

# THE

BUFFALO ASTRONOMICAL ASSOCIATION INC.  
BUFFALO MUSEUM OF SCIENCE  
HUMBOLDT PARKWAY  
BUFFALO NEW YORK 14211

# SPECTRUM

SEPTEMBER 1970

Editor: Ernst E. Both

SEPTEMBER MEETING: Our first meeting of the new season (September 11, 1970, 8:00 pm, EDT) will feature Mr. Ray Manners in a lecture entitled: "Pulsars, Quasars, and Gravitational Collapse." Mr. Manners is a Product Engineer in Advanced Technology at Bell Aerosystems Corporation. He is a member of the British Astronomical Association and of the Royal Astronomical Society of England; among our members he is well-known for his interesting lectures and stimulating discussions. We are happy to welcome back RAY MANNERS!

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\* THE MOON IS NOT MADE OF GREEN CHEESE - OR IS IT? \* By Kurt Erland

Apparently history fails to record the author of the theory that our Moon is made of Green Cheese (1) and yet this theory is so well-known that every child of former years was thoroughly familiar with its main premise. I say "of former years" because today's children think they know better, thanks to the Apollo astronauts. The lunar samples which these brave men brought back to Earth were obviously not made of Green Cheese - at least if they were, their composition remains a well-kept secret.

In a masterpiece of tongue-in-cheek writing, E. Schreiber and O. L. Anderson recently reported on their studies of the behavior of shock waves in the Moon set up by the impact of the Apollo 12 LEM on the lunar surface and similar experiments with terrestrial substances in the laboratory (2). Specifically they studied the (compressional) velocities of sound waves in lunar material and they compared these velocities with those in various terrestrial rocks and minerals. For lunar igneous rock 10017 they found a velocity of 1.84 km/sec, while for a lunar microbreccia (10046) they found 1.25 km/sec; these velocities are much lower than those in terrestrial rocks which ranged between 4.69 and 6.06 km/sec for sedimentary rocks, between 4.9 and 6.89 km/sec for metamorphic rocks, between 5.7 and 6.8 km/sec for igneous rocks, and between 7.23 and 10.8 km/sec for certain minerals. Clearly there was a serious discrepancy. Remembering the old Green Cheese theory, they next turned to various terrestrial cheeses, being careful to select these "so as to represent a broad geographic distribution in order to preclude any bias that might be introduced by regional sampling."

Now the cheeses studied by these authors showed velocities ranging from 1.57 km/sec for Wisconsin Muenster Cheese to 2.12 km/sec for Swiss Sapsego, with Norway Gjetost being closest to lunar rock 10017 (1.83 km/sec) and Muenster coming closest to lunar rock 10046. Thus it can be seen that the Moon is not made of Green Cheese after all - rather it seems to be a mixture of Muenster and Gjetost,

perhaps with some Cheddar, Emmenthal, Romano and Provolone thrown in for flavoring? No! There is one major flaw in this new theory - the densities of all these cheeses are only about  $\frac{1}{2}$  to  $\frac{1}{3}$  of those found in the lunar rock samples. However, this difficulty can be overcome by retaining a tongue-in-cheek attitude with the authors when they say: "This apparent inconsistency . . . may readily be accounted for when one considers how much better aged the lunar materials are." Or, one may remember G. V. Schiaparelli's remark in connection with an elaborate theory accounting for the Martian canals he discovered by invoking MCBs (Martian Canal Builders): "Semel in anno licet insanire!"

