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Video Analysis of an Anomalous Image Filmed during Apollo 16

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Abstract—Video data of NASA Film CL-862 showing a saucer-shaped object moving in an unusual trajectory above the moon is examined. It is alleged by Donald B. Ratsch that footage was taken by John W. Young, who was spacecraft commander during the Apollo 16 mission, as the spacecraft approached the moon. Image analysis is performed to determine if the object in question is Earth as claimed by Karsten Voigt, even though James Oberg, who also thought it was Earth, has retracted that explanation because of work by Jack Kasher.

Our analysis indicates that the object is neither Earth, the command module, or debris. Our analysis shows that the footage was not obtained when Apollo 16 was approaching the moon. We have shown this by using the age of the moon in the film scene. We show that the footage was obtained when Apollo 16 was leaving the moon. This analysis is supported by corroborative data of metric camera images AS16-M-3051, -3052, and -3053, even though there were no metric photos taken at the same time as the CL-862 footage.

Our analysis shows that the film was taken by Apollo 16 between 2:30 and 3:00 UTC on 25 April 1972 from about 2,200 km above 10.2 degrees north latitude and 89.1 degrees east longitude. Assuming the object is roughly the same size and distance as some craters, the diameter was 60 to 120 km!

The disc object appears to have vanished into the moon shadow 4 seconds after its initial appearance in the film, but it never moved much farther away from the Apollo 16 craft into the dark space background. The object appears to have been on a collision course with the moon. However, it is unlikely that a minor planet (large meteor) crashed into the moon because a moonquake did not occur on 25 April 1972; therefore, the object was not a minor planet.

Furthermore, the object appears to be an artificial structure consisting of a disc that has a prominent dome at the center. The apparent motion toward the moon which, nevertheless, avoided collision with the moon, and the unsuitable shape for a minor planet suggest that the object is a kind of very large extraterrestrial spaceship.

However, we ask NASA for the disclosure of more information while refraining from emphasizing premature explanations for the object.

Keywords: UFO—CL-862—extraterrestrial spaceship

1. Introduction

There is the erroneous belief, among some fanatic ufologists, that some of the Apollo missions' photographs which show halation from reflected sunlight must be photos of UFOs. Conversely, there is the unscientific interpretation,

even by famous UFO skeptics, that there are no UFO photos in the NASA collection.

In the NASA film CL-862, the object of interest has neither halation from reflected sunlight nor optical aberrations, so it is amenable to scientific exploration. Unlike many of the UFO sighting cases on Earth, where some can be attributed to the atmospheric plasma hypothesis, the present incident illustrates an illogical hypothesis. There is a reliable source from the NASA film archives (File Roll 9361), eliminating the hoax hypothesis.

Furthermore, Mr. Donald B. Ratsch has claimed that the footage was taken by Mr. John W. Young, who was spacecraft commander during the Apollo 16 mission, as the spacecraft approached the moon. Some skeptics claimed that the object in question was Earth, a quarter of a million miles away. James Oberg now agrees it is not Earth, so he has retracted this explanation[1]. On the other hand, Karsten Voigt has recently restated the Earth explanation[2].

Our purpose is to examine this photo image in detail in order to determine if the object in question was indeed Earth, a minor planet, or some object associated with the command module.

2. Identification of the Foreground Field of the Film

Our analysis was performed on digitized portions of MPEG files from the following sites on the Internet[3]:

UFO Folklore Video Archive
(http : //www.qtm.net/~ geibdan/videoclips/index.htm)
German UFO-Server ALIEN.DE
(http : //www.alien.de/alien/sichtungen/videos/apollo16/)

Both video files have 1/2 a megabyte, a duration of 5 seconds on 350 lines of resolution, and 24 frames per second.

Figure 1 is the first frame of CL-862 film's video image. The location of the anomalous image shows that it is possible that it is on the far dark side of the moon because no mares are visible. The far side of the moon was never seen by man until the space age.

This area of the far side was directly viewed by American astronauts from each Apollo spacecraft and later photographed clearly in daytime by the Japanese spacecraft Nozomi in 1998. (The photo will be described in detail in the latter part of this paper.)

Figure 2 is a cropped version of another Apollo 16 photograph. The foreground area of the CL-862 image can be identified easily by comparing it with Figure 2. One can clearly see that some of the craters in Figure 1 are the same as in Figure 2. The coordinates of the center of this view area are 125 degrees east longitude and 5 degrees north latitude.

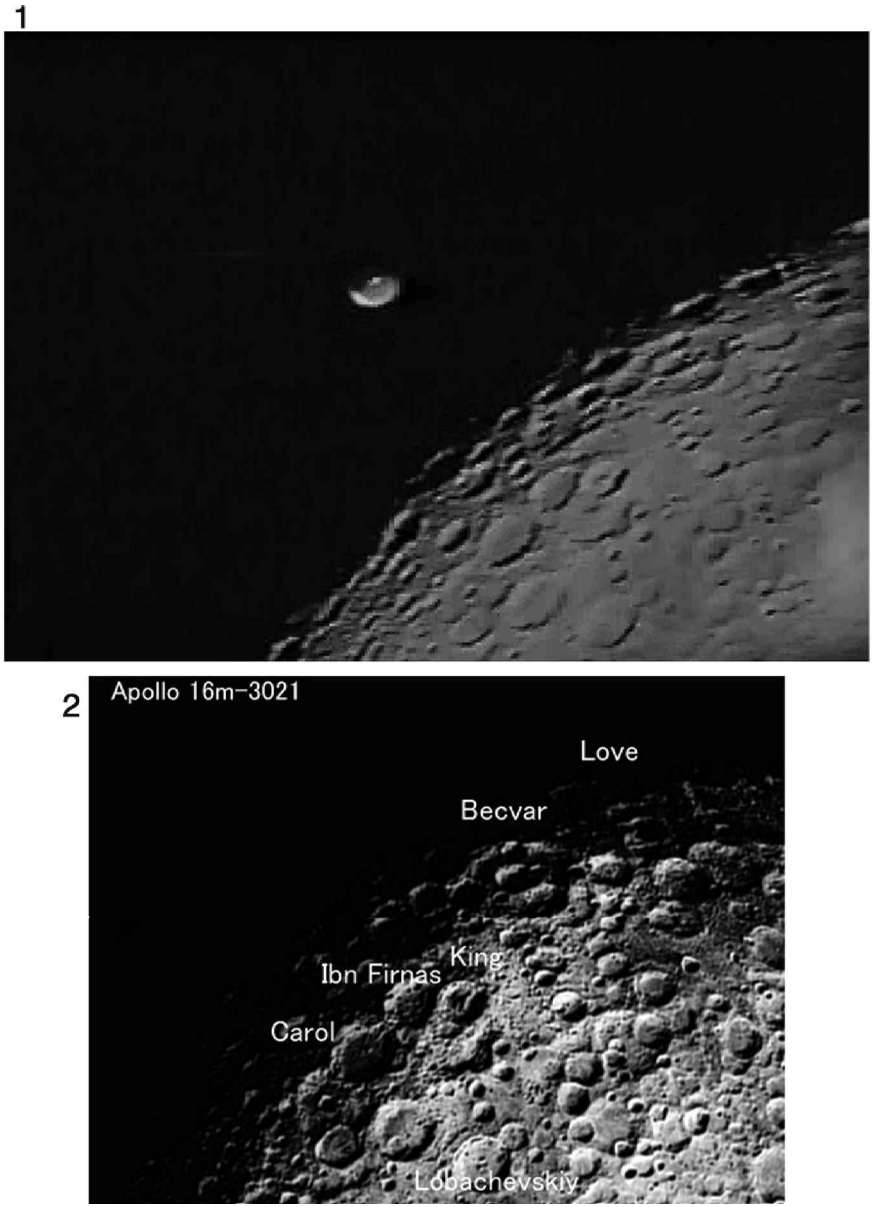

Fig. 1. Identification of the field of the moon in the film, CL-862.
Fig. 2. Identification of the field of the moon in the film, M-3021.

3. Identification of the Date and Time

The mosaic image of Figure 3 was made from several frames in the CL-862 film's video. It is obvious that the image of the moon was small and practically the whole lunar circumference was visible, which suggests that the crewmen had not reached lunar orbit yet, or they had left lunar orbit already. The photograph in Figure 3 shows Tsiolkovsky crater on the circumference. The coordinates of the east edge of Tsiolkovsky crater are 131.5 degrees east longitude and 21.0 degrees south latitude.

It is especially important that the shadow line is falling approximately along the 131.5 degree east longitude line. This information can be used to calculate the phase or ''age'' of the moon as follows:

$$270^\circ - 131.5^\circ = 138.5^\circ$$
$$138.5^\circ/360^\circ \times 29.53 \text{ (Synodic month)}/11.36 \text{ days (age of moon)}.$$

The ''age'' of the moon relative to the new moon is 11.36 days. That is, it is around 11.36 days after the new moon that a lunar shadow appears along this meridian. Table 1 shows the ages of the moon for each Apollo mission at the time of approach and return[4].

