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Rochester Academy of Science

BULLETIN

"An organization of people in the Natural Sciences" *January, 2009 - Vol. 63, #1*

PRESIDENT'S REPORT JANUARY, 2009

One of the major purposes of the RAS is to promote the natural sciences in our community. To this end, some Sections of the RAS conduct community, scout and school outreach programs throughout the year. Many times, the members who organize these events purchase materials and prizes to encourage participation, paying for them out of their own pockets.

This year, we have set up a fund specifically to support the unplanned expenses incurred delivering these outreach programs. We encourage members to make a tax-deductible donation to this fund. You will find a place on your membership renewal to direct such a donation. Please consider including a small amount along with your membership.

Stan Spector
President, RAS

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EDITOR'S NOTE

Last month, I wrote about my experiences at the Fall Scientific Paper Session. This month, I'll let the abstracts speak for themselves.

Frank Bov
Editor, RAS Bulletin

AMATEUR OBSERVATIONS OF LAYERS IN THE ARABIA REGION OF MARS.

J. Secosky,. Finger Lakes Community College, Canandaigua, NY

Under the public target program, I discovered areas that contained layers on Mars. In August 2003 NASA began accepting suggestions from the public for possible targets for the Mars Orbiter Camera (MOC) narrow angle camera system on the Mars Global Surveyor (MGS). Up to that time over 120,000 images, representing about 3% of the surface had been taken. I began receiving images from MOC in October 2004. Many of these images are on my website: PAWS.flcc.edu/~secoskjj.

The MOC narrow angle images have resolutions of 1.4, 3.0, or 4.5 meters/pixel. Images are either 1.5 or 3.0-3.1 Km across (about 1 or 2 miles across). They are all taken with a local time of 2 PM when the spacecraft crosses the equator. In other words, the angle of the sun is consistent.

Arabia is about the size of Australia and has features of both the northern plains and the southern highlands. Although appearing very old due to a high density of impact craters, it is not near as high in elevation as the southern hemisphere.
In areas that I suggested that NASA image with MOC, I observed layers in widely separated parts of Arabia. Layers are found in many parts of Mars and can be caused by a variety of processes including volcanoes, wind, and deposition at the bottom of lakes and seas. The widespread distribution of layers suggests that the conditions for producing layers may have existed over a very large area. Perhaps, Arabia contained a large number of lakes. In September 2008 NASA released strong evidence for a lake in Xanthe Terra, which is located just to the west of Arabia.

I am grateful to Malin Space Science Systems for providing the images, the staff at FLCC's computer labs, and the staffs of Red Jacket Library, Wood Library, Clifton Springs Library, and Naples Library. Since I was not connected to the internet, I needed help where free access to computers was available.

* * *

DERIVATION OF THE HUBBLE CONSTANT

Ingo H. Leubner, Rochester Institute for Fundamental Research, Penfield, NY

The Big Bang as the origin of the Universe is based on E. Hubble's observation that galaxies in all directions are moving away from our Galaxy, and that their rate of separation is proportional to their distance from our Galaxy. The slope of this correlation is known as the Hubble Constant. The cause and reason for this correlation was

not known, but led to such esoteric suggestions as negative energy, which supposedly pulls the Universe apart, and dark matter, which supposedly will cause the Universe to collapse into a singularity.

It was shown in a new model of the Universe that the concepts of negative and dark matter are unnecessary to explain the expansion and collapse of the Universe (Leubner, RAS Fall Meetings, 2003, 2007). The new model suggests that the Universe expands because matter, with directed gravity, is converted to photons, with non-directed gravity. The loss of directed gravity causes the loss of cohesion of planetary systems, like the solar system (RASNY2004/6), galaxies, and the Universe.

The new model leads to a reinterpretation of the Hubble constant. For this purpose, the model was extended to determine the rate of separation in closed systems, e.g., the Universe, as a function of the distance from the gravitational center. The modeling of separation rate as a function of distance leads to a linear correlation, in agreement with the experimental Hubble correlation.

This result suggests that the Hubble constant represents the mass loss ('decay') rate, or more accurately the gravity loss rate, of the Universe, k_u. The presently considered most accurate value of the Hubble constant is 71.0 (+/- 1.3) (km/s)/Mps (Mps = mega-parsec). From this value, the universal mass loss constant k_u was calculated to 3.24+/-0.059)E-20 s^{-1} or (0.0715+/-0.0013) Byr^{-1} (Ga^{-1}).

The identification of the Hubble constant as the universal decay rate and its value are ground-breaking successes of the new model of the Universe.

GUT CONTENTS OF A LOWER CRETACEOUS DROMAEOSAURID DINOSAUR: NEW DATA ON THE FEEDING BEHAVIOR OF DEINONYCHUS ANTIRRHOPUS (SAURISCHIA, THEROPODA)

William L Parsons,. Kristen M Parsons, Department of Geology, Buffalo Museum of Science, Buffalo, NY

