert Stern, a geologist at the University of Texas in Dallas, contends that there is no firm evidence of plate tectonics earlier than 1 billion years ago, but says that their theory of the mechanism behind plate formation is "the first interesting example of how it might have occurred".

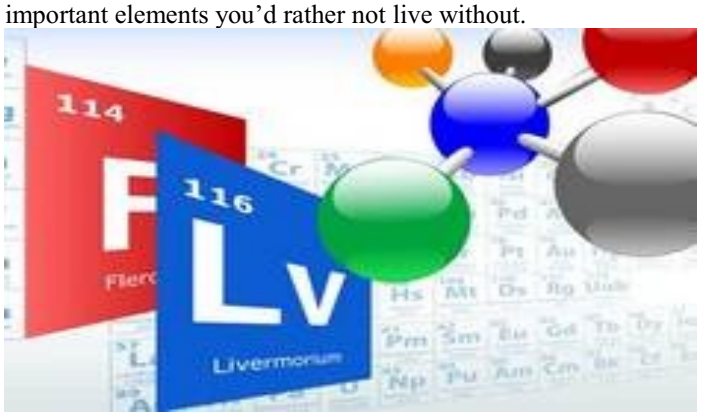
Source: *Nature News* 4/07/2014

Elementary, My Dear:
8 Elements You Never Heard Of

By Marc Lallanilla, Assistant Editor

[Editor's Note: We NYMC members may or may not be science geeks, BUT I bet most of us have heard of ALL of these elements, especially if you have paid attention to the meeting lectures over the past few years OR read the material in the Bulletins. Nevertheless the information here is interesting!]

Unless you're a real science geek, chances are you never knew these eight elements even existed. Nonetheless, many of them form the foundations of modern life, from europium (a critical element in television and computer screens) to tellurium (used in solar panels and memory chips). Here's a sample of little-known but important elements you'd rather not live without.



❶ Europium

Next time you're traveling through Europe, take note of some euro paper banknotes. They contain tiny amounts of europium, a hard, silvery metal, as an anti-counterfeiting measure.

There are a handful of places in the world where europium-containing ore is mined, but deposits of the rare element (atomic number 63) are in short supply. Few people cared until the invention of the television.

Early color television programs were barely colored: The blues were muted, yellows appeared somewhat bleached out and whites were dingy and grayish. The reason? Nobody could find a way to reproduce a strong, rich red color, so the other colors were toned down to maintain some balance.

Then, once it was discovered that europium reproduced a robust red in television (And later, computer) screens, the scramble for europium supplies was on. Mines in China, Russia and a small mine in California supply most of the world's europium.

❷ Argon

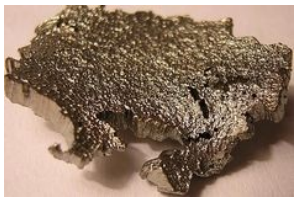
If you live or work in a new or recently renovated building, chances are you're within spitting distance of a cache of argon: Argon (atomic number 18) is often used between the double panes of glass in energy-efficient windows because of its low thermal conductivity.

Argon is a noble gas that's more common in the Earth's atmosphere than even carbon dioxide. In addition to its uses in homes—incandescent light bulbs are filled with argon because it keeps the filaments from burning away—argon has numerous industrial uses, from arc welding to laser surgery.

Though it's generally safe, pure argon is heavier than air and can be lethal in areas where it displaces oxygen. It's used in poultry production to asphyxiate birds, but it can also suffocate people if it's allowed to concentrate in an enclosed area.

❸ Scandium

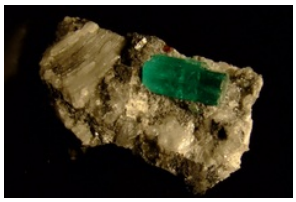
First discovered in 1879, scandium (atomic number 21) was named for Scandinavia by chemist Lars Fredrik Nilson. Though it's fairly common in the Earth's crust, nobody had any real use for this silvery metal until about 100 years after its discovery.



But in the 1970s, metallurgists found that aluminum-scandium alloys are strong and lightweight, making it useful in aerospace components. It wasn't long before sporting-equipment manufacturers started using the alloys in everything from baseball bats to lacrosse sticks.

❹ Beryllium

In Isaac Asimov's sci-fi story "Sucker Bait," scientists struggle to understand why all the colonists of the planet known as Junior died after settling on its surface. Finally, one mutinous renegade realizes that high levels of beryllium in the soil caused the colonists to slowly die of berylliosis.



The dangers of beryllium aren't just the stuff of fiction, however: The element (atomic number 4) is recognized as a carcinogen by the International Agency for Research on Cancer.

In another form, however, beryllium is highly desirable, even priceless. When combined with trace amounts of chromium, beryllium takes on a beautiful green hue as the gemstone commonly known as the emerald. *[Editor's Note: The writer is confusing beryllium with beryl, obviously!]*

❺ Antimony

Vanity, thy name is antimony, to paraphrase Shakespeare. The heavy metallic element (atomic number 51) is used today as an ingredient in cosmetics, and has been since the earliest days of ancient Egypt.

Additionally, antimony is used as a flame retardant in children's cloths, automobiles, toys and aircraft. And if you've ever admired the warm, silvery glow of pewter mugs and dinnerware, thank antimony: Most pewters are a combination of tin, copper and antimony.

❻ Gallium

Few elements are weirder than gallium: A relatively soft, glittering metal, it's widely used today in semiconductors and other electronics, as well as in the pharmaceutical industry.

But in years past, gallium (atomic number 31) was a key part of a favorite parlor trick for magicians because it melts when it's just slightly warmer than room temperature. Thus, spoons that are made of gallium look normal, but when dipped into a cup of hot tea will instantly dissolve. Even holding a gallium spoon in your hand too long will create a drippy, metallic mess.

❼ Tellurium

Tellurium, a silvery-white metal first discovered in Transylvania, is often used in solar panels, computer memory chips and rewritable optical discs. Its name comes from the Latin word for earth (tellus).

Tellurium (atomic number 52) is considered by most experts to be mildly toxic, though it's unusual to find someone who has suffered serious harm from it. How to tell if someone has been exposed to high levels of tellurium? As their body metabolizes telluride, their breath will have a pungent, garlic-like odor — as befits an element first found in Dracula's legendary homeland.

