THE MONTHLY NEWSLETTER OF THE MINERALOGICAL SOCIETY OF THE DISTRICT OF COLUMBIA

The Mineral Minutes

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In this Issue:

October Program

"Tom Tucker's Western Odyssey"

Presented by Tom Tucker, Past President

by Dave Hennessey

Come see the mineral West! This month our program will be brought to us by one of our former club presidents, Tom Tucker. During the summer of 2016 Tom headed west, drifting along with the tumbling tumbleweeds, provided the tumbleweeds were going to certain old classic mining and mineral localities.

Tom's western wanderings included old gold and silver-mining towns in Colorado - Creede, Telluride, Ouray, Silverton, and Howardsville; Silver Gate in Montana; the silver and copper mining towns of Ely and Hamilton, Nevada; the gold mining district of Tintic, Utah, and the scenic and geologic wonders of Dead Indian Hill, Wyoming and Yellowstone National Park.

Tom reports that he visited as many mines and mineral localities as possible, learning some of their history, and picking up a few specimens of interest. He covered a lot of ground, took a lot of pictures he will share with us, acquired a few specimens, and may have some giveaways for us!!

Please join us in taking Tom to dinner on September 6th before the club meeting. We will be meeting at 6:00 pm at Elephant & Castle Restaurant, 1201 Pennsylvania Ave, NW, Washington, DC, about 2 blocks from the Smithsonian Institution National Museum of Natural History (NMNH) where our club meeting is held. If you cannot make it to dinner, we will meet in the NMNH lobby at 7:30 pm and head up to the Cathy Kerby Room for Tom's presentation.

Prez Says...

by Dave Nanney, MSDC President

I am looking out my back window watching a leaf storm falling in my yard. I see many hours of raking, mowing and plant cleaning in my immediate future. Temperatures are dropping this weekend to the upper 60s, a far reach from the 90 degrees attained last Wednesday. I'm pretty much ready for the cooler weather but not looking forward to cold that follows.

I want to congratulate Susan and Ed Fisher on a very successful book and mineral sale. Apparently a bunch of us went home from the Fisher's with many new treasures. I also want to thank the several people who contributed books and minerals to the sale. The proceeds from the sales will be used to defray some of the expenses of our upcoming 75th MSDC Anniversary and Holiday gathering.

Put 9 December on your calendar for the big event. We are finalizing the location, speakers, and a hundred other details. When you look back over the long history of the club, we have had some amazing individuals involved in keeping our shared interest running. Expect to hear more on the gathering at our meeting on October 4.

For those inclined, we are taking our speaker, our own mountain man, Tom Tucker (yep, I made a mistake in September), to dinner at the Elephant and Castle at 6PM before the meeting. Tom has been researching our past

June Business Meeting Synopsis

By Amanda Parker, Acting Secretary

Vice President Dave Hennesey welcomed the crowd and reminded us he was just standing in for the President of the club, Dave Nanney, who was flying back from Seattle that evening. First and foremost, Dave acknowledged that he, the stand-in president was much better looking than the current club president and received many nods from the crowd. Then, he thanked the "food bringers" and acknowledged past presidents in attendance, Ed and Steve. Amanda Parker was thanked for taking minutes and it was noted no guests were present this evening. However, David Gibbs attended the meeting for the first time in 15 months and club members were quite pleased.

Previous meeting minutes were unanimously approved after a motion to do so and the president's report was skipped due to Dave's untimely absence. The treasury report was announced with a summary for 2016-2017. The expenses are expected to be a little more, but the club also expects to continue items such as the scholarship given to Maggie Moss and the donation to the Smithsonian which were completed in the past year.

No committee report was declared as no visitors were present, so the meeting was turned over to club members for minerology in the news which was quite exciting for the summer.

Mineralogy in the News - An article was released in July 2017 claiming to have solved the mystery of 2000-year-old Roman concrete structure durability. Researchers found the structures to be denser due to the Roman's concrete recipe. Volcanic ash, rock, seawater and lime are typically combined to produce what is referred to as a "pozzolanic reaction" however another mineral was found in their recipe.

Researchers discovered Phillipsite and a rare mineral called Al-tobermorite in the mixture. Although today's concrete is eroded by seawater, the Al-tobermorite crystallized and spread upon exposure. Over time the structures became much stronger. At this time it was noted Andy had done an article on that Al-tobermorite. Researches are hoping to develop processes to add Al-torbermite to concrete mixtures to produce stronger structures along coastlines worldwide and is already being considered for construction projects in the UK, however it's cost may outweigh the benefits in some cases. It could take 120 years to recoup the budget used on a massive structure such as the tidal lagoon power project proposed in the Swansea Bay.

In other news, Bob Cooke discussed "raining diamonds" on planets like Jupiter and Saturn. It turns out that diamonds might be the most prevalent form of "rain" in the Universe, which makes sense since ice is considered a mineral and we have large hail storms here on Earth. The abundance of carbon on these planets can be converted from methane into soot (carbon) during lightning storms. As it falls to Earth it hardens into graphite and eventually a diamond (up to about 1cm wide) before hitting a molten sea on the planet's surface.

