The Apache Junction Rock & Gem Club, Inc.

SMOKE SIGNALS

April 2012

Officers of the Apache Junction Rock & Gem Club, Inc.		
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The Club meets on the second Thursday of every month October thru April at 7:00 pm at the Carefree Manor RV Park, at the corner of Tepee & Delaware, Apache Junction, AZ

Club Dues - $24 a year per member prorated to first of month of joining. This may be paid at the general meeting or by mail to Ron Ginn, 691 N. Velero St., Chandler, AZ 85225.

In This Issue

Next Meeting – SEPTEMBER 12, 2012

At the Carefree Manor RV Park, at the corner of Tepee & Delaware, Apache Junction, AZ.

General Meeting Minutes

Apache Junction Rock & Gem Club
General Meeting Minutes April 12, 2012

The meeting was called to order by the President at 7:00 pm. She led the Pledge of Allegiance.

- The secretary's report was accepted as circulated in the newsletter.
- Mattie Gadd, Treasurer, reported the following: Lapidary Checking account $2,553.58, Lapidary Savings account $2,274.11, General Checking account $2,209.69, Show Savings account $2,680.14, and Show Checking account $7,095.56.
- Ron Ginn, Membership Chair, reported that we have 8 new members, 221 current members, and 235 former members who did not renew membership. There were between 25 to 30 new persons signing for membership at the Rock Show. The new members presented in April 2012 are Conrad Allen, Larry Brehm, Roy & Sharon Broadbent, Tom Hollobaugh, James Rader, Emily Rose, and Chris Whitney-Smith.
- Phil Gadd, Lapidary Chair, stated that 4-13-2012 was the last of the Winter schedule for the lapidary shop. During the Summer, the shop will be open on Wednesdays and Thursdays by appointment. He thanks the Lapidary Shop mentors for their contribution of their expertise.
- Kelly Iverson, Show Chair, reported that all business for the 2012 show has been completed and contracts have been established for the 2013 show.
- Wally Frlich, Advertisement Chair, wishes to thank all who worked at the Flagg Show in Mesa and at our Rock Show. He added Dave Ellenwood who worked two shifts at the show. The most effective coupon distribution was from the Flagg show and from individual members. The newspaper

advertisements were most effective from East Mesa, Apache Junction, and Gold Canyon. The least effective newspaper advertisements were from Gilbert and Queen Creek.

- Natalie Kirmiel, Hospitality Chair, wishes everyone a safe Summer.
- Rick Grzych announced that this weekend, April 14th and 15th would be the last Rock Art Sale for the season.
- Tom Sundling made the motion that the Articles of Incorporation be amended to allow the Board of Directors to discontinue the $10,000 debt ceiling. The motion was seconded and passed with 49 yes votes and 0 no votes. This change must be filed with the State of Arizona. This motion allows the members of the Apache Junction Rock & Gem Club to vote on amounts of debt for the club.
- The problem of the current location for the Lapidary Shop was presented as the Sandvig family must move in the near future. Thus our shop would not be able to continue at the present location.
- Mr. Sundling presented the potential purchase of a property with .48 acre of land and a 1,800 sq. ft. building. This property is located at Superstition and Ocotillo in Apache Junction. Pictures of the property were presented by Jack Pawlowski. The details regarding this property include: (1) need for new wiring $7,500 to $10,000,(2) plumbing repair, (3) responsibility for the taxes prior to a tax exempt status 7/12 of $3,500 (approximately $2,050.00), (4) future utility billings, (5) liability insurance $1,000 per year, and $3,300 in finance charges for 10 years before the fee of $95,000 is due. Information was presented also by Gene Minchuk of the Realty One Group. Responsibility for this property would be the club, not individual members as the club's name will be on the title of the property. There was a review of potential income from the Rock Show, lapidary fees, and membership dues. Barbara Bayer reported there had been no reply from the Mesa School District regarding the sale of portable school buildings. There was a review of the current Lapidary Shop expenses of $133.00 per month rent and $60.00 per month for the Porta- Potty. Rick Grzych made the motion to purchase this property, Ken Perkins seconded the motion. The motion passed with 44 yes votes and 5 no votes.
- The door prizes were distributed. Margie LaVigne won the 50-50 pool for the amount of $49.00. The silent auction was held.
- The meeting was adjourned at 8:00 pm.
- Submitted by Barbara Bayer, Secretary

Article of the Month

The Flying Dragons of The Carboniferous

by Andrew A. Sicree

Just how big can a bug get?

The biggest insect ever to roam the earth didn't do much roaming – it flew! We joke about mosquitoes big enough to carry off pets and small children, but way back in the Carboniferous coal swamps the dragonflies were much bigger than the biggest baddest bug beating its wings down in the bayous today.

Meganeura monyi is the name that paleoentolomogists (scientists who study fossil insects) have given to the biggest insect ever to have roamed – or rather flown – the Earth. Meganeura monyi was a giant version of a modern dragonfly and had a wingspan greater than 30 inches (75 cm) across. By comparison, the largest modern-day dragonfly is Anax strenuous (the Giant Hawaiian Darner or the Giant Hawaiian Dragonfly) which has a wingspan up to 7.5 inches (19 cm). Meganeuropsis permiana is another early dragonfly, found in the early Permian. At 28 inches (71 cm) its wingspan rivals that of Meganeura monyi. These bigger-than-most-birds dragonflies were predatory, capturing other insects in flight and perhaps feeding on small amphibians.

