

Lightning Center
Minutes
St. Anthony Hospital
August 10, 2001

Quote of the Month:

"Yet cease your ire, you angry stars of heaven! Wind, rain, and thunder, remember earthly man
Is but a substance that must yield to you; And I, as fits my nature, do obey you."

William Shakespeare, Pericles, Act II, Scene 1

1. Meeting began at 11:30 am and adjourned at 1:15 pm.
2. Members present: Barron, Burrows, Cherington, Farrish, Hodge, Kithil, Langford, Lines, Losleben, Mc Donough, Olson, Sellon, Stewart, Thomas, Yarnell.
3. I brought the following article from the literature (abstracted in part here):

a. Navarro-Gonzalez R, McKay CP, Mvondo DN. A possible nitrogen crisis for Archaean life due to reduced nitrogen fixation by lightning. *Nature* 2001:61-4.

"Nitrogen is an essential element for life and is often the limiting nutrient for terrestrial ecosystems. As most nitrogen is locked in the kinetically stable form, N₂, in the Earth's atmosphere, processes that can fix N₂ into biologically available forms -- such as nitrate and ammonia -- control the supply of nitrogen for organisms. On the early Earth, nitrogen is thought to have been fixed abiotically, as nitric oxide formed during lightning discharge...Here we report an experimental simulation of nitrogen fixation by lightning over a range of Hadean (4.5-3.8 Gyr ago) and Archaen (3.8-2.5 Gyr ago) atmospheric compositions, from predominantly carbon dioxide to predominantly dinitrogen. We infer that, as atmospheric CO₂ decreased over the Archaean period, the production of nitric oxide from lightning discharge decreased by two orders of magnitude...After this time, the rise in oxygen concentrations probably initiated other abiotic sources of nitrogen."

Definition from Dictionary of Science, Oxford University Press:
Archaean = the earliest eon of geological time, in which there is the first evidence of life on earth. It extends from roughly 3.8 billion years ago to about 2.6 billion years ago.

b. Anderson W, Prescott GJ, Packham S, et al. Asthma admissions and thunderstorms: a study of pollen, fungal spores, rainfall, and ozone. *QJM* 2001;94:429-33. "Asthma admissions are increased during thunderstorms. The effect...is not explained by increases in grass, pollen...or fungal spore counts...There was an independent, positive association between ozone concentrations and asthma admissions."

c. Jafari H, Couratier P, Camu W. Motor neuron disease after electric injury. *J Neurol Neurosurg Psychiatry* 2001;71:265-7

"The patients were five men with spinal onset and one woman with bulbar motor neuron disease...Two patients were struck by lightning and four by industrial electric shock...The mean delay for onset of motor neuron disease was 44 months...Even if the pathogenic relation between the electrical trauma and motor neuron disease is difficult to ascertain, it is noteworthy that in these cases the disease started at the site of the electric trauma..."

4. Ken Langford brought a copy of the article, Does a Fifth Mechanism Exist to Explain Lightning Injuries by RB Anderson, *IEEE Engineering in Med Biol* 2001;105-112. Ken had questions about the

article and he sent an email to the author. Phil Yarnell remarked that he and others (including Ron Larson and Howard Wachtel) read the same paper and wondered if a new mechanism was needed to explain the events listed in that article.

5. Sheryl Olson reported on a 27 year old lightning patient who presented with keraunoparalysis and Lichtenberg figures.

6. Greg Stewart asked the members how far ground current could travel? George Hodge and Ken Langford remarked that the answer depends on soil conditions, presence of water, etc.

7. George Hodge announced that he has started his own business, Hodge Services Incorporated. George is a Certified Fire and Explosion Investigator. Congratulations and Good Luck, George.

8. Our speaker today was Jeffrey L. Sellon, professional engineer. Jeff investigates electrical failures and accidents. His topic: "Lightning Protection & Prevention Technologies." Jeff gave a superb presentation. I cannot do justice to his presentation here, but I will provide a copy of notes that I took during his talk:

Information about the Franklin lightning rod is based on historical precedents and lacks scientific merit. NFPA will issue a report on lightning protection in October 2001. Lightning rods are divided into two types: A. Collectors of Lightning Stroke; B. Preventors of Lightning Strokes. Collectors include: Franklin Rod and Early Streamers. The concept of "The Cone of Protection" under the lightning rod is no longer widely accepted.

9. Next meeting: Friday, September 14, 2001, at 11:30 am in the Main Auditorium of St. Anthony Central Hospital. Guest speaker: Brian Gray. He will speak on the subject of Golf courses and Lightning Hazards. The exact topic title will be sent as a reminder before the next meeting.

Respectfully submitted,

Michael Cherington, MD
Chair, Scientific Committee, Lightning Center