An excellent simulator furnished by Mr. John Walker and made available to researchers and to the general public on the Internet provides useful lunar data[5]. His simulator calculated the following lunar events during the Apollo 16 mission. From his dates we calculated the age of the moon:

Last new moon:	20:31 UTC 13 April 1972.	Age of moon: 0.0 or 29.371
First quarter:	12:44 UTC 20 April 1972.	Age of moon: 6.6750
Fullmoon:	12:44 UTC 28 April 1972.	Age of moon: 14.675
Last quarter:	12:27 UTC 6 May 1972.	Age of moon: 22.663
Next new moon:	04:08 UTC 13 May 1972.	Lunation 611

According to his data, the age of the moon at the times of the sighting (film) was $\therefore 138.5^\circ/360^\circ \times 29.371 \fallingdotseq 11.299$ (age of moon), which differs very slightly from the previous estimate, 11.36 days.

The Apollo 16 mission was launched on 16 April 1972 and ended on 27 April 1972. Table 2 profiles the Apollo 16 mission in the timetable supplemented with each age of the moon. From the table we can see that the return to Earth (trans-Earth injection) began at age 11.238 days. Hence the film, taken at 11.3 days (approximately), occurred after the command module left lunar orbit. Furthermore, this date and time are inconsistent with the Saturn IVB stage hypothesis (it crashed into the moon at 6.0 days) and also the LM hypothesis (the lunar module was jettisoned about 5 hours earlier).

The relative positions of Apollo 16, the object, the moon, Earth, and the sun on 25 April 1972 are indicated in Figure 4, also including the positions of the moon at other times.

TABLE 1
The Ages of the Moon in Each Apollo Mission at the Time of Approach and Return[a]

Mission	Lunar orbit insertion (UTC)	Age of moon[b]	Trans-Earth injection (UTC)	Age of moon[b]
Apollo 8	1968/12/24 09:59:20	4.6520	1968/12/25 06:10:16	5.4930
Apollo 10	1969/05/21 20:44:54	5.5120	1969/05/24 10:25:29	8.0820
Apollo 11	1969/07/19 17:21:50	5.1310	1969/07/22 04:54:42	7.6120
Apollo 12	1969/11/18 03:47:23	8.2320	1969/11/21 20:49:16	11.942
Apollo 13	1970/04/14 —	8.3250	1970/04/15 02:40:39	8.9370
Apollo 14	1971/02/04 06:59:43	8.3350	1971/02/07 01:39:04	11.113
Apollo 15	1971/07/29 20:05:47	7.4510	1971/08/04 21:22:45	13.504
Apollo 16	1972/04/19 20:28:22	5.9970	1972/04/25 02:15:33	11.238
Apollo 17	1972/12/10 19:47:23	4.9740	1972/12/16 23:35:09	11.132

[a] From Lunar and Planetary Institute (1998). Apollo Missions. Available at http://www.lpi.usra.edu/expmoon/apollo_landings.html.
[b] The ages of the moon were calculated independently by us.

It is now necessary to determine whether or not there was a simultaneous photograph taken by another Apollo 16 camera system, such as the metric camera. The metric camera took a series of photos during the return from the moon. In the next section we investigate the metric camera photos.

4. Identification of the Location where the Footage was Captured

Fortunately, many craters are visible on the film, including King Crater and Tsiolkovsky crater. King Crater has an unusual crawfish-shaped central peak. The floor of Tsiolkovsky crater is filled with the darkest mare deposits. These craters were the subjects of visual observations and photography on more than one revolution during the mission.

Some of the high-resolution photographs taken with the Apollo 16 metric camera are available on the Internet. These photos are AS16-3005, AS16-3008, and AS16-3021[6–8].

What follows is a series of statements found at the Internet site of the Lunar and Planetary Institute[6–7]:

The Metric/Mapping photography was performed using the Mapping Camera Subsystem, which included the metric camera, the stellar camera, and the laser altimeter. This equipment was mounted in the SIM bay section of the CSM. The Mapping Camera was operated on 16 passes during the period of lunar orbit. The camera was also used twice during trans-Earth coast, the first time for 2 hours and 29 minutes, and a second time for approximately 13 minutes. Camera operation was near normal. The deployment mechanism exhibited an anomaly; however, this problem had no effect on acquisition of the photography. Inflight contingencies required rescheduling of planned photography, resulting in a loss of approximately 10% of the planned photography. A total of 3481 frames were taken, but only 2491 frames are considered usable. Some frames are blank as a result of exposure during operation with the laser altimeter on the darkside.

During Apollo 16, the Metric Camera was used on 16 orbits and during the early hours of the return to Earth, obtaining 2491 usable photographs. The Panoramic Camera was

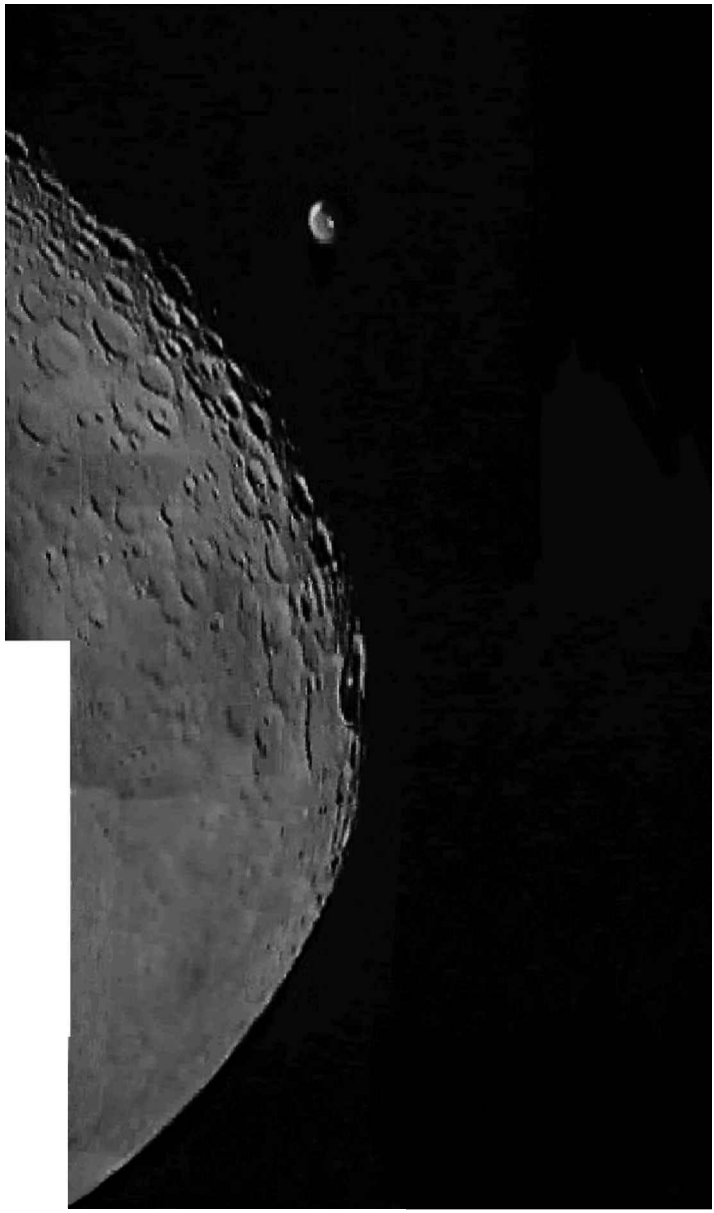

Fig. 3. The mosaic image of CL-862.

TABLE 2
Apollo 16 Mission Profile[a]

Mission outline	Date and time (UTC)	Age of the moon[d]
Launched	1972/04/16 17:54:00	2.890
Entered Earth orbit	1972/04/16 18:05:56	2.898
Translunar injection	1972/04/16 20:27:37	2.997
CSM and S-IVB separated	1972/04/16 20:58:59	3.018
CSM docked with LM	1972/04/16 21:15:53	3.030
S-IVB tracking lost	1972/04/17 21:03	4.021
Mid-course correction	1972/04/18 00:33:01	4.167
SIM door was jettisoned	1972/04/19 15:57:00	5.809
Lunar orbit insertion	1972/04/19 20:22:28	5.993
S-IVB impacted Moon[b]	1972/04/19 21:02:04	6.021
Young and Duke entered LM	1972/04/20 15:24	6.786
LM separated from CSM	1972/04/20 18:08:00	6.900
LM landed on Moon	1972/04/21 02:23:35	7.244
LM lifted off from Moon	1972/04/24 01.:25:48	10.204
LM docked with CSM	1972/04/24 03:35:18	10.294
LM was jettisoned	1972/04/24 20:54:12	11.015
Subsatellite was spring-launched	1972/04/24 21:56:09	11.058
Tran-Earth injection began	1972/04/25 02:15:33	11.238
Mattingly began cislunar EVA[c]	1972/04/25 20:43	12.007
CM separated from the SM	1972/04/27 19:16:33	13.864
Returned to Earth	1972/04/27 19:45:05	13.884

[a] From the Internet site of Lunar and Planetary Institute. Apollo 16 Mission Summary. Available at http://nssdc.gsfc.nasa.gov/nmc/tmp/1972-031A.html.
[b] S-IVB stage impacted the Moon at 1.3 N, 23.8 W with a velocity of 2.5 to 2.6 km/s at a 79 degree angle from the horizontal, as estimated from the Apollo 12, 14, and 16 seismic station data.
[c] Mattingly began a cislunar EVA to retrieve camera film from the SIM bay and inspect instruments, 2 trips taking a total of 1 hour and 24 minutes.
[d] The ages of the moon were calculated independently by us.