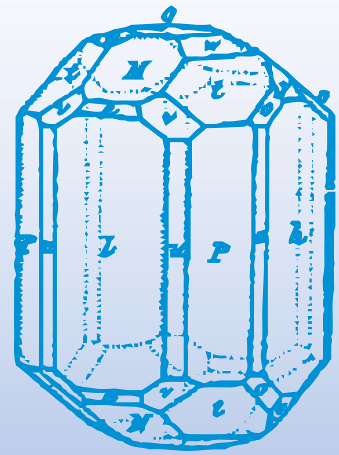
After some discussion, a question arose regarding the composition ofSaturn's core and how they could possibly know what's going on inside. It was explained (in laymen's terms) the composition of the upper layers of the planet reflect light until they become opaquer within models created by NASA. The same models are used on other planets to decide what their core might be made of, including diamond. Planets made entirely of diamond intrigued the crowd quite a bit (possible field trip)?

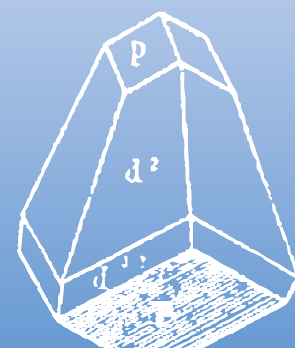
Susan Fisher announced her fundraiser which will have donated items such as books, specimens and flats will be available at her home on the 23rd of Sept. They asked for donations while shopping their garage at 10am that Saturday.

The date of December 9th was announced for the annual Christmas party and 75th Anniversary celebration. We now have a location of the Patriot Hall thanks to Dave Nanney. Jeff Post and his predecessor will be speaking and the micro mount club may join us by celebrating their 50th Anniversary that evening. Menu choices will be decided upon soon and a "gold & diamond" theme was suggested if the micro mount club joins the celebration (even though they had a conference in the spring to commemorate the date). It was also noted the invitations will likely be extended to as far a reach as possible, including other clubs in the area.

A motion to introduce speaker was made and passed. Without further ado, Hutch Brown took the podium.

newsletters, stored at the USGS archives. Dinner might be a great place to hear about events and people from the past. Please send Dave Hennessey a note so we can insure enough seats.





Editor's Note: Crystal Shapes are from Goldschmidt's "Atlas der Krystallformen"

CLUB INFO

MINERALOGICAL SOCIETY OF THE DISTRICT OF COLUMBIA

MEETINGS

Meetings are the First Wednesday of the Month (Jan-Jun and Sep-Dec). We meet in the lobby of the Smithsonian National Museum of Natural History at 7:45pm.

WEBSITE

http://mineralogicalsocietyofdc.org/

FACEBOOK

www.facebook.com/MineralogicalSocietyOfTheDistrictOfColumbia

2017 Officers & Directors

President	Dave Nanney, dnanney@cox.net
Vice President	David Hennessey, davidhennessey@comcast.net
Secretary	Andy Thompson, thompson01@starpower.net
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September Program: "Roosevelt Island Geology"

Presented by Hutch Brown

By Amanda Parker, Acting Secretary

Vice President Dave Hennessey introduced Jake Slagle as the eveningNative Gold: Maryland Mine, Montgomery County: Collected in 1940's. Sold by Edward T. Ingalls to U. S. National Park Service in 1971 Hutch holds a Ph.D. in German Literature and works for the US Forest Service in addition to editing Fire Management today and the NVMC newsletter, which he has done for five years. A lot of this "structural geology" is speculation, Hutch notes, as he has some theories to share and wants others to interject if they can provide additional scientific background or information. Land forms are what he covers for the forest service, so he wrote about Roosevelt Island and decided it would be ideal for tonight's talk.

The National park known as Theodore Roosevelt Island is a beautiful spot located in the Potomac in Arlington and this presentation begins with a map of that area. Before our time it was known as Analostan Island and Native Americans populated it. The name originated from the Algonkian speaking Nacotchtank Indians, who were using it for farming and fishing. But eventually a man named Mason drove them out and inhabited the Island.

He admired the sweeping views and entertainment became the focus of the island for a while. The only remains from that time are a few bricks that can be located on the island today. The geology included bands of rock that went from SW to NE. This includes the Mather Gorge complex, Sykseville Formation, and Laurel Fm. Taconic Orogeny was discussed and how this island is on the edge of the Potomac terrane. The Sykesville formation begins above the coastal plan and covers the Northern part of Arlington. This is where the island is located and it has a metamorphic, sedimentary mélange just south of there.

Quartz and other rocks can be seen embedded into this formation which formed in the ocean trench. An ocean trench is then described before the "mountain building event" of tectonic orogeny about 400mya. That eventually brings us to 320-280mya, the Alleghenian orogeny, when the Appalachians formed. The size of the rocks created when the Indian sedimentary mélange was moved by the tectonic plates into the Sykseville bedrock was so large they were mappable, Hutch notes.

He then described the flattening of the Earth's crust which was met by a "hot spot" that activated an old suture line. This thin, flat crust eventually became thinner until it broke. That break affected many fault lines and water pushed between them, separating this area as much as the rest of the world during and after Pangea. Ultimately, Triassic basins, valleys, and even Bull Run Mountain was formed during that time. Eventually the erosion of the rift valley wall occurs and a river forms in an unusual direction due to "headward erosion" which caused the Shenandoah River to split through the rock along the blue ridge mountains.