❽ Dysprosium

"Hoarding gold is for libertarians. Bitcoin mining is for nerds," wrote Jonathon Keats in Wired. "Really adventurous investors — especially fans of the stranger stretches of the periodic table — ought to consider stockpiling something more intense, like industrially valuable exotic elements."

High on the list of rare, valuable elements is dysprosium (atomic number 66), which is named after the ancient Greek dysprositos, meaning "hard to get," appropriately enough. The soft, metallic substance is in big demand for electric motors, especially those in electric vehicles and wind turbines, which has earned dysprosium a place on the U.S. Department of Energy's list of critical materials for the green economy.

Source: LiveScience.com March 31, 2014

Need Some New Ideas? Take A Walk!

By Amanda L. Chan

Taking a walking meeting isn't just good for getting you out of your chair – a new study shows that it could also be better for your creativity.

Researchers from Stanford University's Graduate School of Education found that study participants gave more creative responses to questions meant to gauge creative thinking when they were walking, versus sitting.

"Asking someone to take a 30-minute run to improve creativity at work would be an unpopular prescription for many people," study researcher Daniel L. Schwartz, Ph.D., said in a statement. "We wanted to see if a simple walk might lead to more free-flowing thoughts and more creativity."

The study included several experiments, involving 176 people overall. For one of the experiments, 48 college students participated in two tasks: In one, they were asked to come up with alternate uses for common items, such as a button or a tire, in order to test creativity. In the second task, the participants came up with a word that combined three other words (for instance, given the words "cottage," "Swiss" and "cake," the answer would then be "cheese"). The participants completed the tasks while sitting in a room facing a blank wall, as well as while on a treadmill facing a blank wall.

Researchers found that the participants performed better on the first task when they were on the treadmill, but mildly worse on second task when they were on the treadmill. Specifically, 81 percent of the study participants were more creative in the first task when they were walking on the treadmill.

"Walking had a large effect on creativity. Most of the participants benefited from walking compared with sitting, and the average increase in creative output was around 60 [percent]," the researchers wrote in the Journal of Experimental Psychology: Learning, Memory and Cognition study. "When walking, people also generated more uses, good and bad. Simply talking more, however, was not the sole mechanism for the increased activity. When walking, people generated more uses, and more of those uses were novel and appropriate."

In another experiment in the study, researchers looked to see whether the "outdoors" part of walking outdoors boosted creativity more than the "walking" part. They found that it was more the walking that seemed to spur the creative ideas, versus the being outdoors. However, researchers noted that "walking appears to prompt high structure and novelty, whereas the outdoors seems to influence novelty."

Similarly, a study conducted by researchers from Leiden University last year showed that regular exercisers have greater creativity and perform better on cognitive tests than sedentary people.

"We found that people who are doing exercise on a regular basis outperform those who don't," study researcher Lorenza Colzato told The Telegraph. "We think that physical exercise trains your brain to become more flexible in finding creative solutions."

In another study, published in 2012 in the journal PLOS ONE, researchers from the University of Utah found that making time to unplug and recharge in nature could also help to boost creativity.

Source: The Huffington Post 04/25/2014

True Story

By Otis Kidwell Burger

When my grandfather
proposed
Grandmother said "I am opposed
To wearing a big diamond ring.

My hand's too plain for such a thing,
And ostentation's what I dread."
So he built her a big house instead.

They had five kids, kittens, puppies,
Ponies, turtles, rabbits, guppies,
Boats and books, baseballs, bikes,
Beach vacations, mountain hikes.

Her "best friends" weren't flashy rocks,
But family, house, and blue-chip stocks.

Collector's Series – "The 100"

The 100 is a monthly feature of interest to mineral collectors written by Bill Shelton, based upon his many years of experience as a mineral collector, educator, author, appraiser, philanthropist and dealer. Comments as well as suggestions for new topics are most welcome. Contact him at LAELIASON@msn.com.

Garnet & Gypsum

My early collecting experiences in Connecticut led me to find three out of the six common species in the garnet group. Roxbury yielded innumerable almandines, West Redding produced grossular (var. hessonite) and spessartines were found in Haddam as well as some samples in various local pegmatites. New York has the Barton mine where garnet was found and used for abrasives and occasionally for gems. Rough crystals to 24 inches occur. Franklin, New Jersey has the variety polyadelphite which is actually manganoan andradite. A huge, very well-formed 10 pound garnet, currently at the AMNH, was collected within the confines of New York City. The beach sands in the Northeast very often contain tiny bits of garnet (probably almandine). I have seen garnet in the outcroppings of Central Park.

Locality data from over 6,000 places is very interesting for the garnet group. About 32% of the noted localities are for almandine; about 22% is andradite and 21% is grossular. Pyrope is a mere 5%; spessartine is 16% and uvarovite is only 3%: see mindat.org for details. Due to probable errors in identification, uvarovite and pyrope may be far less common that the data given here suggests. In any case, they are frequently offered for sale but will not stand up to scrutiny. Certain spessartines also fail testing but, to the best of my knowledge, bright orange samples generally turn out to be nearly pure spessartine.

Color can be very deceptive with some minerals but garnet can be very confusing. Among the six common species, all but uvarovite can be red. While all uvarovite is green, some andradite and grossular can be green. Pure pyrope, a rarity in nature, is surprisingly, white – but occasional grossular can also be white or colorless. Melanite, a black andradite, can be deceptive. Andradite and grossular are both known to exhibit a wide range of colors. Spesartines can be bright orange. Rhodolite, varying from pink to purple, is a mixture of pyrope and almandine – if one is dominant, that will be its proper mineral name. Gems have innumerable varietal names; for more information, see a gem data book.

All colors seem to occur in one garnet or another but blue is nearly never seen and then it is a very dark shade that may occur in color-change samples. They are probably spessartines. Gems are important items and can reach the following sizes. Almandine sets the size record in star-stones; one from Idaho weighs 174 carats. Andradites seem to be mostly modest – one of 18 carats is known. Grossulars up to several hundred carats are known from Sri Lanka. Pyrope is usually small but a Bohemian stone of approximately 20 mm is documented; it's less than 40 carats, I believe. Spessartine can exceed 100 carats (Brazil). Uvarovite may be up to 1 carat, but they are rare.