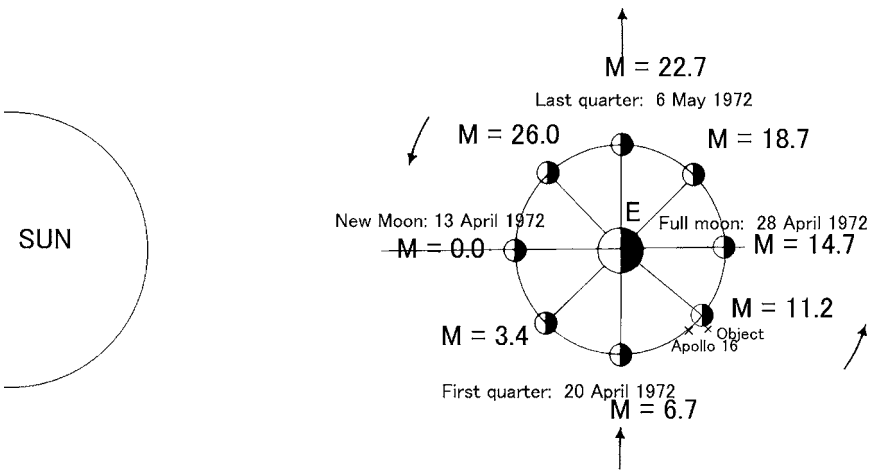

Fig. 4. The location of Apollo 16, and each moon phase (looking down on the North Pole of Earth).

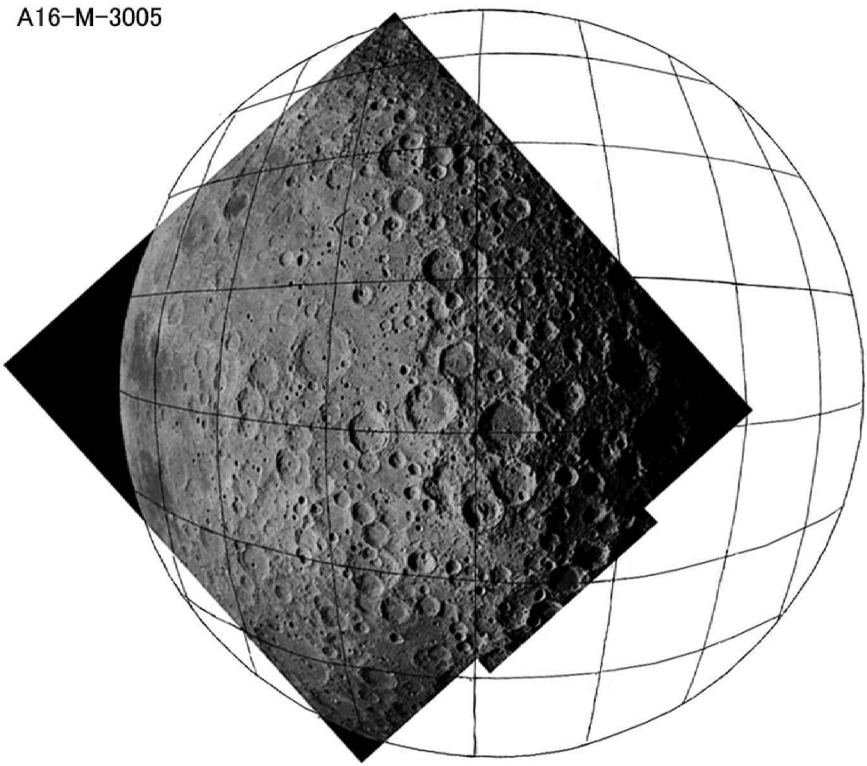

Fig. 5. A16-3005 with gridlines and circumference.

used on eight orbits and during the early hours of the return to Earth, obtaining 1586 usable photographs.

Apollo 16 metric camera frame 3005 taken after trans-Earth injection.

This photo (Apollo 16 Metric photograph AS16-3008) of the Moon's heavily cratered farside was obtained at the beginning of Apollo 16's return voyage to Earth.

Apollo 16 Metric camera image (AS16-3021) was taken by the Apollo 16 mapping camera on the flight back to Earth.

The above statements provide proof that some images were obtained as the Apollo 16 left the moon. Unfortunately, however, 3 sheets of metric camera images have no account in detail on the web site of Lunar and Planetary Institute and other NASA sites. So, to define the location and altitude (above the moon) of the Apollo 16 after trans-Earth injection, images were analyzed. Circumferences and grid lines were superimposed and longitudes and latitudes were identified using a moon globe made with Clementine's data[9].

Figure 5 is photo A16-3005 with grid lines and a circumference added by us. The ratio of the length and the breadth has been corrected, because the original picture was slightly flattened by the web page curator's careless design.

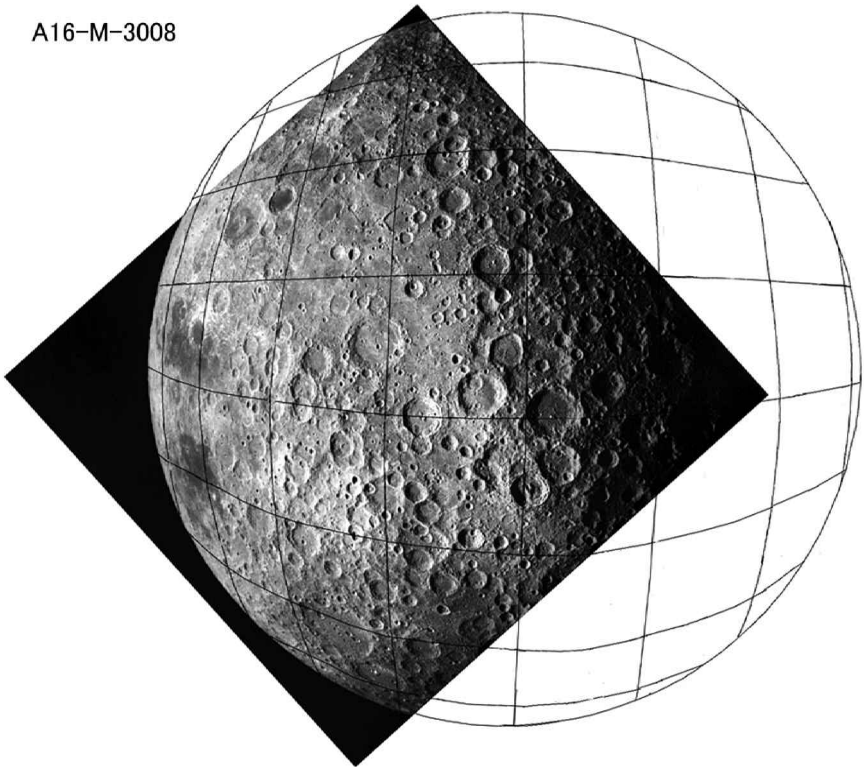

Fig. 6. A16-3008 with gridlines and circumference.

The field of view shown in Figure 5 is approximately 78 degrees, from 52 degrees north latitude to 26 degrees south latitude. The principal point (the coordinate of the center of the circle field) is 120.5 degrees east longitude and 13.0 degrees north latitude. Therefore, the altitude of the camera above the moon can be found with the following formula:

$$1,738 \text{ km (a Radius of Moon)}/\cos(78/2)\text{degree} - 1,738 \text{ km(a Radius of Moon)}.\therefore 1,738/\cos 39^{\circ} - 1,738 = 1,738/0.7771 - 1,738 = 2,236 - 1,738 \fallingdotseq 498 \text{ km}.$$

So the altitude was approximately 500 km.

Figure 6 shows photo A16-3008 with grid lines and a circumference added by us. The field of view shown in Figure 6 is approximately 82 degrees, from 54 degrees north latitude to 28 degrees south latitude. The principal point (the coordinate of the center of the circle field) is 118.5 degrees east longitude and 13.0 degrees north latitude.