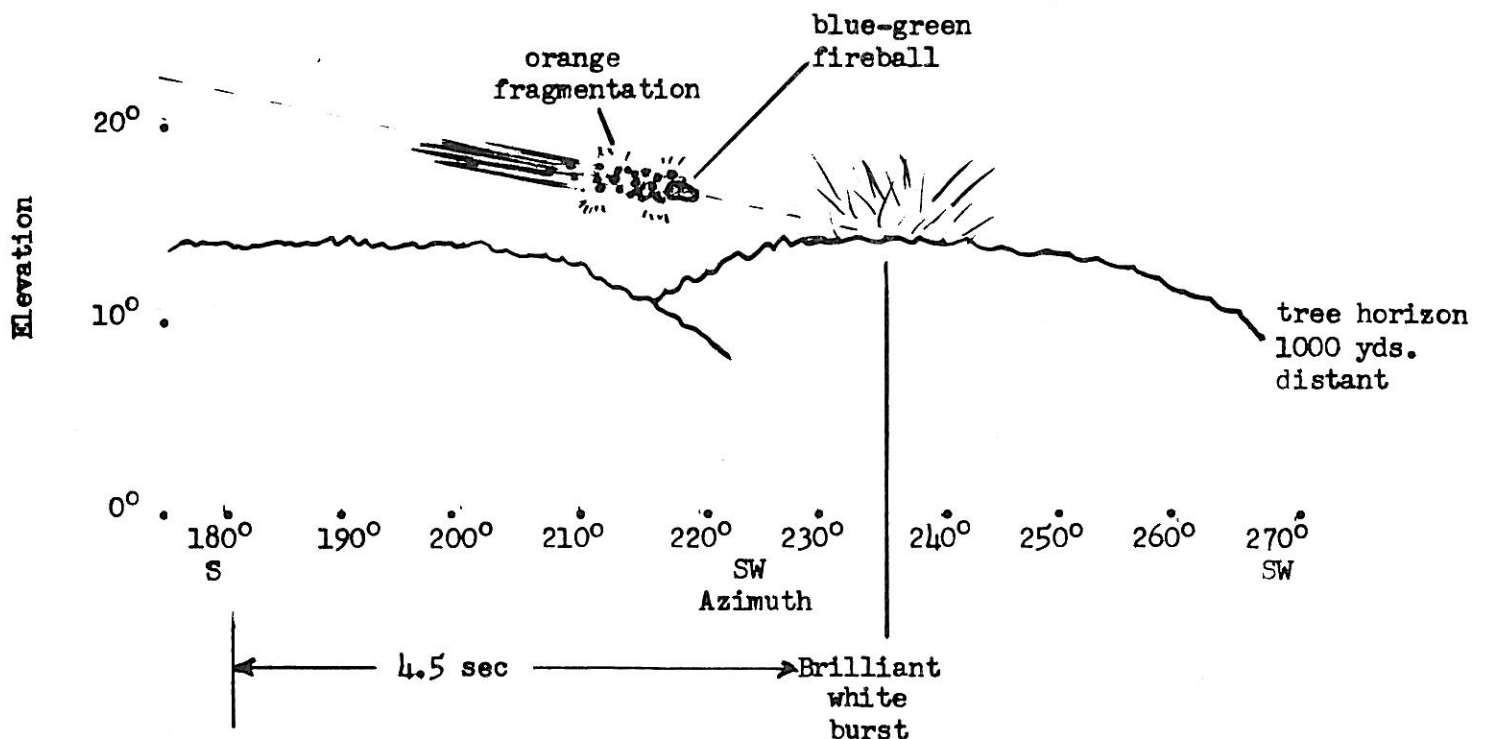
(1) One of the earliest printed versions appears in the Adagia of Erasmus of Rotterdam (1513): "he ... made his friends believe the moon to be made of green cheese."

(2) E. Schreiber and C.L. Anderson, "Properties and Composition of Lunar Materials: Earth Analogies," Science 168:1579-1580, 26 June 1970.