The oldest dragonflies

Paleoentolomogists report that the oldest known dragonfly fossils have been recovered from Upper Carboniferous (i.e., Pennsylvanian) sedimentary rocks in Europe. The Carboniferous Period stretched from about 360 million years ago to about 286 million years ago. It is divided (especially in North America) into the Mississippian (the Early or Lower Carboniferous – approximately 360-320 million years ago) and Pennsylvanian (Late or Upper Carboniferous – about 320-286 million years ago) periods.

Meganeuropsis permiana and other now-extinct ancestral dragonflies are classified into the extinct order Protodonata. Modern-day dragonflies belong to the order Odonata (the name is taken from "odonto-," the Greek word for tooth, a reference to the toothy jaws found in most adult dragonflies). Although Meganeuropsis looked much like a huge version of the modern-day dragonfly, there are some important differences between the two groups. Dragonflies of both Odonata and Protodonata strong spiny legs and toothy jaws, which facilitate the capture of prey, but the Protodonata were, of course, enormous compared to modern-day dragonflies. The jaws of the protodonates were larger than those of modern dragonflies and their legs were stronger and longer. Their forewings are usually slightly longer and a bit thinner than their hindwings. These early dragonflies lacked a wing notch (the nodus) and the pterostigma (the blood-rich colored patch on a dragonfly's wing). Because of the differences between the two groups, some authors have suggested that the term "giant dragonfly" be replaced with "griffinfly."

Insects of the order Odonata first make their appearance in the Triassic (245-208 years ago); the Protodonata went extinct in the Triassic about the same time as the earliest dinosaurs appear.

Why so big?

Scientists continue to debate the causes of gigantism among ancient insects. One theory states that insect body size is limited by the way an insect gets oxygen. It is thought that insects get oxygen by diffusion through their tracheal tubes rather than by "breathing" air in and out. Thus, the theory postulates, insects were able to grow much larger in the Carboniferous because the atmosphere had higher levels of oxygen than the present-day 20%. Other entomologists contend that insects really do breathe (by means of rapid expansion and contraction of their tracheal tubes) and thus the atmosphere of the Carboniferous need not have been oxygen-rich to support gigantic insects.

Dragonfly fossils in Appalachia?

Because dragonflies lived near water, one might suspect that they would be likely candidates for fossilization. Paleontology books depict reconstructed dioramas featuring giant dragonflies buzzing through the ancient coal swamps. It is not unusual to find ferns and other plant fossils by the ten of thousands preserved in the coal and shale of Appalachian coal mines. Why don't we find more dragonfly fossils among all these ferns?

One problem may be that, being predators at the top of the insect food chain, large dragonflies weren't all that common. Another consideration is that, because of their large but somewhat delicate bodies, it would be unusual for an entire dragonfly to be preserved intact. Indeed, most specimens of Carboniferous and Permian fossil dragonflies are known from wing fragments few of which are even complete wings. Body fossils are even rarer.

Another factor may be a matter of who is looking for them. Modern coal mining is heavily mechanized and the miner has little opportunity to climb down out of his haul truck and search for fossils. The best hope for finding dragonfly fossils is to go to sites at which the rocks are of the correct ages and at which fossils of plants are preserved. Even more important would be to identify sites from which other, smaller fossil insects have been recovered.

To find a fossil dragonfly

Dragonfly fossils were first recognized in Europe. In 1880, fossils of Meganeura monyi were discovered in the Stephanian Coal Measures near Commentry, France.

In North America, protodonatan fossils have been found in rocks from the Grand Canyon in Arizona. Many important fossil dragonflies have been found in the Permian strata of Kansas and Oklahoma. The largest complete insect wing ever recovered is of Meganeura americana, found in Oklahoma in 1940; it can be seen at the Harvard Museum of Natural History.

Odonata fossils are more common. The have been found in the Upper Triassic in Italy, and the famous Solnhofen lithographic limestones of Upper Jurassic age in Germany. China produces dragonfly fossils, and some are also found in the Lower Cretaceous Crato Formation of northeast Brazil. This is not a comprehensive list; many other localities are known.

In the Eastern U.S., however, only a few fossils of Protodonata are known. In 1889, a specimen of Paralogus aeschnoides was found in Upper Carboniferous rocks near Silver Spring, East Providence, Rhode Island.

A wing fragment in black shale, attributed to the species Palaeotherates pennsylvanicus, was collected in 1887 from Coxton, one mile north of Pittston, Pennsylvania. It appears that the specimen was taken from the Upper Pottsville Formation. A specimen of Tupus durhami was collected in 1939 from the roof shale over the No. 4 Coal at a coal mine in Catoosa (Durham Quadrangle), Georgia. Interestingly, it appears that this fossil came from the Pottsville Series of Georgia and is of Lower Pottsville age – this corresponds approximately to the lower portions of the Pottsville Formation in Pennsylvania.