Hutch then explained how Rock Creek, which appears directly across from the island, is in an unusual location and how the fault most likely lies under the river. Good evidence exists to show how these faults essentially created the rivers and shoreline near the island. Riverine sediments appear on the island similar to what Hutch saw in Arlington, when he investigated the rock there. That evidence points to artificial fill.

After researching the history of the area, accounts could be found from the 1800s showing where some fill was brought in. Over time, not much had been brought to the area, however, so that didn't explain why the island was growing over time. Land clearing from the 1600s and beyond created more flooding from runoff. Those rivers take sediment, or runoff downstream, possibly depositing it on the island.

Fires, floods and deforestation cut the soil and push more and more downstream to the coastal plain that slowed the river. Ocean ports filled in as a result. Dumfries and Georgetown became more land than water by the 1800 time period. And in conclusion, the island is growing due to the erosion of Georgetown and Northern land areas. The channels are also filling and some areas of the river are quite shallow compared to historic time periods. On one side is the thinner Little River Channel which has it's own bend where erosion is prevented on Arlington side and growing sediment on the island side. The growing wetlands are a good thing despite them growing due to man-made deposits (750k tons move past Chain Bridge annually).

Questions are then answered and the sharing session commences. Fossil plates, Sphalerite "Ruby Jack," Fluorite & Barite are shown from members. The session then ended with a few snacks and friendly member discussion.

Measuring a crucial mineral in the mantle:

New research resolves 40 years of debate on the strength of olivine, the most abundant mineral in the Earth's mantle

from ScienceDaily.com

University of Delaware professor Jessica Warren and colleagues from Stanford University, Oxford University and University of Pennsylvania, reported new data that material size-effects matter in plate tectonics.

Plate tectonics, the way the Earth's plates move apart and come back together, has been used since the 1960s to explain the location of volcanoes and earthquakes.

The study (link here) published Wednesday, Sept. 13 in the American Association for the Advancement of Science journal Science Advances, resolves 40 years of disagreement in datasets about the strength of olivine, the most abundant mineral found in the upper 250 miles or so of the Earth, known as the mantle.

"Measuring the strength of olivine is critical to understanding how strong tectonic plates are, which, in turn, matters to how plates break and create subduction zones like those along the Cascadia plate, which runs down the west coast of Canada to the west coast of the United States," said Warren, a geologist in the College of Earth, Ocean, and Environment. It's also important for understanding how plates move around over the million-year time scales.

The paper demonstrated that olivine's strength is size-sensitive and that olivine is stronger the smaller the volume that is measured, something that has been known in materials science for many metals and ceramics, but has not been studied in a geological material before.

Warren explained that the problem with studying rocks on the earth's surface is that they are no longer subjected to the high pressures found inside the earth that cause materials to flow (like ice in a glacier). Recreating these elevated pressures in the laboratory is difficult, making it hard for scientists to study material strength in the lab.

The researchers used a technique, called instrumented nanoindentation, to measure olivine's strength. The technique allowed them to recreate pressure conditions similar to those inside the earth by pressing a diamond tip that was carefully machined to a specific geometry into the olivine crystal to measure the material's response. The diamond tips ranged in size from 5 to 20 microns (0.000001 meter). The researchers performed hundreds of indentation tests on tiny olivine crystals less than a centimeter square and found that the olivine crystal became weaker as the size of the diamond tip increased.

To validate this size-effect, the researchers reviewed the available literature data on the strength of olivine to determine the sizes and areas that had been tested in previous experiments dating to the late 1970s. The size-effect showed up in the old data, too.

"The reason 40 years' worth of data don't agree from one experiment to the next is because scientists were measuring different sizes or areas of olivine," Warren said. "But if you plot the same information as a function of the sample size, the datasets, in fact agree, and display the same general trend -- the larger the indentation in the material tested, the weaker the olivine becomes."

Now that Warren and her colleagues understand this size-effect, they are turning their attention to how temperature affects the strength of olivine, and more broadly, on where tectonic plates might break and give rise to potential subduction zones.

Temperatures inside the earth are much hotter than on the surface and can range from 1,470 to 2,200 degrees Fahrenheit (800 to 1,200 degrees Celsius).

The team also will consider what role water plays in the structure of olivine minerals and rocks in the earth. According to Warren, current estimates suggest the earth contains the equivalent of 50 percent to 4 times the amount of water found in the global ocean.

"When geologists look at how faults buckle and deform, it is at a very small length scale where conditions in size effect really matter, just like our olivine tests in the laboratory," Warren said. "But this size effect disappears when you get to a large enough length scale on tectonic plates, so we need to consider other things like when temperature and water begin to play a role."

Journal Reference:

Kathryn M. Kumamoto, Christopher A. Thom, David Wallis, Lars N. Hansen, David E. J. Armstrong, Jessica M. Warren, David L. Goldsby, Angus J. Wilkinson. Size effects resolve discrepancies in 40 years of work on low-temperature plasticity in olivine. Science Advances, 2017; 3 (9): e1701338 DOI: 10.1126/sciadv.1701338

https://www.sciencedaily.com/releases/2017/09/170913192943.htm

Mathematics predicts a sixth mass extinction

By 2100, oceans may hold enough carbon to launch mass extermination of species in future millennia

from ScienceDaily.com. Originial written by Jennifer Chu

In the past 540 million years, the Earth has endured five mass extinction events, each involving processes that upended the normal cycling of carbon through the atmosphere and oceans. These globally fatal perturbations in carbon each unfolded over thousands to millions of years, and are coincident with the widespread extermination of marine species around the world.

