July 14, 2000
Minutes
Lightning Data Center
Centura Health - St. Anthony Hospital

Quote of the Month:

"Rain is humidity processed by cooling. The close observer, even if without instruments, has many clues to its coming. The general visibility, the lowering of clouds, the wind direction, the greater audibility of sounds, the actions of smoke. Of birds -- all are parts of the context. Sherlock Holmes must have been a keen weather forecaster, for he knew the value of exact observation of trifles."

T. Morris Longstreth, Knowing the Weather, 1945

1. Meeting began at 11:30 am and adjourned at 1:15 pm.

2. Members present: Anderson, Cherington, Collier, Foley, Forinash, Hodge, Larson, Lines, Mc Donald, Mc Donough, Paton, Sellon, Swanson, H Wachtel, Wallin, Winograd, Yarnell.

3. New members were introduced:

a. Ken Forinash, EMS Coordinator, Cunningham Fire Protection District
b. James McDonald, Commercial Airlines Pilot
c. Bruce Paton, MD, Cardiovascular Surgeon, University of Colorado
d. Steve Wallin, Department of Physics, University of Southern Colorado
e. Larry Winograd, MD, Ophthalmology, St. Anthony Hospital

4. I brought the following articles from the literature (abstracted in part here):

f. Moore CB, Aulich GD, Rison W. Measurements of lighting rod responses to nearby strikes. Geophys Res Let 2000;27:1487-90

"Following Benjamin Franklin's invention of the lightning rod…conventional lightning rods in the U.S. have had sharp tips. In recent years, the role of the sharp tip..has been questioned…After seven years of test, none of the sharp Franklin rods or of the so-called "early streamer emitters" has been struck, but 12 blunt rods with tip diameters ranging from 12.7mm to 25.4mm have taken strikes…The strike-reception probabilities of Franklin's rods are greatly increased when their tips are made moderately blunt."

g. Chesire WP. The shocking tooth about trigeminal neuralgia. New Engl J Med 2000;342:2003.

Adjacent dental amalgams that are composed of dissimilar metals in contact with saliva can form a galvanic cell that generates localized electrical currents with potentials as high as several hundred millivolts. Such currents usually cause no symptoms, although some patients report a metallic or battery-like taste…This patient's oral galvanism produced genuine electrical currents that potentially triggered the neuralgia."

5. We were privileged to hear two outstanding presenters. Their topics complemented each other very well: Leland Anderson spoke about Faraday Cage;
Jim McDonald spoke about lightning issues for airplane pilots and passengers. They both spoke about Ball Lightning.

Leland's formal presentation was superb. I cannot do it justice here. I shall quote his introductory paragraph and then try to convey some of the discussion that followed.

"What is a Faraday cage? A true Faraday cage consists of many closely spaced parallel wires joined at one end (which is grounded) completely surrounding an object to be protected from dynamic electromagnetic (EM) fields. In practice, the wire enclosure consists of fine-mesh copper screens doubled with insulating spacers separating them."

Leland stated that the automobile is one of the best forms of Faraday cage for lightning protection. Since the introduction of steel-radial tires, lightning current does not as easily pass over the tires (as it did on older tires), but is more likely to cause the tires to blow out. "Radiating EM fields set up by a lightning strike to an airplane are able to penetrate its nonferrous aluminum fuselage." "The in-cabin environment from induced EM radiation fields..can result in personal injury and.. damage to the electrical equipment. Leland stated that induced radiation (high frequency effect) had similarities to Tesla Coil experiments where the subjects hair, fingers, and limbs appear to glow. The airplane is vulnerable to EM radiation.

Larry Winograd asked if people with cardiac pacemakers had a problem on airplanes. Bruce Paton stated that newer pacemakers had casings that might provide more protection that the older models.

Jim McDonald told us that his first experience with lightning strike to an airplane occurred in 1971 when he was in the military. He was flying an F-5 when lightning struck the plane. It hit the ejection seat spike just above the helmet of the wingman.

On commercial airplanes, static discharges are common and usually are seen at night. He has had one of his airplanes lose 1 of 3 generators after being struck by lightning.

Gene Lines asked if there were sounds or odors (especially ozone) associated with Ball Lightning. Jim replied that there is a "crackling sound." He has not observed ozone. The duration of ball lightning in an airplane is a few seconds.

Mike Foley asked if the cockpit was equipped with extra shielding. Jim said it was not. Jim did mention that pilots often turn on lights to protect against temporary blindness from lightning.

Carl Swanson stated that with more composite materials being used in the construction of airplanes (and automobiles) there may be more danger from lightning than vehicles with more metal in the shell. He implied that the Faraday cage effect was reduced in the vehicles built with more composite materials. Gene Lines stated that the Stealth airplane is largely composite and therefore more vulnerable to lightning.

Ron Larson asked about whether St. Elmo's fire was a nocturnal phenomenon. Jim replied that it is more noticeable at night, but that it is probably present during daylight hours as well.

6. These minutes reflect the comments of members present and do not represent
official positions of LDC.

7. Next meeting: 11:30 am Friday, August 11, 2000 in the Main Auditorium of St. Anthony Central Hospital.

Respectfully submitted,

Michael Cherington, MD
Chair, Scientific Committee, LDC