Gypsum, familiar in specimens, has long been all around many of up since it is found in plaster and wallboard. Colorless and transparent examples, most popular amongst collectors, are often called selenite. Fibrous varieties may be labeled as satin spar. Fine but modest sized gypsum crystals were once collectible near Kerhonksen, New York and I have found large cleavable masses that resemble ice near Syracuse. Even wind-blown sands in New Mexico and Arizona can be mainly composed of gypsum. Nearby, I have seen gypsum in cauliflower-like white clusters in a soft clay bed. Gems, by the way, are very soft and unsuitable for wear. Carvings of satin spar can be exquisite but are also delicate.

Specimens, many from Mexico, of very long, nearly transparent crystals are favored by collectors. One old locality was called the Cave of the Swords. Recently, an even larger cave with crystals to several feet in length was discovered. Elsewhere in Mexico, specimens of absolutely colorless, transparent selenite on very dark matrix may rank among the best I have ever seen. They were available at Tucson two years ago. So-called selenite roses have been found in Oklahoma but they also occur in Mexico. Sand selenites are also found – they may have small grains or pebbles on their surface. France was once a location for fine specimens.

Species	Ions	Usual Color	Specific Gravity	Important Variety	Gems	Size Data (Crystals)
Almandine	Fe, Al	Deep Red	4.32	N/A	Limited	6in., Salida
Andradite	Ca, Fe	Brown, etc.; Varies	3.86	Demantoid	Significant	7in., Mali
Grossular	Ca, Al	Green,etc.; Varies	3.59	Hessonite	Some	6in., Mali
Pyrope	Mg, Al	Deep Red	3.58	Rhodolite	Significant	14in., Dora-Maira
Spessartine	Mn, Al	Reddish	4.19	N/A	Some	7 in., Loliando
Uvarovite	Ca, Cr	Emerald Green	3.80	None	Rarely	1.5 in., Outokumpu

Topics in Gemology

Topics in Gemology is a monthly column written by Diana Jarrett, GG, RMV, based on gemological questions posed to her over the years by beginners and experts alike. Contact her at dianajarrett.com.

What Went Down in Tucson 2014

Buyers snap up exotics and one-offs for bespoke pieces

Each February like clockwork, the faithful and the curious make their way to Tucson, Arizona, for the American Gem Trade Association's (AGTA's) GemFair and other shows to seek out new stones and jewelry. This year's events brought a steady stream of buyers, and not all were bargain hunting. Many were steeled to pay dearly for important one-offs from favored designers, and the turnout supported that stance. "We're up over five per cent in attendance from last year," said AGTA chief executive officer (CEO) Douglas Hucker. "It actually exceeded our expectations,"

Veteran pundits noticed Thai and Chinese buyers early on picking up anything and everything in colored stones, "The Chinese know they are not buying at the lowest prices, or even the best of species, but they can still make money back home," says gemstone dealer Paul Levin, owner of California-based Tairona Co. Toronto native and gem cutter Sherris Shank found that easy to understand. "The Chinese have new money to spend and they've long valued gemstones," she says. "'They've also been focusing on buying rough, which has driven up the price on many colored stones."

Spread the Love

For many buyers, it all happens at the Convention Center or across the road inside the Gem and Jewelry Expo's (GJX's) billowing white tents. Yet, adventurous designers know they have to spread out farther to get a hold of off-the-beaten-path treasures. Montreal-based designer Claudio Pino took advantage of the more than 40 shows that occur concurrently with the AGTA Gemfair and the GJX. "This year, I was not showing," Pino said. "I was really busy shopping for stones everywhere, including the Pueblo Gem & Mineral Show, I found some pretty spectacular golden prehnite."

A fair amount of trading always occurs on the fringes of the main events. Toronto designer Anne Sportun is branching out from her organic diamond collection with the introduction of a colorful gemstone line this season. Sportun reconnects with her favorite purveyors outside the hub. "It's always fun exploring the periphery shows as well, but the best part about this yearly trip is the time I get to enrich my relationships with the people I've been working with for years."she claims "Then can source anything."

Vancouver gem cutter Lisa Elser relies on similar contacts she's nurtured over the years. Through her connections, Elser snapped up Afghan sea foam tourmaline and other desirable rough on her must-have list.

Here's a First

Tucson is a stage to debut the quirky, the new, and the unpronounceable oddities like natural peach topaz, Mt. Antero aquamarine, and trapiche sapphire and emerald. Blue amber, a Dominican variety of the resinous gem, thrilled jewelry artisans who liked seeing it change from golden amber when light passes through it or blue when the gem rests on a solid background.

Rubellite tourmaline was one stone buyers hustled to snag. In the past, two main sources for the rosy material have kept this gemstone in must favored status with designers, Historically, Brazil and Nigeria have produced enough rough to make it a commercially popular stone. With mines closing and sources drying up, however, there is little available in larger sizes or in top quality.

The furor over glass filling in the last few years has soured consumers to ruby. This, in turn, has sweetened rubellite's street cred. According to Shank, rubellite is a failsafe choice. "There's not much you can do to rubellite," she notes. "It doesn't undergo the treatments that ruby has been susceptible to." So when you buy rubellite, you get an untreated stone in a rich cherry hue.

Veteran cutter John Dyer brought imaginative gemstones in hard-to-find varieties like sherry and cognac zircon. "Zircon is a beautiful gem that is more sought-after all the time due to its extreme brilliance and dispersion," Dyer told *Jewellery Business.* Yet, his ever-popular tourmaline has been more challenging to acquire. "Beautiful tourmaline is getting very hard to find with the high demand from China."

Do You See a Pattern Here?

A curious confluence of creativity happens each year amongst designers who pitch their wares at the Tucson shows. The very nature of their artistry lends itself to working within a vacuum. It would be hard to imagine they divulge to their competition what they are working on prior to these shows. However, simultaneous trending patterns can often be identified by simply walking the aisles on the first day.