The question for many scientists is whether the carbon cycle is now experiencing a significant jolt that could tip the planet toward a sixth mass extinction. In the modern era, carbon dioxide emissions have risen steadily since the 19th century, but deciphering whether this recent spike in carbon could lead to mass extinction has been challenging. That's mainly because it's difficult to relate ancient carbon anomalies, occurring over thousands to millions of years, to today's disruptions, which have taken place over just a little more than a century.

Now Daniel Rothman, professor of geophysics in the MIT Department of Earth, Atmospheric and Planetary Sciences and co-director of MIT's Lorenz Center, has analyzed significant changes in the carbon cycle over the last 540 million years, including the five mass extinction events. He has identified "thresholds of catastrophe" in the carbon cycle that, if exceeded, would lead to an unstable environment, and ultimately, mass extinction.

In a paper published in Science Advances, he proposes that mass extinction occurs if one of two thresholds are crossed: For changes in the carbon cycle that occur over long timescales, extinctions will follow if those changes occur at rates faster than global ecosystems can adapt. For carbon perturbations that take place over shorter timescales, the pace of carbon-cycle changes will not matter; instead, the size or magnitude of the change will determine the likelihood of an extinction event.

Taking this reasoning forward in time, Rothman predicts that, given the recent rise in carbon dioxide emissions over a relatively short timescale, a sixth extinction will depend on whether a critical amount of carbon is added to the oceans. That amount, he calculates, is about 310 gigatons, which he estimates to be roughly equivalent to the amount of carbon that human activities will have added to the world's oceans by the year 2100.

Does this mean that mass extinction will soon follow at the turn of the century? Rothman says it would take some time -- about 10,000 years -- for such ecological disasters to play out. However, he says that by 2100 the world may have tipped into "unknown territory."

"This is not saying that disaster occurs the next day," Rothman says. "It's saying that, if left unchecked, the carbon cycle would move into a realm which would be no longer stable, and would behave in a way that would be difficult to predict. In the geologic past, this type of behavior is associated with mass extinction."

History follows theory

Rothman had previously done work on the end-Permian extinction, the most severe extinction in Earth's history, in which a massive pulse of carbon through the Earth's system was involved in wiping out more than 95 percent of marine species worldwide. Since then, conversations with colleagues spurred him to consider the likelihood of a sixth extinction, raising an essential question:

"How can you really compare these great events in the geologic past, which occur over such vast timescales, to what's going on today, which is centuries at the longest?" Rothman says. "So I sat down one summer day and tried to think about how one might go about this systematically."

He eventually derived a simple mathematical formula based on basic physical principles that relates the critical rate and magnitude of change in the carbon cycle to the timescale that separates fast from slow change. He hypothesized that this formula should predict whether mass extinction, or some other sort of global catastrophe, should occur.

Rothman then asked whether history followed his hypothesis. By searching through hundreds of published geochemistry papers, he identified 31 events in the last 542 million years in which a significant change occurred in Earth's carbon cycle. For each event, including the five mass extinctions, Rothman noted the change in carbon, expressed in the geochemical record as a change in the relative abundance of two isotopes, carbon-12 and carbon-13. He also noted the duration of time over which the changes occurred.

He then devised a mathematical transformation to convert these quantities into the total mass of carbon that was added to the oceans during each event. Finally, he plotted both the mass and timescale of each event.

"It became evident that there was a characteristic rate of change that the system basically didn't like to go past," Rothman says.

In other words, he observed a common threshold that most of the 31 events appeared to stay under. While these events involved significant changes in carbon, they were relatively benign -- not enough to destabilize the system toward catastrophe. In contrast, four of the five mass extinction events lay over the threshold, with the most severe end-Permian extinction being the farthest over the line.

"Then it became a question of figuring out what it meant," Rothman says.

A hidden leak

Upon further analysis, Rothman found that the critical rate for catastrophe is related to a hidden process within the Earth's natural carbon cycle. The cycle is essentially a loop between photosynthesis and respiration. Normally, there is a "leak" in the cycle, in which a small amount of organic carbon sinks to the ocean bottom and, over time, is buried as sediment and sequestered from the rest of the carbon cycle.

Rothman found that the critical rate was equivalent to the rate of excess production of carbon dioxide that would result from plugging the leak. Any additional carbon dioxide injected into the cycle could not be described by the loop itself. One or more other processes would instead have taken the carbon cycle into unstable territory.

He then determined that the critical rate applies only beyond the timescale at which the marine carbon cycle can re-establish its equilibrium after it is disturbed. Today, this timescale is about 10,000 years. For much shorter events, the critical threshold is no longer tied to the rate at which carbon is added to the oceans but instead to the carbon's total mass. Both scenarios would leave an excess of carbon circulating through the oceans and atmosphere, likely resulting in global warming and ocean acidification.