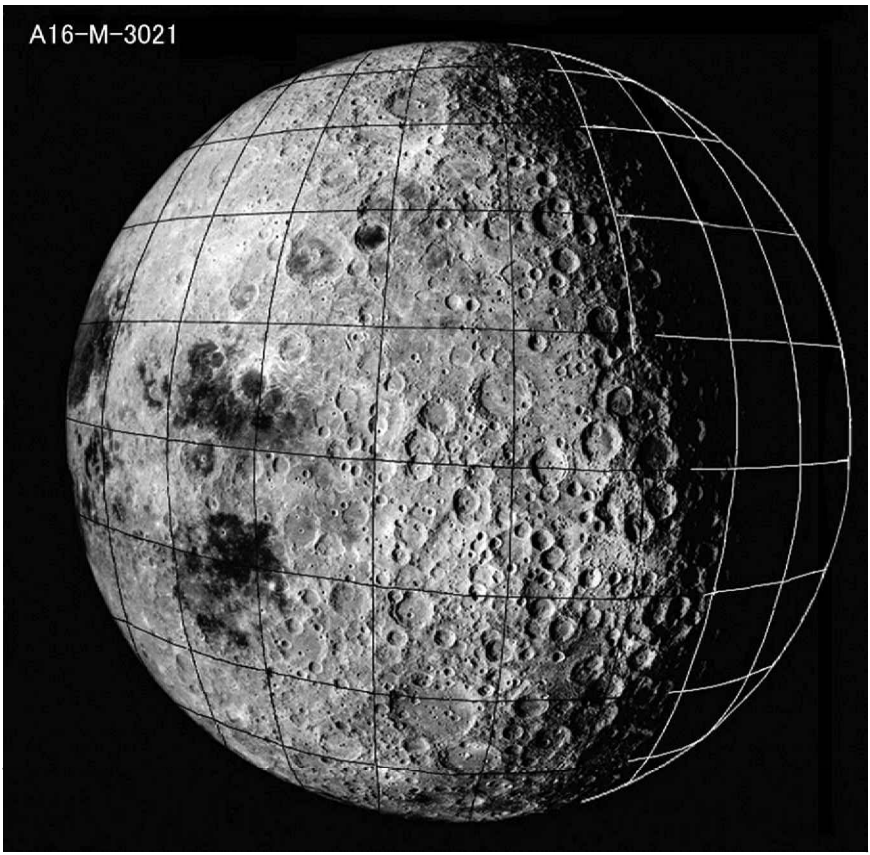

Fig. 7. A16-3021 with gridlines and circumference.

$$\therefore 1,738/\cos 41^{\circ} - 1,738 = 1,738/0.7547 - 1,738$$
$$= 2,302 - 1,738 \fallingdotseq 564 \text{ km}.$$

So the altitude for this photo was approximately 550 km.

Figure 7 is photo A16-3021 with grid lines and a circumference. The field of view shown in Figure 7 is approximately 100 degrees, from 63 degrees north latitude to 37 degrees south latitude. The principal point is 105.5 degrees east longitude and 12.5 degrees north latitude.

$\therefore 1,738/\cos 50^{\circ} - 1,738 = 1,738/0.64278 - 1,738 = 2,703 - 1,738 \fallingdotseq 965$ km.

Thus the altitude is estimated at approximately 970 km.

Figure 8 is a mosaic composed of images from film CL-862. Grid lines and a circumference have been added using the same method. The principal point is 89.1 degrees east longitude and 10.2 degrees north latitude. The field of view

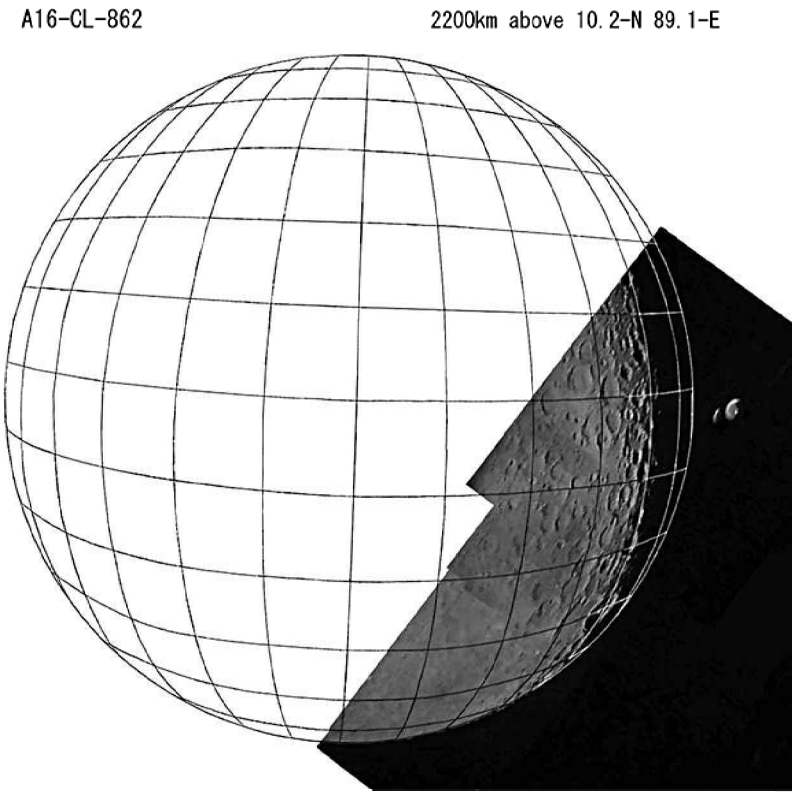

Fig. 8. CL-862 Mosaic with gridlines and circumference.

shown in Figure 8 is estimated (by eye) to be 120 to 130 degrees. Because the field of view was so small and because it did not show the principal point, we needed Mr. Walker's simulator to estimate where the principal point would have been, had it been in the photo. As a result, the grid line and the distribution of foreground craters are perfectly consistent with a view of John Walker's simulator for an altitude 2,200 km above 10.2 degrees north latitude and 89.1 degrees east longitude. Therefore, half of the field of view can be found with the following formula:

$$1,738 \text{ km}/(2,200 \text{ km} + 1,738 \text{ km}) = \cos 63.813^{\circ}.$$

The field of view is approximately 127.6 degrees. This value will be vital in the next section.

The 2 images of the unidentified object in the photomosaic are from the

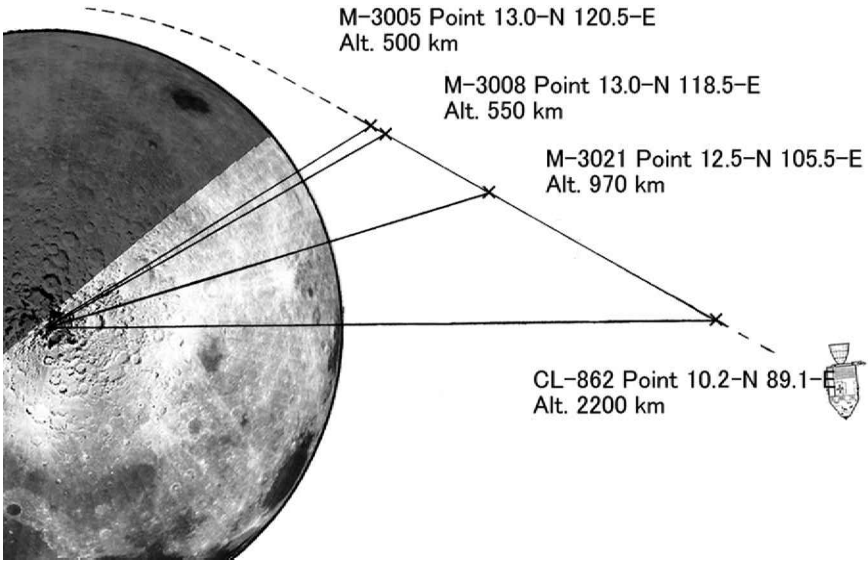

Fig. 9. Estimated photo points and the trajectory of Apollo 16.

beginning frame and the ending frame, so this mosaic demonstrates that the object is descending toward the moon.

Figure 9 shows the locations of Apollo 16 when the various photos and movie were taken. This demonstrates the continuity of the flight track and proves the identification of the date of the film and that it was taken during the Apollo 16 mission.

To conclude this analysis, we have shown that the film was taken by a 16 mm camera aboard the Apollo 16 between 2:30 and 3:00 UTC on 25 April 1972 from about 2,200 km above 10.2 degrees north latitude and 89.1 degrees east longitude. This date and time refutes the hypothesis that the film shows the command module taken from the lunar module.