"Double Ribbon" Ring with emeralds & sapphires, 22K gold, sterling silver, antique silk finish by Babette Shennan.

Vendors were selling eye-catching stylish cuffs for less than $90 Cdn made from sharkskin in natural tones and bold colors. But couture designers also had brightly colored bejewelled sharkskin cuffs in the $890 Cdn range.

Another trending pattern came to the fore among designers looking to ride the next wave in colored stones. This year saw an explosion of bold collections created in analogous color combos. Colors adjacent on the color wheel create excitement by lending an impression of depth or movement to an item. For each designer, however it's a personal prompting that inspires their analogous color choices. U.S. designer Babette Shennan brought a wide array of brightly hued jewelry, including a blue and green gemstone ring inspired by the colors in nature she loves. An avid scuba diver, Shennan spends time in the tropics admiring marine life, especially tropical fish flaunting vibrant blues and greens.

Everyday Exotics

A theme reverberating at the seminars offered at AGTA's GemFair pointed to the prevalence of exotic stones in both designer and volume-manufactured goods. During the economic downturn of not that long ago, designers resorted to using unknown and inexpensive stones as a way to offer lower price points so customers would continue to buy. That was then. Nowadays, daring jewelry artists place matrix opal with diamonds in high-karat gold collections and geode slices as the bold centrepiece of pricey couture jewels. Celebrities shut their stuff wearing exotic jewels on the red carpet, so it is natural designers would oblige their customers with a cultivated preference for out-of-the-ordinary stones,

Peruvian pink opal bead necklace by Splendid Co.

The appeal of so-called exotics ultimately lies in their beauty as a fashion accessory. Women may not know what the stones are, hut they easily gravitate to what they like. First-time exhibitor Splendid Co.'s wide use of unusual stones makes it a natural for upscale retailers whose clientele demand something no one else will be wearing. Designer Robin Franklin admits her designs are not for everybody, and that's fine with her. Each of her creations are strictly one-offs. such as a single strand made of Peruvian pink opal, white shell, blue lace agate, and lemon chrysoprase heads.

Man, Oh Man

Men's jewelry has been for eons a pretty boring lot. A perfunctory cufflink, maybe a ring, and for hipsters perhaps, slender retro tie bars. Vendors aimed to change all that this year. A brave use of splendid color coupled with inspire design put the gent's category front and center. Mark Schneider Designs used spessartite garnet, crystal, tanzanite, and other unlikely stones in its men's collection. Its cufflinks were intentionally created with class and for fun at the same time.

Platinum cufflink by Mark Schneider accented with 18-karat yellow gold. Featuring a 19-carat and a 19-carat rutilated quartz, tsavorites, and yellow and white diamonds.

Designer Brenda Smith believes men's jewelry is making a comeback. "Why can't men express themselves with jewelry as women can?" she asks. Something in Smith's tire motif cufflinks struck a chord with male buyers, she asserts. "A lot of men stopped by to see them because as one 30-something male jeweler said, "I wear cufflinks every day and I am looking for statements to express my individuality."

New Standbys

Many buyers bring a shopping list of tried-and-true items they know their customers will buy, such as pearls. However, once a customer has already acquired a creamy-white strand, where do you go from there? Baggins Inc., winner of Best Use of Pearls at AGTA's 2014 Spectrum Awards, thinks it might be with rare natural aubergine Tahitian pearls with deep tones and endless luster.

Sea Hunt Pearls' large multicolored baroques had buyers ogling a couple rows deep at times. Most every pearl purveyor had 13- to 15-mm freshwater pearls ranging from just under $1000 Cdn is about $9970 Cdn, with each price hike being driven by the quality of luster and the colors of the strand.

Haute Dang!

Many buyers willing to dig deep in their packets for pricey goods signaled a renewed confidence not witnessed for quite a while. Levin saw his blue tourmaline snapped up, as well as orchid-hued tourmaline. He says his cash buyers from China didn't quibble over prices. "Many were getting pricey stones for custom-work clients this year."

18-karat green gold cuff by LJD Designs accented with alexandrite melee (2.56 ctw) and white brilliant diamonds.

Today, customers pay for imaginative design and excellent craftsmanship of well-made pieces. Irrespective of the item's metal. First-time vendor and designer Laura Jackowski-Dickson of LJD Designs found buyers eager to stock up on her bejewelled sterling cuffs, some priced at more than $5500 Cdn. "We had steady traffic admiring alexandrite-studded 18-karat yellow gold cuff and other high-end pieces the entire time," she adds.

Around town, buyers shopped for specific customers for whom bespoke and custom jewels are the norm. Certainly the pervasive vibe was upbeat. With all its storied past, the Tucson experience is still one of reinvention every year. In 2014, its message is one of confidence from buyers who understand their customer's desire for personal expression through luxury jewels.

New Super-Heavy Element 117 'Ununseptium' Confirmed By Scientists

By Denise Chow

A view into the 120-meter long linear accelerator at GSI, which accelerated the calcium-ions used to produce element 117. | Universitaet Mainz

Atoms of a new super-heavy element — the as-yet-unnamed element 117 — have reportedly been created by scientists in Germany, moving it closer to being officially recognized as part of the standard periodic table.

Researchers at the GSI Helmholtz Center for Heavy Ion Research, an accelerator laboratory located in Darmstadt, Germany, say they have created and observed several atoms of element 117, which is temporarily named ununseptium.

Element 117 — so-called because it is an atom with 117 protons in its nucleus — was previously one of the missing items on the periodic table of elements. These super-heavy elements, which include all the elements beyond atomic number 104, are not found naturally on Earth, and thus have to be created synthetically within a laboratory.

Uranium, which has 92 protons, is the heaviest element commonly found in nature, but scientists can artificially create heavier elements by adding protons into an atomic nucleus through nuclear fusion reactions.

Over the years, researchers have created heavier and heavier elements in hopes of discovering just how large atoms can be, said Christoph Düllmann, a professor at the Institute for Nuclear Chemistry at Johannes Gutenberg University Mainz. Is there a limit, for instance, to the number of protons that can be packed into an atomic nucleus?

"There are predictions that super-heavy elements should exist which are very long-lived," Düllmann told Live Science. "It is interesting to find out if half-lives become long again for very heavy elements, especially if very neutron-rich species are made."