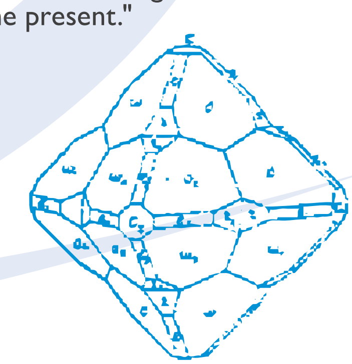
The century's the limit

From the critical rate and the equilibrium timescale, Rothman calculated the critical mass of carbon for the modern day to be about 310 gigatons.

He then compared his prediction to the total amount of carbon added to the Earth's oceans by the year 2100, as projected in the most recent report of the Intergovernmental Panel on Climate Change. The IPCC projections consider four possible pathways for carbon dioxide emissions, ranging from one associated with stringent policies to limit carbon dioxide emissions, to another related to the high range of scenarios with no limitations.

The best-case scenario projects that humans will add 300 gigatons of carbon to the oceans by 2100, while more than 500 gigatons will be added under the worst-case scenario, far exceeding the critical threshold. In all scenarios, Rothman shows that by 2100, the carbon cycle will either be close to or well beyond the threshold for catastrophe.

"There should be ways of pulling back [emissions of carbon dioxide]," Rothman says. "But this work points out reasons why we need to be careful, and it gives more reasons for studying the past to inform the present."



Researcher Unearths Hottest Rock on Record

from GeologyIn.Com

Rock found at Mistastin Lake crater in Labrador heated to 2,370 C during impact.

It was a stroke of serendipity that led to Michael Zanetti's discovery of the hottest rock on Earth. In 2011, Zanetti, now a postdoctoral researcher in Earth Sciences at Western, was on an analog mission with Earth Sciences professor Gordon Osinski at 28-kilometre-wide Mistastin Lake crater in Labrador – a Canadian Space Agency (CSA)-funded endeavour using the impact structure as a test bed for exploration strategies and field equipment for use on the moon and Mars.

A PhD student at Washington University in St. Louis at the time, Zanetti's eye honed in on something that stood out within the crater. "My role was basically to assist the mock astronauts and take notes. Being a wide-eyed graduate student, I kept my eyes open for interesting rocks and things like that," he said.

"Being an impact crater guy and being in one, I was super excited. When I was out there, I found a rock that didn't look in place. It was essentially glass – which, in geotechnical terms, is a rock – that didn't have any crystals in it. It melted. Before it had a chance to form any little crystals in it – which form slowly as things cool – it cooled rapidly and quenched a glass," he explained.

When a city-sized asteroid hits the ground at 15 km/second, an enormous amount of energy is released, like "a billion hydrogen bombs worth of energy," Zanetti said. This produces a lot of heat – so much heat, you could vaporize rocks. The rapid cooling that follows impact 'freezes' in place whatever is inside the rock. In the case of the glass rock that caught Zanetti's eye, small zircon grains from the host rocks were frozen in place.

Zircon – a mineral known by many as a cheap diamond substitute – doesn't break easily and doesn't melt, even at temperatures hot enough to melt surrounding rocks. Instead, the zircon grains present in host rocks recorded the heat at the time of the asteroid's impact 38 million years ago. The rock Zanetti found recorded the hottest temperature in a rock formation on Earth as a result of the asteroid impact – a whopping 2,370 C.

"The big picture here is this – very hot temperature is at the centre of the Earth; it is unusual here. There are hot temperatures and high pressures down deep in the Earth but not at the surface of the Earth," Zanetti said. "You've got these little zircons floating around (in this rock). They're feeling the effects of this heat and one of the effects of this very high heat on zircon is to change its crystal structure to cubic zirconia. This little zircon inside this little sample I found records that; it got frozen in place by quenching to glass halfway through. If it had gone on another couple of seconds, the heat might have just completely engulfed this grain. But this is just kind of a rare happenstance that it got frozen halfway completed."

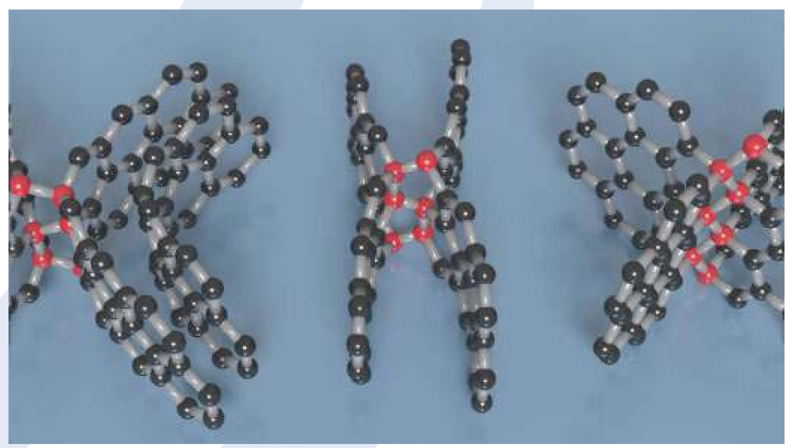
An analysis of the rock, and this record-breaking temperature, led by Nicholas Timms at Curtin University in Perth, Australia, co-authored by Zanetti and colleagues in Switzerland and the United States, was recently published in the journal Earth and Planetary Science Letters. The crux of the science behind this discovery is that it closes the gap between computer models, Zanetti explained.

"We can do the math on what happens, and how much energy is really released when a giant asteroid hits the ground really fast, and we can get estimates on what these temperatures should be, and where in the crater these temperatures should be found. But what we have now is an actual hand specimen that we can say, 'This came from this place and it got this hot," he said.