A more recent in Pennsylvania is that of Palaeothertes analis, which is preserved at the William Penn Museum in Harrisburg. This specimen came from the underclay of the Buck Mountain #5 anthracite, part of the Allegheny Series. It was found in a strip mine located 400 meters eat of benchmark 1271 on the St. Clair-Mahoney City Road, in Blythe Township, Schuylkill County, Pennsylvania.

Ideal vs. Real Formulas in Minerals

Mineralogy texts often accompany their descriptions of each mineral with a chemical formula. Articles in magazines such as The Mineralogical Record may also give formulae for minerals. And mineral lists such as Fleischer's Glossary of Mineral Species (the 10th Edition, released in 2008, authored by Malcolm Black and Joseph A. Mandarino) give mineral formulae, too. The observant collector will notice that sometimes there are differences between the ways different literature sources report formulae for the same mineral.

This may be because the older source is reporting the mineral formula as it was known originally, while another source is reporting a more-accurate formula based on later data. Sometimes, there are perfectly valid, but different, ways to write a mineral's formula. For instance, John Sinkankas' Mineralogy gives $HFeO_2$ as the formula for the common mineral goethite. Other sources use $FeO(OH)$. Note that both give the same ratios of Fe, H, and O.

But discrepancies can also be because one literature source is reporting the "ideal" chemical formula while another is reporting the actual chemical formula for the mineral as found in nature. One example of this may be seen by examining the case of franklinite. Franklinite is "zinc iron oxide" and the ideal formula is $ZnFe_2O_4$
In this formula, zinc is present as Zn^{2+} and iron as Fe^{3+}, while oxygen atoms have a "minus two" charge (i.e. O^{2-}). Electrical charges are balanced in this formula. Four oxygens in the minus two state give a total of eight negative charges. Two irons in the three plus state give a total of six positive charges, and two more from the zinc ion bring the total to eight positive charges. Thus, the mineral is electrically neutral.

An actual specimen of franklinite may contain a substantial amount of manganese (Mn). How does that fit into the picture? In such a case, the formula is closer to $(Zn,Mn,Fe)(Fe,Mn)_2O_4$. Putting the first three elements in the first set of brackets indicates that some of each of those elements (as Zn^{2+}, Mn^{2+} or Fe^{2+}) is occupying the position that Zn^{2+} held in the ideal formula. Likewise, either iron or manganese may occupy the site held by iron in the ideal formula. Note that the iron and manganese must be in the "three plus" state (as Fe^{3+} or Mn^{3+}) to produce an electrically-neutral mineral. This actual formula gives us more information than the ideal formula does. It tells us, for instance, that both iron and manganese are present in franklinite as both "plus two" and "plus three" ions.

Weird Geology

Ultraviolet Auroras

The Northern Lights or the aurora borealis are an eerie, beautiful phenomenon best observed in Alaska and northern Canada, but also visible much further south. Driving west from New York City on I-80 late one night, I was surprised to encounter a large number of cars parked along the roadside with the drivers standing outside staring to the north. It looked like a scene from "Close Encounters of the Third Kind." Naturally curious, I stopped too, expecting maybe to see a UFO. No UFO's were visible, but what I did see was a wavy pulsing curtain of deep blue and purple – the Northern Lights.

What I didn't know at the time was that I should've hauled out my freshly collected calcite and willemite specimens (I had been at a night dig at the Sterling Hill Mine in Odgensburg, NJ – a famous locality for fluorescent minerals) and checked to see if they glowed under the aurora.

The aurora is created when "energetic" particles from the Sun smash into the Earth's upper atmosphere. Mostly, these particles are the nuclei of hydrogen atoms (i.e., protons) and electrons. When they hit gas molecules in the upper reaches of the Earth's atmosphere (above 80 kilometers or 50 miles) they knock off electrons. As the electrons recombine with the gas molecules, they give off light.

The colors you see are a function of the energy of the solar particles. If the incoming particles have energies of a few hundred electon volts, they don't get below altitudes of about 200 km (125 miles) and they produce a red aurora. Solar particles with energies of about 1 kiloelectron volt (KeV) create auroras that are greenish-yellow. And their more-energetic buddies, those with energies around 10KeV, penetrate deeper into the Earth's atmosphere (below 100 km or 63 miles) and stir up auroral colors that can be deep purple.

If you get even more powerful solar particles, with energies above 100 KeV, the auroral emissions will occur in the ultraviolet. In theory then, one should be able to get a tan at night in the winter above the Artic Circle if the auroras are strong. In reality however, the auroral ultraviolet light is probably too weak to expect to be able to observe fluorescence in even the brightest fluorescing specimens. Still, it is an experiment to try one wintery night if you are in Point Barrow, Alaska, and happen to have a good Sterling Hill willemite with you!

Ref: Strangeway, R. J., "How do auroras form?" *Physics Today*, p. 68-69, July 2008

SHOW WORKERS

Apologies to Dave Ellenwood (2) for omitting his name from the Skyline High School show-worker list in the last newsletter.