5. Analysing the Behavior of the Object

How far was the object from the observer? Fortunately, there is a direct way to determine this distance from Figure 8 if one assumes that the object vanished into the moon shadow while it maintained an approximately constant distance from the Apollo 16. (The image seems to remain at an approximately constant size suggesting that it was at an approximately constant range from the camera.) We made use of the simple geometric camera relation between the object and photographic image distances and sizes to calculate the location of the object shown in the photos. A plane model map drawn on a scale of 1:20,000,000 is given in Figure 10, which shows the location of the object based on the angles

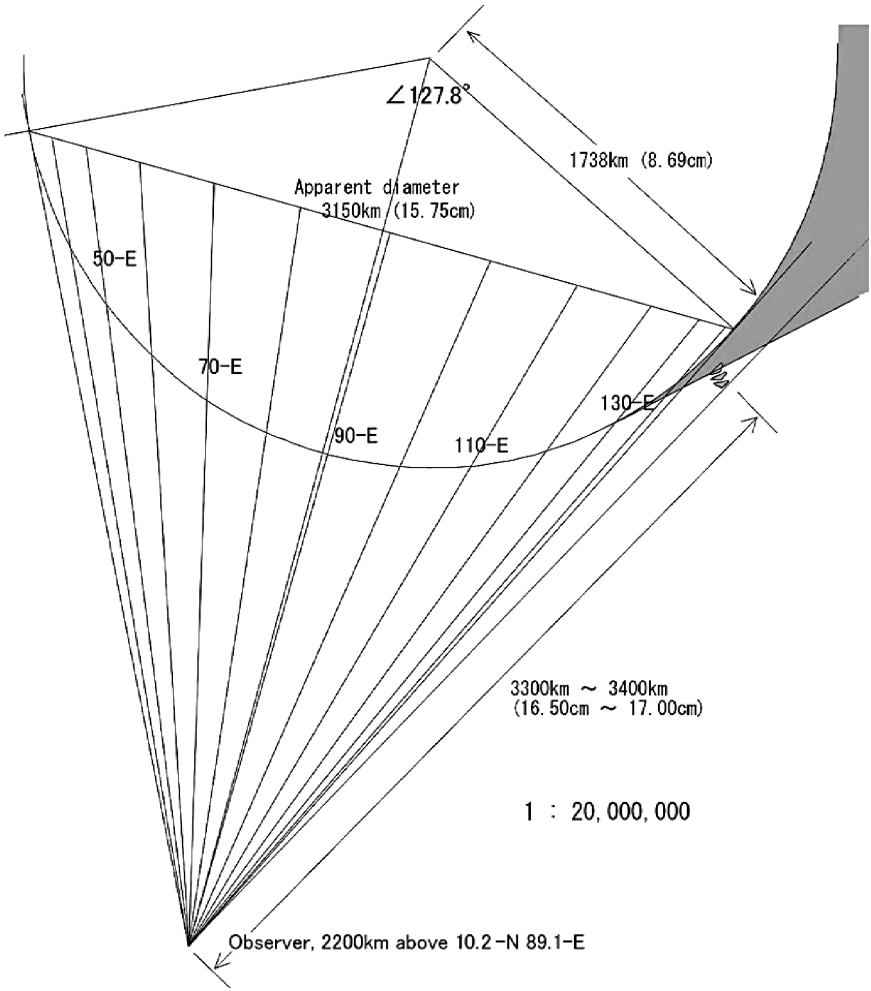

Fig. 10. How far was the object from Apollo 16?

from the circumference as viewed by the observer as shown in Figure 8. The diameter of the moon (3,476 km) becomes equivalent to 17.38 cm in diameter in this model. The distance to the moon from Apollo 16 (2,200 km) becomes 11.00 cm at the principal point directly below. In Figure 10, the object is at an angle of about 30 degrees from the longitude of principal point of the moon. We estimated that the object was an extreme distance of about 17.00 cm and a minimum distance of about 16.50 cm, assuming that it was in the shadow of the moon.

If one assumes the object moved toward the moon and perpendicular to the line of sight, then the angles measured in Figures 8 and 10 allow us to estimate

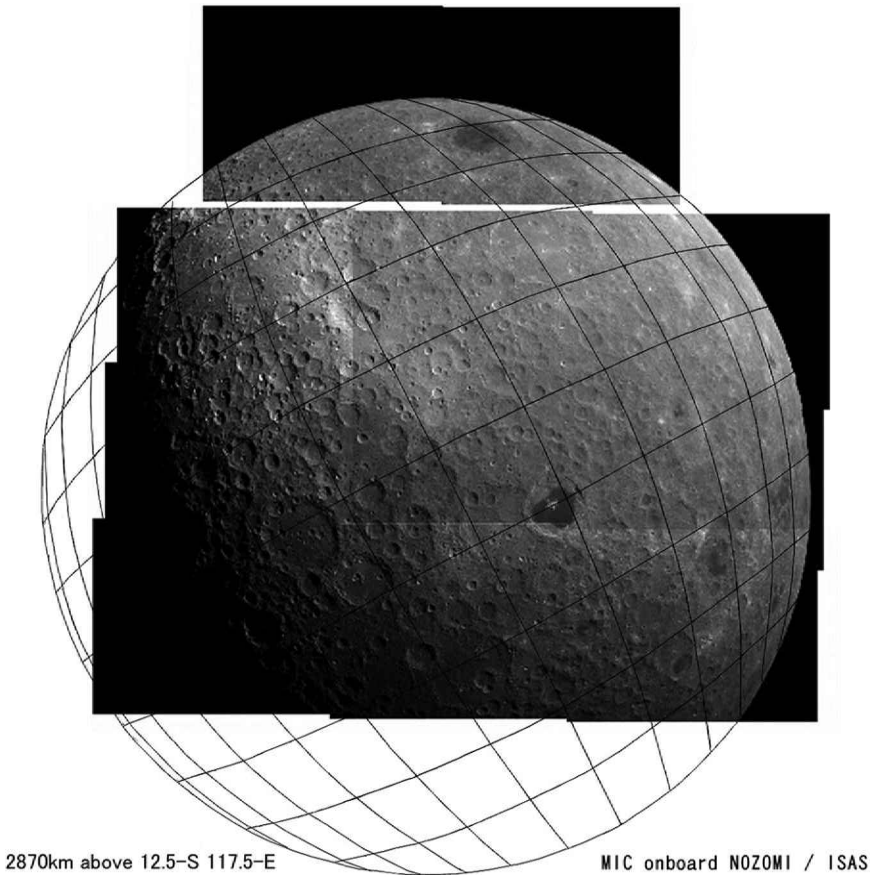

Fig. 11. Moon far side under present conditions.

the distance of movement. The possible vertical movement of the object is equivalent to that of 0.6 ± 0.1 cm on Figure 10. Thus, the model shows that the object descended from 150 to 50 km, give or take 50 km, over a span of 4 seconds, reaching the lower altitude when the UFO disappeared just after it entered into the shadow. Its distance, about 3,300 to 3,400 km from Apollo 16, implies that from the point on the first frame in the footage to the point where it seems to come to the shadow, its velocity is about 20 to 40 km/sec. And the object obviously was on a collision course.

The estimated diameter of the object, if about 3,300 to 3,400 km in distance, is approximately the same as that of some craters known to be 60 to 120 km in diameter. If the object was farther away, then it would have been even larger! This size dismisses the space debris hypothesis without any difficulty. Only an

asteroid could be this large. But such an object with this trajectory and being this close to the moon could not avoid lunar gravity.

Figure 11 shows the far side of the moon during the lunar day. It was imaged with the green filter by MIC onboard NOZOMI / ISAS[10]. The figure has the grid lines and circumference which are added by the author. The mosaic image was constructed from 2 images of the northern part taken at 07:39 UT and 9 images taken at 07:40 UT on 18 December 1998. The principal point (the coordinates of the center of the circle field) is 117.5 degrees east longitude and 12.5 degrees south latitude. The distance from the lunar surface was precisely 2,870 km[11]. If an object had been an asteroid it would have made a great collision crater between Mare Moscoviense and Tsiolkovsky crater in this photograph. However, no trace of a recent collision can be found.

Moreover, there were 4 operating seismographs that had been left by the Apollo missions (Apollo 12, 14, 15, and 16). None of these showed evidence of a moonquake between 19:50 UT on 24 April 1972 and 09:24 UT on 25 April 1972. A large crashing object would have caused a severe moonquake. Incidentally, there were 2 moonquakes by meteoroid impacts on 18 April 1972 and 27 April 1972, during the Apollo 16 mission.

Observations by 5 seismographs (after Apollo 17's seismograph was added) were continued until 30 September 1977. Seismic waves were recorded for 179 meteorite collisions, and some of these collisions happened on the moon's far side. However, the mass sizes of the meteorite which collided are estimated only from 500 g to 50 kg at the most[12]. Therefore, the object was not a minor planet.