The entire reason this rock was found was because of a Western-led CSA-funded expedition for something completely unrelated, Zanetti stressed. "I didn't set out to find a hot rock. The other part of this is how lucky things can get. One, I was lucky to get on that mission, lucky to get this rare sample, lucky when I cut into it that I cut across one of these rare zircons, lucky that I was with a team of people who could identify it for what it was and lucky to find the right people to analyze it," he noted. "Sometimes it takes just a bit of happenstance to find some cool things."

New Form of Carbon Discovered That Is Harder than Diamond but Flexible as Rubber

By Elton Santos



Scientists have found a way to make carbon both very hard and very stretchy by heating it under high pressure. This "compressed glassy carbon", developed by researchers in China and the US, is also lightweight and could potentially be made in very large quantities. This means it might be a good fit for several sorts of applications, from bulletproof vests to new kinds of electronic devices.

Carbon is a special element because of the way its atoms can form different types of bonds with each other and so form different structures. For example, carbon atoms joined entirely by "sp3" bonds produce diamond, and those joined entirely by "sp2" bonds produce graphite, which can also be separated into single layers of atoms known as graphene. Another form of carbon, known as glassy carbon, is also made from sp^2 and has properties of both graphite and ceramics.

But the new compressed glassy carbon has a mix of sp^3 and sp^2 bonds, which is what gives it its unusual properties. To make atomic bonds you need some additional energy. When the researchers squeezed several sheets of graphene together at high temperatures, they found certain carbon atoms were exactly in the right position to form sp^3 bonds between the layers.

The researchers made the compressed glassy carbon using a relatively simple method that could be reproduced on a large scale easily and cheaply. In simple terms, they used a sort of machine press that applies high-pressure loads to the carbon. But this must have involved several tricks to control the pressure and temperature in exactly the right way. This would have been a time-consuming process but should still be achievable for other people replicate the results.

Carbon materials are continually surprising us – and the emphasis of research has been to find or cook things in between its natural forms of diamond and graphite. This new form is the latest of what seem like limitless ways you can bond carbon atoms, following on from the discovery of graphene, cylindrical carbon nanotubes and spherical buckminsterfullerenemolecules.

A material like this – that is strong, hard, lightweight and flexible – will be in high demand and could be used for all sorts of applications. For example, military uses could involve shields for jets and helicopters. In electronics, lightweight, cheaply manufactured materials with similar properties to silicon that could also have new abilities could provide a way to overcome the limitations of existing microchips.

The dream is to find a carbon material that could replace silicon altogether. What is needed is something that allows electrons to move through it quickly and whose electrons can easily be placed into an excited state to represent the on and off functions of a transistor. The researchers behind glassy carbon haven't studied these properties in the new material so we don't yet know how suitable it might be. But it might not be that long until another of carbon is found. So far, decades of hunting hasn't turned up what we need, but maybe we just have to look deep down to find it.

Source: IFLScience.com from July 8, 2017

Mineral of the Month – Cinnabar (from Wikipedia)

This month's mineral is stibnite. This should be in most collections. It forms beautiful, silvery prismatic crystals and nice specimens can be found in a wide range of sizes.

The name comes from Ancient Greek: κιννάβαρι (kinnabari), a Greek word most likely applied by Theophrastus to several distinct substances. Other sources say the word comes from the Persian: شنگرف shangarf (Arabicized as زنجفرة zinjifrah), a word of uncertain origin. In Latin it was sometimes known as minium, meaning also "red cinnamon", though both of these terms now refer specifically to lead tetroxide.

Cinnabar generally occurs as a vein-filling mineral associated with recent volcanic activity and alkaline hot springs. Cinnabar is deposited by epithermal ascending aqueous solutions (those near surface and not too hot) far removed from their igneous source. It is associated with native mercury, stibnite, realgar, pyrite, marcasite, opal, quartz, chalcedony, dolomite, calcite and barite.

Cinnabar is essentially found in all mineral extraction localities that yield mercury, notably Almadén (Spain); Puerto Princesa (Philippines); New Almaden (California); Hastings Mine and St. John's Mine, Vallejo, California; Idrija (Slovenia); New Idria (California); Giza, Egypt; Moschellandsberg (de) near Obermoschel in the Palatinate; La Ripa, at the foot of the Apuan Alps and in the Mount Amiata (both in Tuscany); the mountain Avala (Serbia); Huancavelica (Peru); Murfreesboro, Arkansas; Terlingua, Texas (United States); and the province of Guizhou in China, where fine crystals have been obtained. It was also mined near Red Devil, Alaska on the middle Kuskokwim River. Red Devil was named after the Red Devil cinnabar mine, a primary source of mercury. It has been found in Dominica near its sulfur springs at the southern end of the island along the west coast.

Cinnabar is still being deposited, e.g., at the present day from the hot waters of Sulphur Bank Mine in California and Steamboat Springs, Nevada.