Typically, the more protons and neutrons are added into an atomic nucleus, the more unstable an atom becomes. Most super-heavy elements last just microseconds or nanoseconds before decaying. Yet, scientists have predicted that an "island of stability" exists where super-heavy elements become stable again. If such an "island" exists, the elements in this theoretical region of the periodic table could be extremely long-lived — capable of existing for longer than nanoseconds — which scientists could then develop for untold practical uses, the researchers said. (A half-life refers to the time it takes for half of a substance to decay.)

Düllmann and his colleagues say their findings, published today (May 1) in the journal Physical Review Letters, are a step in the right direction.

"The successful experiments on element 117 are an important step on the path to the production and detection of elements situated on the 'island of stability' of super-heavy elements," Horst Stöcker, scientific director at the GSI Helmholtz Center for Heavy Ion Research, said in a statement.

Element 117 was first reported in 2010 by a team of American and Russian scientists working together at the Joint Institute for Nuclear Research in Dubna, Russia. Since then, researchers have performed subsequent tests to confirm the existence of the elusive new element.

A committee from the International Union of Pure and Applied Chemistry (IUPAC), the worldwide federation charged with standardizing nomenclature in chemistry, will review the findings to decide whether to formally accept element 117 and grant it an official name.

Source: LiveScience.com May 3, 2014

Mitigating Climate Change with Geochemistry

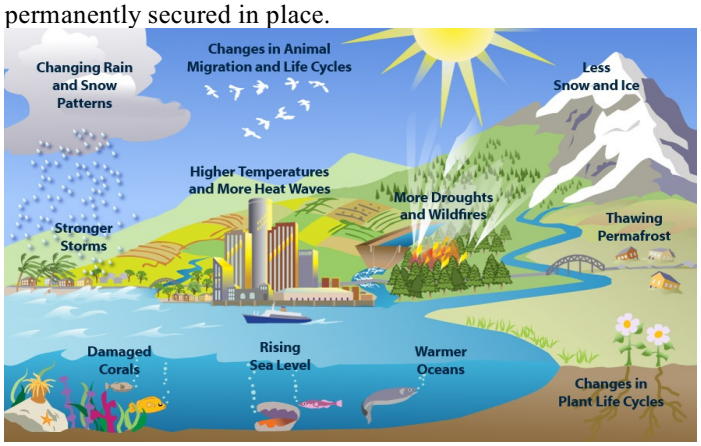
By Melissa Fleming

Geology is probably not the first branch of science that comes to mind when you hear about mitigating climate change. As global carbon dioxide (CO_2) levels continue to rise, however, geologic sequestration and mineralization may prove to be extremely important in tackling this pressing environmental issue.

In early May, I attended a public lecture at Columbia University's Lamont Doherty Earth Observatory entitled *Air, Water and Stone: Lowering* CO_2 *through Sequestration*. Presented by David Goldberg, a Lamont Research Professor, it started off by highlighting the findings of the latest report from the UN's Intergovernmental Panel on Climate Change (IPCC). Authored by hundreds of scientists from around the world, it predicts an increase in global mean temperature of 3.7°C to 4.8°C (7°F to 9°F) by 2100. It also calls for immediate action to reduce global CO_2 emissions to near zero. To achieve this difficult goal, the IPCC emphasizes the use of zero-carbon energy sources, like solar and wind, but also stresses the need for complimentary actions such as utilizing carbon capture technology.

Working on the assumption that the full replacement of fossil fuels will not happen for decades, Professor Goldberg says carbon capture and sequestration (CCS) will be key to meeting the IPCC's target. As CO_2 mixes easily in the atmosphere and spreads quickly around the planet, his research is focused on remote CCS – pulling CO_2 from the ambient air. Utilizing existing "scrubbing" technology to separate CO_2 from the air, this process would then liquefy and inject it deep into porous beds of basalt rock where it would be secured through mineralization. Given the mobile nature of atmospheric CO_2, remote CCS facilities could be set up in isolated areas, away from large population centers.

The mineralization aspect of this procedure involves turning atmospheric CO_2 into solid limestone. This geochemical process occurs naturally in basalt, which is largely composed of iron, calcium, and magnesium. Pouring out of underwater lava flows, basalt generally forms as a thick layer of rock filled with pores. According to the process outlined in the lecture, when CO_2 reacts with pore water, it forms carbonic acid. The carbonic acid then reacts with the basalt and releases magnesium and calcium. These in turn, react with the carbonate from the CO_2 and form solid limestone. Once the CO_2 turns to limestone, it is permanently secured in place.



Since the rate of this process depends on the amount of rock in contact with CO_2, Professor Goldberg suggests targeting locations with large expanses of basalt that are relatively easy to access. Requiring power to operate, remote CCS sites must also have a renewable energy supply like solar, wind, or geothermal. One ideal location highlighted in the lecture is the Kerguelen Islands, a French Protectorate in the Southern Indian Ocean. More of a submerged micro-continent than island-chain, it is made entirely of basalt and has a steady supply of wind. Professor Goldberg's models show that an ambient air CCS facility there could sequester 75 million tons of CO_2 per year. That is roughly equivalent to the emissions from 25 power plants.

To view the lecture in its entirety on the web, go to: http://www.ldeo.columbia.edu/news-events/events/public-lectures.

Please Send in Your 2015 NYMC Membership Dues!

Forget
Forget the hasty, unkind word:
Forget the slander you have heard;
Forget the quarrel and the cause;
Forget the whole affair, because,
Forgetting is the only way.
Forget the storm of yesterday;
Forget the knocker, and the squeak;
Forget the bad day of the week.
Forget you're not a millionaire;
Forget the gray streaks in your hair;
Forget to even get the blues -
But don't forget
To Pay Your Dues!

Please take the time to send in your 2015 NYMC membership dues if you have not already done so.

And get yourself a set or two of note cards — they make great gifts!