However, there clearly is an image of something which seems to be outside the command module. This raises the question of whether or not the image could be a reflection in the window of some object inside the command module. Astronauts routinely might have placed their camera lens against the window surface to avoid reflections when they took pictures through the windows. If the lens of the movie camera was not close to the spacecraft window then one probably could not reject the idea of a reflection in the window of some object inside the command module as a possible explanation. However, the redeeming feature of this footage is that, as the camera swings over to the "right side'' of the moon, it would cause a large change in the angle of incidence of the reflected image of an interior object. Thus, if a reflection, the UFO image should have moved rapidly over the different areas of the film scene.

Furthermore, the window's reflection of some object inside the command module might disappear with changes of the position of the camera as it swings around, whereas the UFO image in the footage is relatively constant with respect to the moon over this interval. It is thus unlikely that the UFO was a reflection of an interior light or some other interior object.

A more reasonable identification would be that it was a small object outside the command module but close by. If this is true, by the law of inertia, the object should not be moving subtly as when a leaf wobbles while falling from a tree.

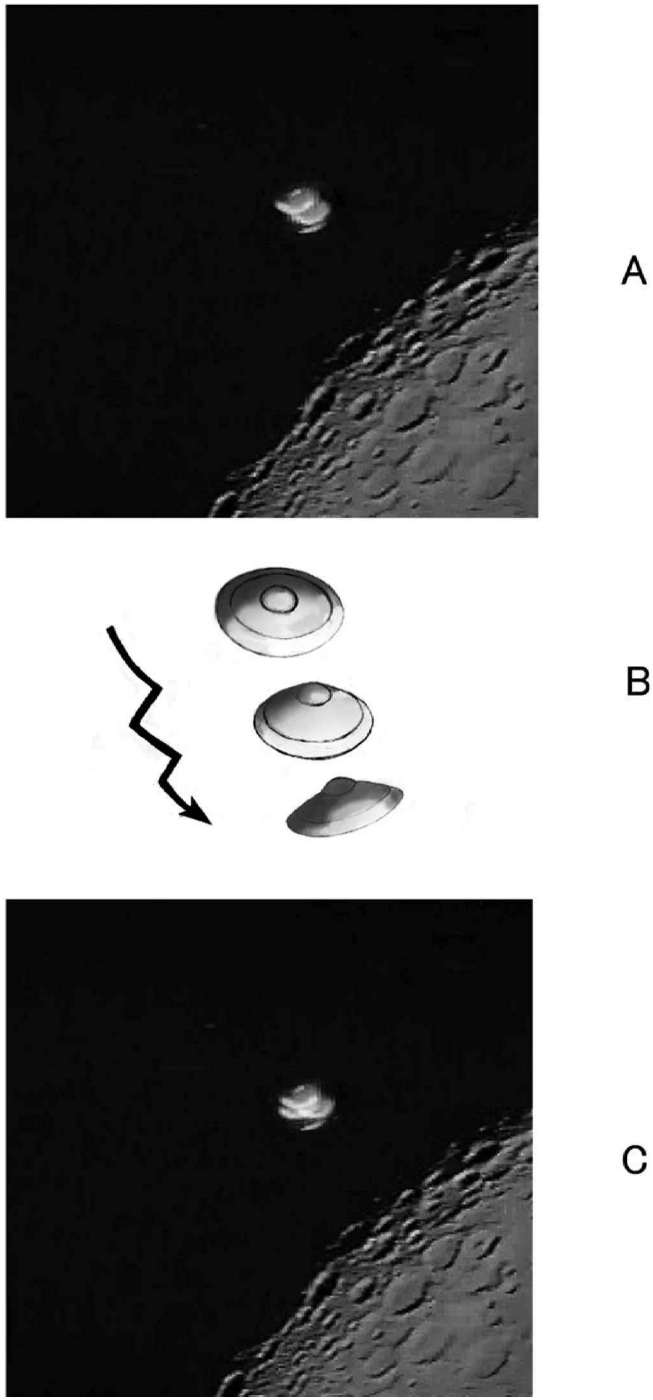

Fig. 12. The behavior of the object.

TABLE 3
The Measurement of AS16-Metric Photographs

Photo number	Apparent diameter of moon image	Longitude and latitude of principal point
M-3043	3957 pixel or 83.76 mm	92.5 E 10.8 N
M-3044	3911 pixel 82.78 mm	92.3 E 10.8 N
M-3045	3855 pixel 81.60 mm	91.8 E 10.7 N
M-3046	3835 pixel 81.24 mm	91.3 E 10.7 N
M-3047	3780 pixel 80.01 mm	90.8 E 10.6 N
M-3048	3725 pixel 78.85 mm	90.5 E 10.5 N
M-3049	3705 pixel 78.42 mm	90.1 E 10.5 N
M-3050	3660 pixel 77.47 mm	89.7 E 10.3 N
M-3051	3617 pixel 76.57 mm	89.3 E 10.2 N
M-3052Far	3580 pixel 75.78 mm	88.9 E 10.2 N (inferred value)
M-3052Near	3465 pixel 73.34 mm	87.7 E 10.1 N (inferred value)
M-3053	3408 pixel 72.14 mm	87.4 E 10.0 N
M-3054	3390 pixel 71.76 mm	87.2 E 10.0 N
M-3055	3350 pixel 70.91 mm	86.8 E 9.9 N
M-3056	3297 pixel 69.79 mm	86.3 E 9.8 N
M-3057	3280 pixel 69.43 mm	85.7 E 9.7 N
M-3058	3249 pixel 68.77 mm	85.3 E 9.7 N
M-3059	3207 pixel 67.88 mm	85.1 E 9.7 N
M-3060	3183 pixel 67.37 mm	84.9 E 9.6 N
M-3061	3162 pixel 66.93 mm	84.5 E 9.6 N
M-3062	3112 pixel 65.87 mm	84.2 E 9.5 N

(The detail will be described below.) Furthermore, it could not have been debris very close to the Apollo 16 since the UFO image seems to be well focused, whereas a nearby object, whether seen directly through a window or seen as a weak (dim) reflection in the window, would likely be out of focus since the camera was focused on infinity (the moon is well focused). This distance vs focus argument also rejects the question of whether or not it could be something attached to the spacecraft itself which was momentarily illuminated by the sun. Thus, for all of these reasons the object was not a piece of debris or a part of the command module.

Figure 12 shows time-lapse image A that was synthesized from start, middle, and end frames of CL-862 footage. Illustration B is our interpretative model. The time-lapse image C was created by adding yet another frame.

The object appears to be descending in a wobbling manner, like a leaf falling from a tree. This behavior is consistent with some reported behaviors of a "flying saucer'' while it refutes the photo aberration hypothesis.

Furthermore, the object appears to have an artificial structure consisting of a disc that has a prominent dome at the center. The dynamic behavior which is able to avoid collision with the moon and the unsuitable shape for a minor planet suggest that the object is an extraterrestrial spaceship or an alien station. Of course, one could assume the crew are not aliens but automatons[13].