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\* Brilliant Bolide at Sprucelands. \* By Dick Zygmunt

A very bright, slow-moving meteor appeared at Camp Sprucelands on Saturday evening August 2, 1970. This object, resembling a burning airplane, appeared over the southern treetop horizon at 10:10 PM, EDT. Its brightness was estimated to be about -8 to -9 apparent magnitude since it well exceeded the brightness of the nearly first quarter Moon. The bolide was first noticed very low in the southern sky as a bright blue-green light. A series of minor bursts caused trailing streamers which appeared to flake off the meteor. A bright orange train of ionized gas was obvious for some time afterward. Just as it disappeared over the horizon, a brilliant white flash signalled a major burst. This flash was so intense that it was noticed by many others who were not aware of the meteor. This was certainly a spectacular bolide. The author welcomes observations by others who might have seen it.



# Reporting Fireballs (Communicated by Dick Zygmunt)

A fireball is a bright meteor with a luminosity which exceeds that of the brightest planets. When reporting fireballs, a well-defined report should be submitted so that its results may be well interpreted. The National Research Council of Canada has devised a standard report form for reporting fireballs. When a sufficient number of these fireball observations have been obtained over an area of over 100 miles it then becomes possible to combine these observations to derive an orbit for the bolide and to predict the most probable area in which meteorites associated with it may have reached the surface of the Earth. Following is the standard form for reporting fireballs and brief explanations for terms used.

FIREBALL REPORT			
YEAR	MONTH	DAY	
HOUR	MINUTE	AM PM	TIME ZONE
WEATHER			OBSERVER
			ADDRESS
LOCATION OF OBSERVER WHEN FIREBALL SEEN			BURSTS
LAT			LUMINOSITY
LONG			COLOUR
			FORM
			DURATION
SOUNDS			BEGIN
POSITION IN SKY			END
			ELEVATION
			BEARING
DATE			RELIABILITY
PLACE			REPORTER

Date-Date of observation. Remember date change after midnight.

Time-Time of observation to the nearest minute. Include time zone.

Weather-Brief observational summary of weather conditions. Location of clouds, etc.

Location-Latitudes and longitudes from a Geological Survey map or location pinpointed with reference to nearest town.

Observers address-not address of observation.

Bursts-Describe bursts as to number and location along path.

Luminosity-Make an estimate of the apparent brightness by comparing with planets, bright stars, first quarter or full Moon.

Color-Describe any changes or variation in color along its path. Distinguish between fireball color and train colors.

Form-Estimate its angular size and shape, if any (compare apparent size to size of a dime at arm's length, or to that of the Moon if available)

Duration-Estimate the duration of the luminous phenomena, distinguishing between the time the fireball was seen in motion and the duration of any persistent train. (Estimate time by counting:"one-and-two-and-three ..." at a normal

rate. In the absence of a second hand on your watch, this is sufficiently close.

Position-One of the best ways of doing this is to plot the path of the fireball in relation to the stars. Locate beginning and end of phenomenon with respect to star background. If this is not possible, the observer should stand on the spot where he was when the fireball appeared and attempt to recall what he saw. Estimates of the direction in which the beginning and end of the fireball path were seen can be indicated in a small sketch or recorded in relation to roads, buildings, magnetic compass bearings, etc. Indicate north on any sketch.

Date-Date card was filled out.

Completed forms should be mailed to: Meteor Center, National Research Council, Ottawa 2, Ontario, Canada. Forms and instruction sheets may be obtained from this address.

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SUMMER COURSE IN SOLAR PHYSICS: Next year the museum's Kellogg Observatory will hold a **six-week** seminar in Solar Physics and Solar Observations during July and August. The seminar is designed for serious high school students who will have an opportunity to use the solar instruments of the Kellogg Observatory. Various field trips are planned, including one to a major professional solar observatory. Anyone interested, contact Ernst Both either at the museum or at one of the BAA meetings. The program is limited to ten students who will be selected on the basis of background in astronomy, ability, and interest.

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REMEMBER: DUES WILL BE COMING UP SOON. SEE MRS. EDITH GEIGER \*\*\* CONTRIBUTIONS TO THE SPECTRUM ARE ALWAYS WELCOME, SUBMIT YOUR WRITINGS, SKETCHES, ETC.



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*First Class*