Name (s)			
Street Address			
City		State	Zip
Home Phone	Work Phone	E-mail PLEASE! ☐ **Send me my monthly Bulletin via e-mail**.	
☐ Individual Membership ($25.00)		☐ Family Membership ($35) for:	

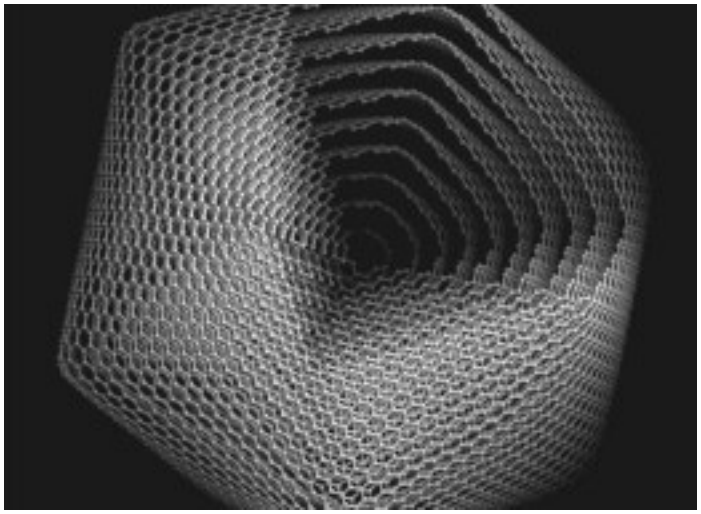
Please send me a set of the following boxed **Note Card Sets** (Each set for $6.00 including envelopes):
☐ Garnet ☐ Mineral Bookplates ☐ Jade ☐ Native Elements ☐ Crystallography ☐ Ruby ☐ Amethyst
☐ Diamonds ☐ Birthday Mineral Cards ☐ Malachite ☐ Quasicrystals ☐ Quartz ☐ Lapis ☐ Fluorite

Mail this form (or copy) with your check to:
Membership Coordinator, New York Mineralogical Club, Inc.
PO Box 77, Planetarium Station, NYC, NY, 10024-0077

New Synthetic Diamonds May Be the Hardest Gems Ever Made

By Jesse Emspak

Diamonds are the hardest naturally occurring minerals known to man. Even so, scientists are working to make them even tougher, in order to use the sparkling gems as tools for cutting.



To create a harder diamond, researchers used tiny particles of carbon, layered like onions, and subjected them to high temperatures and pressures. A model of a 10-shell "onion" carbon shown here.

Now, a team of researchers, led by Yongjun Tian and Quan Huang at Yanshan University in China, has created synthetic diamonds that are harder, meaning they are less prone to deformation and breaking, than both natural and other man-made diamonds.

To create these tougher-than-steel diamonds, the researchers used tiny particles of carbon, layered like onions, and subjected them to high temperatures and pressures. The resulting diamonds had a unique structure that makes them more resistant to pressure and allows them to tolerate more heat before they oxidize and turn to either gas (carbon dioxide and monoxide) or ordinary carbon, losing many of their unique diamond properties.

First, a bit about diamonds: Gem-quality diamonds are single crystals, and they are quite hard. But artificial diamonds used on tools are harder still. That's because they are polycrystalline diamonds, or aggregates of diamond grains called domains, that measure a few micrometers or nanometers across. The grains help to prevent the diamond from breaking, as the boundaries act like small walls that keep chunks of diamond in place. The smaller the domains are, the stronger the diamond.

Tian's team used the onion-like carbon nanoparticles to make diamonds with domains that are a few nanometers in size and are mirror images of each other. Such "nanotwinned" crystals are much harder than ordinary diamonds, by a factor of two.

The team tested the artificial diamond's hardness by pressing a pyramid-shaped piece of diamond into the nanotwinned diamond. Tian's group made a small indentation in their artificial diamond, applying pressures equivalent to nearly 200 gigapascals (GPa) — about 1.9 million atmospheres. An ordinary natural diamond would crush under just half that pressure.

The team also tested how hot the nanotwinned diamond could get before oxidizing. In two different tests, they found that the ordinary diamond began to oxidize at about 1,418 and 1,481 degrees Fahrenheit (770 and 805 degrees Celsius), depending on the testing method. The nanotwinned diamonds didn't oxidize until they reached 1,796 or 1,932 ºF (980 or 1,056º C).

But not everyone is convinced by these results. Natalia Dubrovinskaia, a professor of material physics at the University of Bayreuth in Germany, said she doesn't trust the pressure tests. If what Tian's group is reporting is true, the indenter should have broken, because the material of the indenting tool is not as hard as the nanotwinned diamond, she told Live Science in an email.

Tian disagreed with Dubrovinskaia's assessment of the indenter. He said that it is possible to measure pressure on the nanotwinned diamond because the indenter was pushed from a vertical position and the amount of shearing force on it wasn't enough to damage it.

Tian and Dubrovinskaia have "sparred" before; last year, the Yanshan lab said it demonstrated a similar phenomenon, making a form of ultrahard cubic boron nitride. At the time, Dubrovinskaia voiced similar concerns.

Tian, meanwhile, stands by his work. "Indentation hardness of any material can be measured reliably using [a] diamond indenter when the indenter axis is exactly perpendicular to the smooth surface of [the] tested sample," he said.

Another scientist, Ho-Kwang Mao, of Argonne National Laboratory in Illinois, thinks Tian's work is valid; he noted that an indenter could reliably measure the hardness of materials much harder than itself.

In addition, the novel part of the work is that such a hard material has been created in a way that can be readily reproduced. "They created a bulk material," Mao said. "They succeeded in making this and making it harder than diamond — that's novel."

The new study is detailed in the June 12 issue of the journal *Nature*. Source: LiveScience 06/19/2014

Los Alamos Researchers Verify World's Largest Gold Crystal

By Mark Oswald, Journal Staff Writer

Researchers have verified that this lump is the world's single largest gold crystal ever found. (COURTESY LOS ALAMOS NATIONAL LABORATORY)

Researchers at Los Alamos National Laboratory have confirmed that a golf-ball size nugget is the world's largest single crystal of gold ever found.

A neutron scanner was used to examine the 217.78 chunk, which belongs to a private collector and is valued at $1.5 million. It was found in Venezuela decades ago.

What makes the piece unique is that it's a single gold crystal, not the more commonplace multi-crystal variety.