Cinnabar	
Category	Sulfides
Formula	HgS
Strunz Classification	2/C.18-10
Crystal System	Trigonal
Crystal Class	Trapezohedral
Color	Cochineal-red, toward brownish red and lead-gray
Cleavage	Perfect Perfect {1010}
Fracture	Irregular/Uneven, Sub-Chonchoidal
Mohs Scale	2-2.5
Luster	Adamantine to dull
Tenacity	Flexible
Streak	Red-brown to scarlet
Specific Gravity	8.176

Mineralogical Society of America Editors' Picks

With the permission of Keith Putirka, the following are the Editor's picks of Highlights and Breakthroughs & Invited Centennial Articles from the June, July and August 2017 issues of the American Mineralogist: Journal of Earth and Planetary Materials.

http://www.minsocam.org

A Metallic Core Source for Nitrides in Diamonds?

On page 1769 of this issue, Zedgenizov and Litasov review Kaminsky and Wirth's paper (in the August issue) regarding new data on nitride inclusions in diamonds. As noted in a prior summary, this work describes phases that are included in so-called "superdeep" diamonds; the nitrides inclusions may be derived by contamination of the diamond source region by metallic material from the core. Zedgenizov and Litasov here suggest that the contamination of the diamond source might have occurred at pressure conditions as low as 5-10 GPa, well short of the 120 GPa near the core-mantle boundary. But a metallic source for these inclusions is still implied; this leaves open the need for trace element and isotopic studies of such inclusions, to determine if any might represent mantle traces of an otherwise long-segregated core.

The Transport of Rare Earth (and other) Elements in Metamorphic Systems

On page 1796 of this issue, Jay Ague examines the dissolution and transport of rare earths and other elements in the fluids generated in metamorphic systems. He finds that despite their trivalent character, REE are indeed quite mobile in high flux environments (more so than other high field strength elements) and are fractionated in the process; in contrast Th and Zr are relatively immobile. REE mobility appears to be enhanced in "extreme" environments, such as hydrothermal systems connected to magma emplacement or any system where supercritical fluids are developed. Ague proposes a diverse array of interesting and important implications, including how high field strength elements may be sufficiently mobile so as to sometimes negate certain tectonic discrimination diagrams; or using mass balance considerations to distinguish how CO2 is released by metamorphic reactions.

The Subsolidus Partitioning of H in Peridotites

On page 1822 of this issue, Demouchy et al. present new data on how H is partitioned amongst the nominally anhydrous minerals in a garnet-lherzolite, experimentally equilibrated at 1100oC at 3 GPa. A key finding is that their partition coefficients for the pyroxenes relative to olivine tend to be much lower than those derived from studies where melt is present. The authors suggest that in some studies, high values for Pyx/Ol partition coefficients may be related to H loss in Ol. But clearly, new studies that show co-variations of H in pyroxenes and olivine are needed to better understand how water is stored in the sub-solidus mantle.

Global water and K cycles may be linked

On page 1922 of this issue, Tao et al. compare the structures and compositions of a Al-10 Å phase and the K-bearing micas muscovite and phlogopite. Their worked is sparked by studies of the Mg-bearing 10 Å phase, found in many hydrous high pressure experimental studies, and thought to be an important carrier of water into the deep mantle via subduction. This new work indicates that an analogous K-bearing, Al-10 Å has at definite micro-solid solution relationships with more common K-bearing phyllosilicates. The results are important for two reasons. First the solid solution relationships provide a possible link between high- and low-P phase assemblages, and these linkages may act as steps on a downward ladder, so that water might eventually be partitioned into a high-P 10 Å phase, of one sort or another. The authors also point out that if this K-bearing downward-pointed ladder is operative, then the global K and water cycles are linked.

Pressures of Inclusion

On page 1957 of this issue, Angel et al. present new software that can be used to more accurately determine the P-T paths of mineral-in-mineral inclusions. Their new programs do this by taking into account the differing equations of state (EoS) for inclusions and hosts, and by allowing the user to input customized EoS. Their approach uses an "isomeke", which is a curve in P-T space that provides the locus of point where the fractional volume change of the host, induced by some external change of pressure, yields an equal fractional volume change in an inclusion. Among the intriguing results is that quartz included in garnet may experience pressures along a prograde metamorphic path that are 30-40% lower than a host garnet; in contrast, pressures experienced by rutile in the same garnet may differ by <5%, due to the similar EoS for these materials.

Upcoming Local (or mostly local) Geology and Mineral Events of Interest:

October

- 4 MSDC Meeting
- 7 Macungie, PA - 2017 Autumn Mineralfest Show sponsored by the Pennsylvania Earth Sciences Association. Macungie Memorial Park, Macungie, PA. www.mineralfest.com
- 11 GLMSMC Meeting
- 13-15 Annual Desautels Micromount Symposium hosted by the Baltimore Mineral Society. Info and Registration baltimoremineralsociety.org
- 21-22 45th Annual Gem & Mineral Show and 67th Eastern Federation Convention. Beals Community Center, 240 Stafford Ave., Bristol, Connecticut. Info: amfed.org/efmls EFMLS Annual Meeting: Friday, October 20.
- 21-22 44th Annual Jewelry, Gem, Mineral & Fossil Show and Sale sponsored by the Kanawha Rock & Gem Club. So. Charleston Community Center, 601 Jefferson Rd; So. Charleston, WV.
- 23 NVMC Meeting
- 25 MNCA Meeting