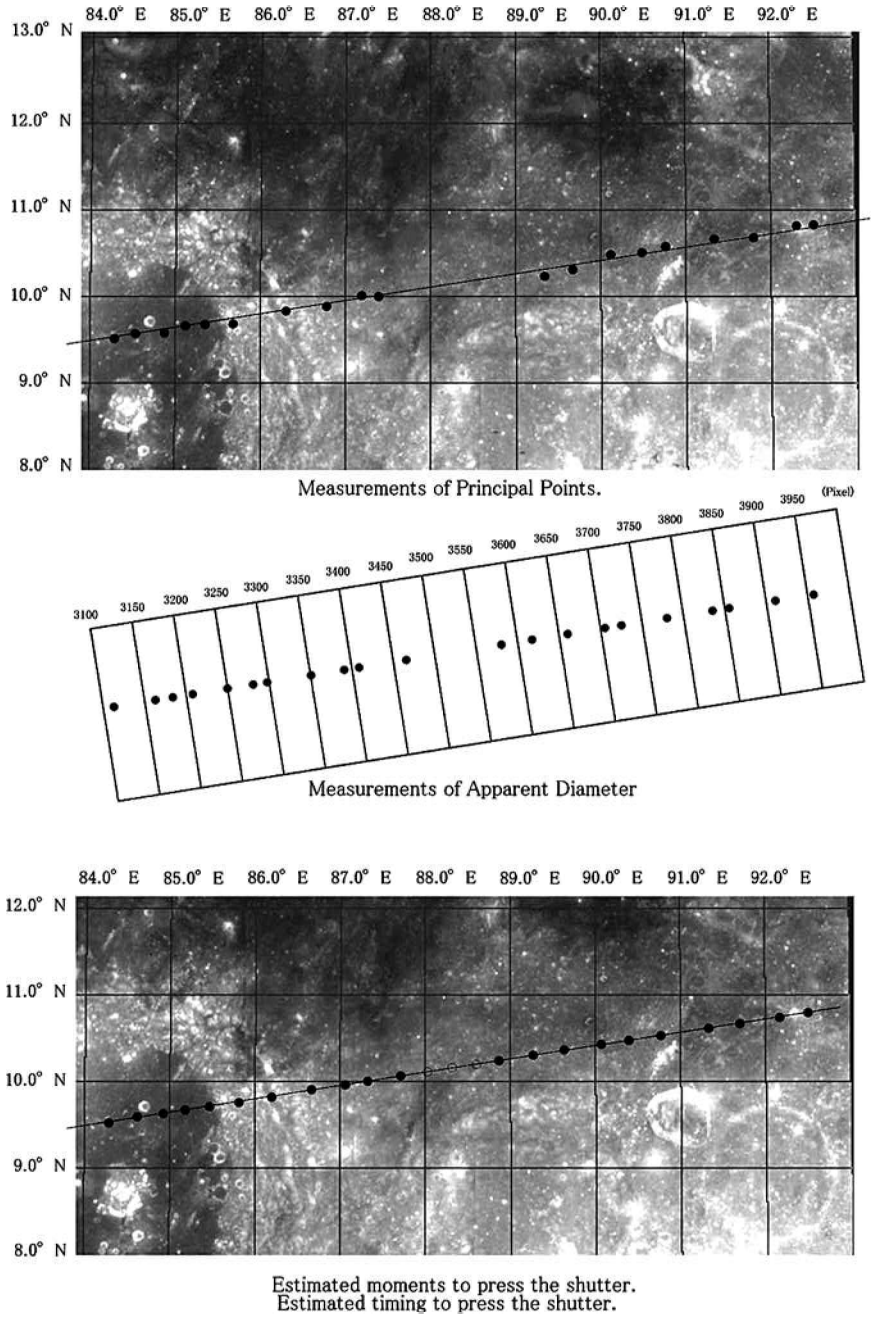

Fig. 13. The analysis of a series of metric photos.

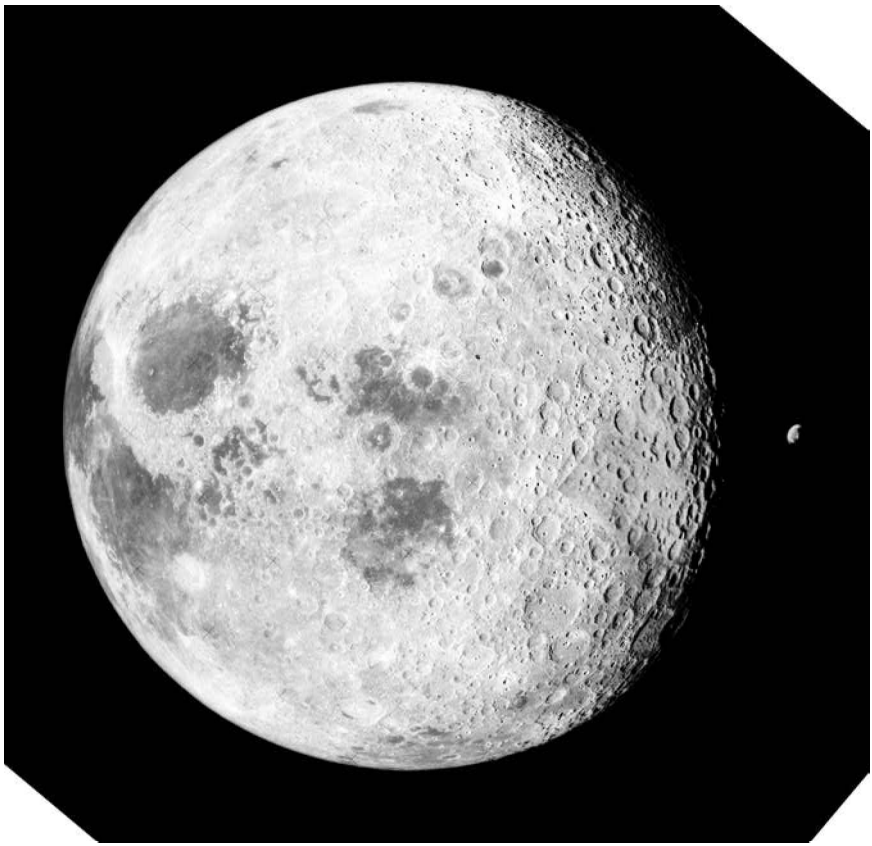

Fig. 14. A composite photograph, CL-862 and M-3053.

6. Further Analysis

While this paper was being revised many important images from Apollo 16's metric camera were furnished to us by Lunar and Planetary Institute. Their ID numbers are from AS16-M-3032 to AS16-M-3062 consecutively, but they do not have any descriptions of when they were taken[14]. Unfortunately, their photographs do not have a UFO image, either. (We cannot judge the rumor that a UFO was blotted out with an air brush.)

The apparent (angular) diameters of the moon decrease with the increase in the distance with the passage of time, in AS16 metric images. Longitudes of the central coordinates (principal points) in these images also move along Apollo 16's trans-Earth trajectory.

Table 3 is the list of the metric photograph data. We obtained each datum from averaging several sets of measurements. The date and time of CL-862 film

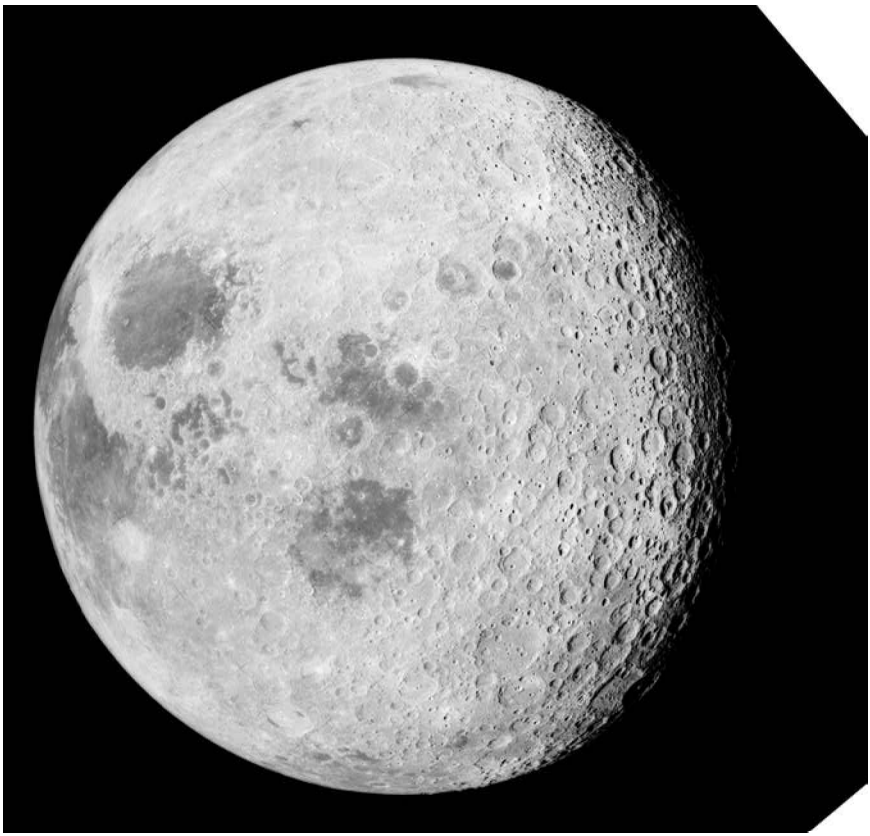

Fig. 15. AS16-M-3051.

corresponds to a little after M-3051 and a little before M-3053. That is to say, AS16-M-3052 photography was obtained at almost the same time when CL-862 was filmed. The latitudes and longitudes of the locations of both photos are nearly equal. Therefore, AS16-M-3052 is especially important. However, AS16-M-3052 is a bad photograph because it is a double exposure.

Here we name the 2 images 3052Far (it shows details only around the part of Mare Crisium and Mare Fecunditatis) and 3052Near (it shows a monotonous white from overexposure). Assuming it was an accidental double exposure, both lunar sizes should be about the same. Yet there are distinct differences between the 2 image sizes.

The apparent angular diameters of the moon, from M-3043 to M-3062, are compared in Table 3 and Figure 13. Thus, lunar apparent angular diameter in 3052Near is remarkably smaller than that in 3052Far. Double exposure with such a time lag is absurd.