The lab checked out the gold as part of the work of University of Miami geologist John Rakovan.

"The structure or atomic arrangement of gold crystals of this size has never been studied before, and we have a unique opportunity to do so," Rakovan told the LANL staff.

Three of four specimens he brought to the lab turned out to be single-crystal gold.

Below is the full LANL staff article on the gold, which has generated news reports around the world.

By Nancy Ambrosiano

When geologist John Rakovan needed better tools to investigate whether a dazzling 217.78-gram piece of gold was in fact the world's largest single-crystal specimen—a distinguishing factor that would not only drastically increase its market value but also provide a unique research opportunity—he traveled to Los Alamos National Laboratory's Lujan Neutron Scattering Center to peer deep inside the mineral using neutron diffractometry. Neutrons, different from other probes such as X-rays and electrons, are able to penetrate many centimeters deep into most materials.

"The structure or atomic arrangement of gold crystals of this size has never been studied before, and we have a unique opportunity to do so," the Miami University professor said.

Revealing the inner structure of a crystal without destroying the sample—imperative, as this one is worth an estimated $1.5 million—would allow Rakovan and Lujan Center collaborators to prove that this exquisite nugget, which seemed almost too perfect and too big to be real, was a single crystal and hence a creation of nature. Its owner, who lives in the United States, provided the samples to Rakovan to assess the crystallinity of four specimens, all of which had been found decades ago in Venezuela.

During the past Lujan Center user run cycle, Heinz Nakotte, New Mexico State University professor and lead scientist for the single-crystal diffraction (SCD) instrument, and Sven Vogel, instrument scientist for the high-pressure/preferred orientation (HIPPO) instrument, helped Rakovan probe the stunning pieces at Los Alamos. The authors are preparing a scientific report.

Three of the four samples turned out to be single-crystal pieces of gold, rather than the commonplace multiple-crystal type. Of particular interest was a golf-ball-shaped nugget that at one time was believed to be the world's largest trapezohedral gold crystal. In 2006 the crystal had been rejected at auction over questions of authenticity, and indeed, the Los Alamos instruments confirmed that it was not a world-record trapezohedral crystal.

Further interpretation of the results will also provide an understanding of how the rare pieces may have formed before they were slightly deformed while being washed down in ancient stream sediments. The ability of the HIPPO instrument to also show how far away a specimen is from being a single crystal helps with these interpretations.

The SCD instrument is a neutron single crystal diffractometer used to determine the periodic atomic arrangement or crystal structure of single crystals, both natural and synthetic. While one of the workhorse-instruments at the Lujan Center, HIPPO is a general-purpose powder diffractometer that measures both the crystal structure and orientation distribution of crystals (or texture) making up a poly-crystalline material from the powder pattern of the crystals. It is the only time-of-flight neutron instrument in the world that routinely measures texture, with single crystals being the ultimate textured samples.

"The gold single crystals are so far the largest single crystals characterized on HIPPO," Vogel said. HIPPO handles a wide range of materials including rocks, battery materials, alloys, and nuclear fuel mock-ups.

History of Rakovan and the Lujan Center

The big-crystal question is not the first mystery to be solved using the Lujan Center tools: In 2006, Rakovan had been given a collection of several dozen gold crystals to study with X-ray diffraction. One crystal out of the batch was puzzling, showing a single-crystal pattern in one orientation but a polycrystalline nature in all other orientations. He hypothesized that weathering and erosion had altered the exterior of the nugget, but that the overall single crystal morphology was intact. "To test this we needed to look at the interiors of the crystals but without cutting them in half," Rakovan said.

Twelve years before, Rakovan had used the SCD instrument at the Lujan Center to characterize OH ordering in natural apatite crystals. "…Through that experience I learned about other potential applications of neutrons in studying materials. Thus, it dawned on me that neutron diffraction would be ideal to 'see' the crystallinity of the interior of these samples without having to destroy them," he recounted.

While using the SCD instrument for this problem, Nakotte and Rakovan realized that the HIPPO instrument, allowing for texture measurements among other applications, would be able to provide additional data on the gold samples. Several samples were also measured on the HIPPO beamline and the larger probed volume on this instrument indeed provided valuable additional information.

In 2009, the journal *Rocks & Minerals* published the study, which demonstrated neutron diffraction is the best non-destructive method to establish gold crystallinity of samples that have been formed under the most extreme conditions. At that time, they examined a selection of museum and private collection pieces, discerning which ones were frauds.

While these unusual gold studies open new avenues for geologists, the work underscores a proven capability relevant to other fields, too. Researchers looking to understand the properties of single crystals that are several cubic centimeters in size may need to establish first whether their sample is indeed a single crystal using neutron diffraction. Additionally, researchers that require understanding of single crystal growth procedures or who need single crystals for a specific application, such as scintillators, can find the answers using Lujan Center instruments and expertise.

Source: Albuquerque Journal April 11, 2014

And Coming Next Month . . .

2014-5 Club Calendar

Date	Event	Location	Remarks & Information
December 10	Meeting at 6:45	Holiday Inn Midtown	Special Lecture: John Sanfaçon – "Worldwide Crown Jewels"
January 14, 2015	Meeting at 6:45	Holiday Inn Midtown	Special Lecture: Mitch Portnoy – "Malachite"; Malachite (Chinese) Auction – New!!
January 18 (?)	Annual Benefit Sale (?)	Upper West Side, Manhattan	Details to Follow
February 11	Meeting at 6:45	Holiday Inn Midtown	Members' Show & Tell
March 11	Meeting at 6:45	Holiday Inn Midtown	Special Lecture: Alfredo Petrov – "Pseudomorphs – False Forms of Minerals"
April 8	Meeting at 6:45	Holiday Inn Midtown	Special Lecture: Jamie Kruse (Artist) – "NYC is a Geologic Force"
May 13	Meeting at 6:45	Holiday Inn Midtown	Special Lecture: Renée Newman – "Exotic Gems and the Jewelry Business Today"
June 10	Benefit Auction	Holiday Inn Midtown, Mezz C	100+ diverse lots, not to be missed!
July/August	Tentative Club Events	TBD	Details to Follow
September 9	Meeting at 6:45	Holiday Inn Midtown	Details to Follow
October 7	Annual Banquet	Holiday Inn Midtown	Theme: NYC Subway / Garnet More Details to Follow