November

- 1 MSDC Meeting
- 8 GLMSMC Meeting
- 11-12 Fall New York City Gem & Mineral Show hosted by the New York Mineralogical Club. Watson Hotel (formerly Holiday Inn at 57th St), 440 West 57th St; New York, NY. Contact: Tony Nikischer: www.excaliburmineral.com
- 11-13 W. Springfield, Mass. - Annual East Coast Gem & Mineral Show
- 18-19 26th Annual Gem, Mineral & Fossil Show sponsored by the Northern Virginia Mineral Club. NEW LOCATION: George Mason University Dewberry Hall, Johnson Center, Braddock Rd & Rte 123; Fairfax, VA. Contact: www.novamineralclub.org
- 22 MNCA Meeting - depending on Thanksgiving
- 25-26 Rock and Mineral Weekend sponsored by the Morris Museum Mineralogical Society. Morris Museum, 6 Normany Heights Rd; Morristown, NJ. Info: kfrancis@morrismuseum.org
- 27 NVMC Meeting

Useful Mineral Links:

AFMS	American Federation of Mineralogical Societies (AFMS)	www.amfed.org
Eastern Federation Mineralogical & Lapidary Soc's, Inc.	Eastern Federation of Mineralogical and Lapidary Societies (EFMLS)	www.amfed.org/efmls
mindat.org	MINDAT	www.mindat.org
Mineralogical Society of America · Mineralogy · Petrology · Crystallography · 1916 2016 American Mineralogist Centennial	Mineralogical Society of America (MSA)	www.minoscam.org
Friends of Mineralogy F M	Friends of Mineralogy	www.friendsofmineralogy.org/
	WebMineral	webmineral.com
The Geological Society of America	The Geological Society of America (GSA)	www.geosociety.org/
Scovil Photography	Jeff Scovil Mineral Photography (not advertising - just great photos)	scovilphotography.com/
USGS science for a changing world	United States Geological Survey (USGS)	www.usgs.gov
The Geological Society of Washington founded 1893	The Geological Society of Washington (GSW)	http://www.gswweb.org/

AFMS Code of Ethics

- I will respect both private and public property and will do no collecting on privately owned land without the owner's permission.
- I will keep informed on all laws, regulations of rules governing collecting on public lands and will observe them.
- I will to the best of my ability, ascertain the boundary lines of property on which I plan to collect.
- I will use no firearms or blasting material in collecting areas.
- I will cause no willful damage to property of any kind - fences, signs, and buildings.
- I will leave all gates as found.
- I will build fires in designated or safe places only and will be certain they are completely extinguished before leaving the area.
- I will discard no burning material - matches, cigarettes, etc.
- I will fill all excavation holes which may be dangerous to livestock. [Editor's Note/ Observation: I would also include wildlife as well as livestock.]
- I will not contaminate wells, creeks or other water supply.
- I will cause no willful damage to collecting material and will take home only what I can reasonably use.
- I will practice conservation and undertake to utilize fully and well the materials I have collected and will recycle my surplus for the pleasure and benefit of others.
- I will support the rockhound project H.E.L.P. (Help Eliminate Litter Please) and will leave all collecting areas devoid of litter, regardless of how found.
- I will cooperate with field trip leaders and the se in designated authority in all collecting areas.
- I will report to my club or Federation officers, Bureau of Land management or other authorities, any deposit of petrified wood or other materials on public lands which should be protected for the enjoyment of future generations for public educational and scientific purposes.
- I will appreciate and protect our heritage of natural resources.
- I will observe the "Golden Rule", will use "Good Outdoor Manners" and will at all times conduct myself in a manner which will add to the stature and Public "image" of rockhounds everywhere.

MEMBERSHIP APPLICATION OR RENEWAL
THE MINERALOGICAL SOCIETY OF THE DISTRICT OF COLUMBIA (MSDC)

(____) Family ~ $25.00 per year. One address.

(____) Individual ~ $20.00 per year.

(____) New * (____) Renewal Dues are for Year __________*

For new members who join in the last months of the year, membership will extend through the following year with no additional dues.

ANNUAL DUES – PLEASE PAY YOUR DUES PROMPTLY.

Pay at next meeting or mail to:

Mineralogical Society of DC
c/o John Weidner
7099 Game Lord Drive
Springfield, VA 22153-1312

Name(s) (First and Last) ____

Address____

City ______________________________ State _____________ Zip: ________________

Phone(s): Home/Work/Mobile____

Email(s): ____

OK TO INCLUDE YOU ON CLUB MEMBERSHIP LIST?

( ) Yes – Include name, address, phone, email.

If you want any information omitted from the membership list, please note:

Omit my: ( ) Email; ( ) Home phone; ( ) Work phone; ( ) Mobile phone; ( ) Address; ( ) Name

SPECIAL CLUB-RELATED INTERESTS? ____

Meeting Dates, Time, and Location: The first Wednesday of each month. (No meeting in July and August.) The National Museum of Natural History, Smithsonian Institution, 10th Street and Constitution Ave, Washington D.C. We will gather at the Constitution Avenue entrance at 7:45 PM to meet our guard who will escort us to the Cathy Kirby Room. Street parking: Parking is available in the Smithsonian Staff Parking – Just tell the guard at the gate that you are attending the Mineral Club Meeting.

THE MINERAL MINUTES

NEWSLETTER OF THE MINERALOGICAL SOCIETY OF THE DISTRICT OF COLUMBIA

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