Two partial specimens of *Deinonychus antirrhopus*, from the Lower Cretaceous Cloverly Formation of central Montana, discovered within a mono-specific site, were found to be closely associated with preserved gut contents. The gut contents consisted of several small nodules composed of densely packed bone fragments. Many of the bone fragments that appear upon the surface of these nodules exhibit erosion of the outer periosteal layers and acid-etching, which are indications of the digestive process. The acid etching is similar to the result of the action of digestive acids and enzymes found within the gut contents of modern amniotes. Although no gastroliths are present at this site, the highly fragmented nature of some of the bones in this gut material may indicate digestive processing by a muscular gizzard. Color differences between gut content material and associated bone have been noted in the descriptions of other fossil gut contents. Almost all of this gut content material is a deep shade of orange and can be easily distinguished from the pinkish-green/grey coloration of the associated Deinonychus bone material. Although some of the larger bone fragments within these conglomerates were of the size that would be expected from the remains of a medium-sized dinosaur, many fragments are from much smaller individuals. An avian-like manual phalanx found among these conglomerates indicates the original source of at least some of the smaller bones. The morphology of this phalanx indicates a forelimb/wing from a taxon that is very likely to have been capable of sustaining some form of flight. Although the discovery of this forelimb element is notable, it is also significant in that it indicates that Deinonychus not only fed upon the carcasses of larger dinosaurs, but that its predatory behavior included the acquisition of much smaller prey. Deinonychus was an opportunistic feeder, probably capable of catching prey species that possessed some form of flight.

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A PHARMACEUTICAL ANALYSIS OF IBUPROFEN DRUG RELEASE USING DISSOLUTION TESTING

R. Best, Hilton NY, Dr. I. Kimaru, Rochester NY, Dr. F. Zhao, Rochester NY

The rate of drug release from different dosage formulations of ibuprofen in relation to the human digestion system illustrates a real life pharmaceutical analysis application. In order to determine these rates, dissolution testing of three dosage formulations (Advil tablets, capsules and gelatin capsules) of ibuprofen was performed. Dissolution media was selected that mimicked to some extent the physiological conditions encountered in the stomach and small intestines. The amount of drug release was quantified using UV/Vis spectroscopy upon the dissolution samples. The results indicate that the dissolution of ibuprofen is dependent on the pH of the physiological environment where the release of ibuprofen generally takes place in the small intestines at neutral pH and not under the acidic conditions found in the stomach. This project introduces simple pharmaceutical analysis of over the counter medications.

* * *

COORDINATED STASIS: CURRENT STATE AND FUTURE DIRECTIONS

John C. Handley, Rochester Academy of Science Fossil Section, Fairport, NY

Coordinated stasis is an observed pattern in the fossil record that communities of organisms persist through long time spans with no net evolutionary or taxonomic change. Prolonged periods of stasis are bracketed by abrupt turnovers. Although it has been well over a decade since the current form of the hypothesis was proposed by Brett and Baird, 1995, from studies in the Devonian Hamilton Group of New York, it remains controversial. Several conflicting studies have contributed to debate. Surrounding the controversy are issues of geographic scale, methodological problems of sampling and refinement of the hypothesis itself. It may be that sampling done at a regional level (10's of km) may fail to detect this pattern that occurs at 100's of km. The original formulation of the hypothesis that rank abundances persist may be too strict, and that the reappearance of communities is characterized by re-ordering of ecological dominance.

This talk reviews the results of several major studies to illustrate the hypothesis and debate, presents some recent results in the literature and discusses future research directions.

EVENTS for JANUARY 2009

(For updates to events, check the Academy web site, http://www.rasny.org, or appropriate Section web site.)

Fri 09 ASTRONOMY GENERAL MEETING

7:30 PM at RIT, Gosnell Hall, room A300. The main speaker is Jeff Wynn of ITT Space Systems. His topic will be "Techniques, Technologies and Future Missions for Finding and Characterizing Exoplanets." We'll also have a short talk by members as well. Visitors are always welcome. Come early for snacks and conversation. For more information, contact Carol Latta at <cosmos@rochester.rr.com> or 230-9548.

Fri 09 LIFE SCIENCES MEETING

7:30 PM, St. John's Lutheran Church, 800 Ridge Road East. Topic: The Lemurs Of Madagascar, We will attend the Burroughs Audubon Nature club's lecture/meeting for this interesting and timely talk. Endemic to Madagascar, there are approximately 32 different types of lemurs in existence today. Learn from Darlene Benzon how the Seneca Park Zoo Docent Association is working with the Malagasy people to protect the lemurs, now considered the most endangered species of all primates. This presentation will be highlighted by Darlene's up close & personal photographs. Contact, Karen Wolf 670-9709.

Thur 15 RAS BULLETIN

Deadline for event notices and articles for the February issue.

Wed 21 LIFE SCIENCES HERBARIUM WORKSHOP

10:00 AM to 2:00 PM at the RAS Herbarium, located in the basement of the Rochester Museum and Science Center (RMSC). This is a great way to get a look at very interesting plants from around the world! No experience needed! Plan to come and help with this valuable collection – and learn about plants in the process. If you plan to attend, ***please RSVP*** to Elizabeth Pixley. Then, at RMSC, go to the front desk and ask staff person there to call ext. 368, the phone in the Herbarium. You can either bring a lunch or purchase food at the RMSC café. For more information, contact Elizabeth Pixley at 334-0977 or epixley@rochester.rr.com).

Wed 21 RAS BOARD MEETING

7:00 PM Brighton Town Hall, 2300 Elmwood Ave., in the Stage Conference Room. Everyone welcomed.

Tue 27 MINERAL MEETING

(Note this is the 4th Tuesday this month) 7:30 PM at the Brighton Town Hall at 2300 Elmwood Avenue, in the Downstairs Meeting Room. Al Mura will give a talk entitled "Evolution and its Effect on Minerals." Door prizes and refreshments; visitors welcome. For more information, call Bob Hiler at (585) 787-1584 or check the RAS web page for any updates