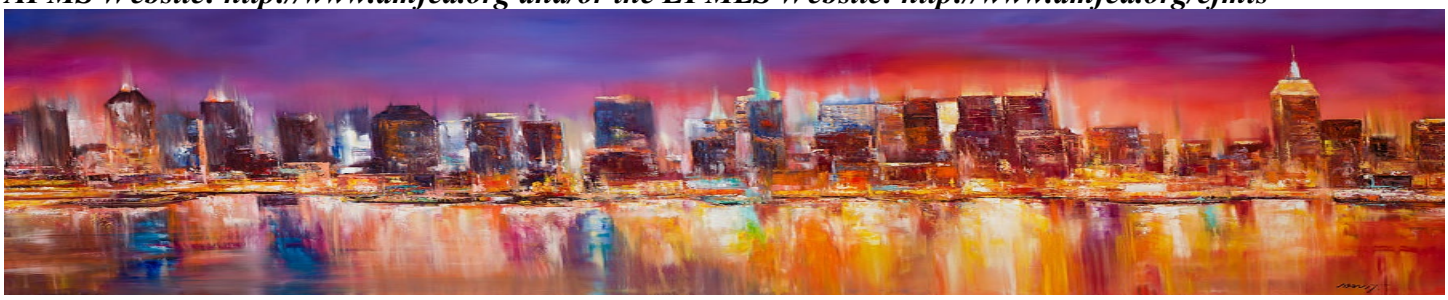
2014-15 Show or Event Calendar

Date	Event	Location	Remarks & Information
November 29-30	Rock & Mineral Weekend	Morris Museum, Morristown, NJ	Lectures, Exhibits, Mineral ID, Mineral Magic! Information: 973.971.3718
January 2015		***United Nations' International Year of Light Begins!***	
Early February 2015	Tucson Shows	Tucson, Arizona	Temporary Mineral & Gem World Capital!
February 14-15	Annual Capital District Gem, Mineral & Fossil Show	New York State Museum, Empire Plaza, Albany, New York	Contact: Michael Hawkins email mhawkins@mail.nysed.gov
March 7-8	Spring New York City Gem, Mineral & Fossil Show	Grand Ballroom, Holiday Inn Midtown, New York City	20+ diverse dealers; lectures; wholesale section (with credentials); Club Booth
March 27-29	EFMLS Convention/Show	Hickory, North Carolina	Article Contest Results; Details to Follow
October 23-24	AFMS Convention/Show	Austin, Texas	Details to Follow

Mineral Clubs & Other Institutions

If you would like your mineral show included here, please let us know at least 2-3 months in advance!

Also, for more extensive national and regional show information check online:
AFMS Website: http://www.amfed.org and/or the EFMLS Website: http://www.amfed.org/efmls



The New York Mineralogical Club, Inc.

Founded in 1886 for the purpose of increasing interest in the science of mineralogy through the collecting, describing and displaying of minerals and associated gemstones.

P.O. Box 77, Planetarium Station, New York City, New York, 10024-0077, http://www.nymineralclub.org

2014 Executive Committee

President	Mitchell Portnoy	46 W. 83rd Street #2E, NYC, NY, 10024-5203	e-mail: mitchpnyc@aol.com..	(212) 580-1343
Vice President	Anna Schumate	27 E. 13th Street, Apt. 5F, NYC, NY, 10003	e-mail: annaschumate@mindspring.com. .	(646) 737-3776
Secretary	Vivien Gornitz	101 W. 81st Street #621, NYC, NY, 10024	e-mail: vmg1@columbia.edu.	(212) 874-0525
Treasurer	Diane Beckman	265 Cabrini Blvd. #2B, NYC, NY, 10040	e-mail: djbeckman@aol.com.	(212) 927-3355
Bulletin Editor	Mitchell Portnoy	46 W. 83rd Street #2E, NYC, NY, 10024-5203	e-mail: mitchpnyc@aol.com..	(212) 580-1343
Membership	Mark Kucera	25 Cricklewood Road S., Yonkers, NY, 10704	e-mail: mark_j_kucera@yahoo.com..	(914) 423-8360
Director	Richard Rossi	6732 Ridge Boulevard, Brooklyn, NY, 11220	e-mail: judysjems@aol.com.	(718) 745-1876
Director	Alla Priceman	84 Lookout Circle, Larchmont, NY, 10538	e-mail: priceman.a@gmail.com.	(914) 834-6792
Director	Sam Waldman	2801 Emmons Ave, #1B, Brooklyn, NY, 11235	e-mail: samgemw@optonline.net.	(718) 332-0764

Dues: $25 Individual, $35 Family per calendar year. **Meetings**: 2nd Wednesday of every month (except July and August) at the Holiday Inn Midtown Manhattan, 57th Street between Ninth and Tenth Avenues, New York City, New York. Meetings will generally be held in one of the conference rooms on the Mezzanine Level. The doors open at 5:30 P.M. and the meeting starts at 6:45 P.M. **(Please watch for any announced time / date changes.)** This bulletin is published monthly by the New York Mineralogical Club, Inc. The submission deadline for each month's bulletin is the 20th of the preceding month. You may reprint articles or quote from this bulletin for **non-profit usage only** provided credit is given to the New York Mineralogical Club ***and*** **permission** is obtained from the author and/or Editor. The Editor and the New York Mineralogical Club are not responsible for the accuracy or authenticity of information or information in articles accepted for publication, nor are the expressed opinions necessarily those of the officers of the New York Mineralogical Club, Inc.

Next Meeting – Wednesday, December 10, 2014 from 6:00 pm to 10:00 pm

Mezzanine, Holiday Inn Midtown Manhattan (57th St. & Tenth Avenue), New York City

Special Lecture: John Sanfaçon — *"Crown Jewels of the World"*

New York Mineralogical Club, Inc.
Mitchell Portnoy, Bulletin Editor
P.O. Box 77, Planetarium Station
New York City, New York 10024-0077

FIRST CLASS

George F. Kunz
Founder