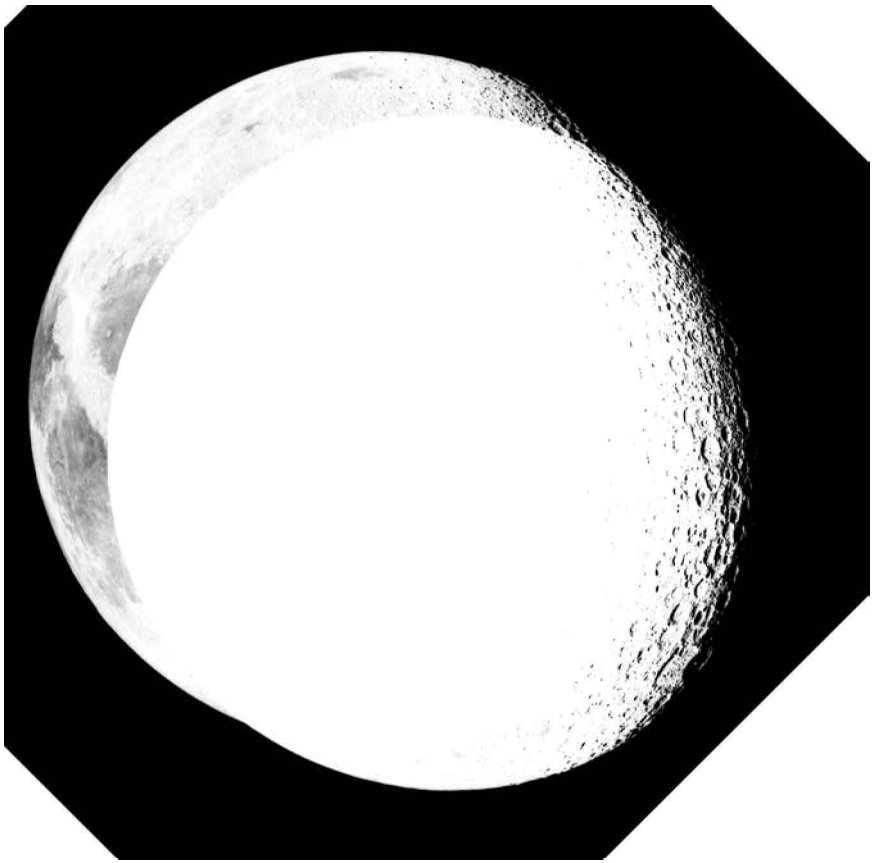

Fig. 16. AS16-M-3052.

The image AS16-M-3052 indicates that there is an absence of photo points from 89.3 degrees east longitude to 87.4 degrees east longitude.

Figure 13 is an analysis of a series of metric photos. The top graph shows the movement of the latitude and longitude of principal points which are the origins of the coordinates of the photos. The middle graph shows the apparent diameters of the moon. Both sets of data have measurement errors. However, these errors can be corrected by adjusting the apparent diameters and principal points mutually. So, the bottom graph countervailed accidental errors of measurement in the top and middle graphs. It appears that the moon and the object were photographed at nearly a constant interval by motor drive shutter system. Thus, the gap must have had the principal points of photographs of about three sheets. Some photographs are lost, and so perhaps the destruction of the evidence was attempted.

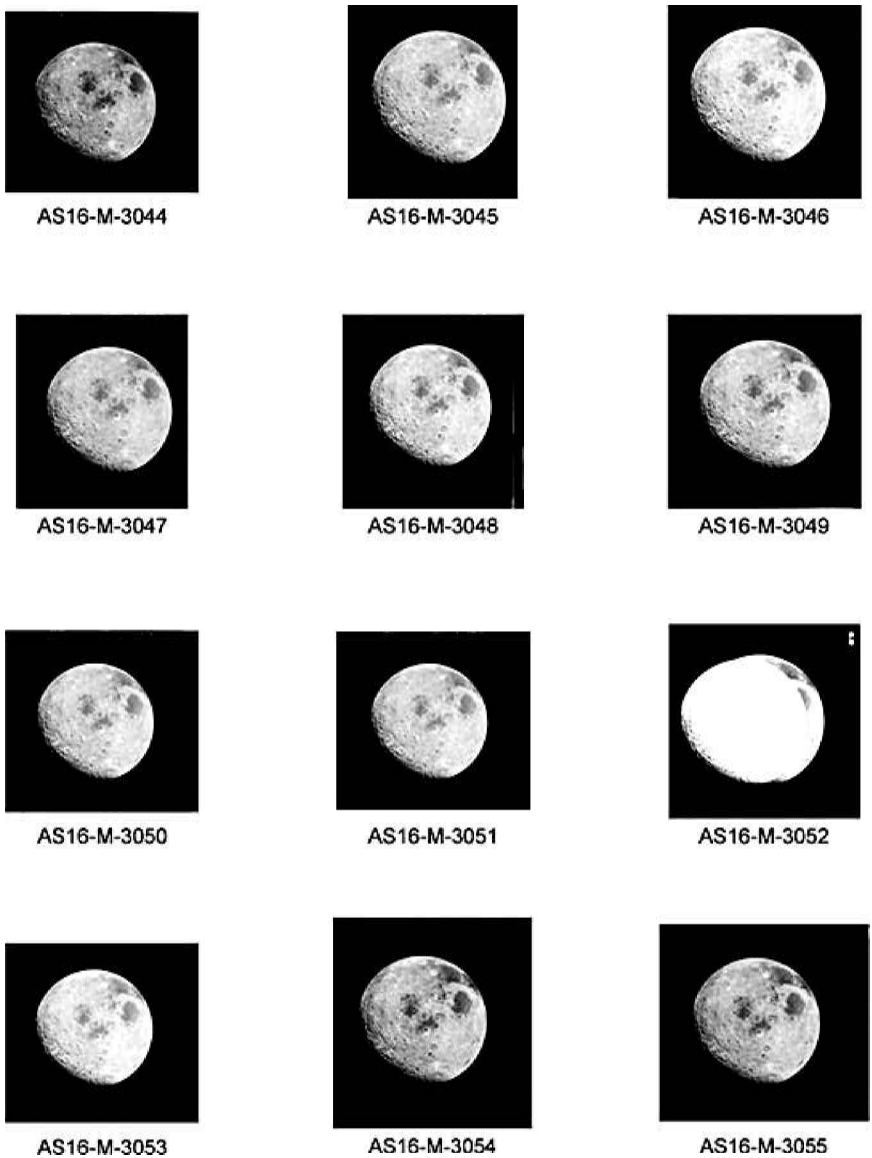

Fig. 17. Contact sheet of metric photos.

Figure 14 is a full-view composite photograph (without the UFO) which was created from CL-862 and M-3053. The long axis of the UFO image, measured in the image plane, is proportional to the diameter (width) of the object. We obtained the long axis of the image of the UFO and the apparent diameter of the

image of the moon of 112 and 3,410 pixels from averaging several sets of measurements on the montage.

This apparent angular diameter is equivalent to the chord distance of 3,150 km. Hence, $3{,}150/\phi = 3{,}410 / 112$, so $\phi = 103.4$ km. If the distance was 3,400 km from the observer (i.e. the distance to the moon), this becomes a more precise estimated value of the diameter of the object. For reference purposes, Figure 15 is M-3051, Figure 16 is M-3052, and Figure 17 is a contact sheet of M-3044 ~ M-3053[14].

7. Conclusion and New Vista

Our analysis of the CL-862 showed that the footage was taken by Apollo 16 on 25 April 1972 from about 2,200 km above 10.2 degrees north latitude and 89.1 degrees east longitude. The measurements and analysis contained in this paper established that the object captured in this video file is not Earth, a minor planet, the command module, space debris, or a photo aberration.

We believe that the object is a huge extraterrestrial artifact. This will be a controversial hypothesis. Although this is the only hypothesis that is consistent with the data, it may be at the same time seemingly unacceptable for most SETI (Search for Extraterrestrial Intelligence) researchers because they tend to reject the idea that a UFO could be an extraterrestrial spaceship.

Furthermore, most scientists associate the term SETI with large radio telescopes and the search for weak signals from far away. For this reason, few scientists know that a great deal of research and writing on the subject of ETI (Extraterrestrial Intelligence) probes within our solar system has been done.

After the proposal of directed panspermia by Crick and Orgel[15], Marx[16] suggested that a simple biological system carrying information and capable of self-reproducing may be one possible channel for interstellar communication. On the basis of biochemical analysis, Yokoo and Oshima investigated the idea that bacteriophage ϕ X 174 DNA might be a message carrying virus from ETI robotic probes which had reached in the solar system long ago. In 1982, Nakamura[18] attempted to decode a message which SV40 DNA may contain based on an idea that the Lunan's space probe[19] in the vicinity of Earth may have been sent by an advanced society as a possible biological interstellar message. On the other hand, Freitas[20] and Freitas and Valdes[21,22] did an optical search for objects (space probes) at the Lagrange points. Furthermore, Russian scientists have attempted some searches for probe radio signals within the solar system.

These searches, also done within the SETI context, were primarily negative and inconclusive. However, they were never objects of derision by mainstream SETI scientists. Therefore, it is a rational hypothesis that ETI craft may be residing in our solar system. Not only 5 Earth-moon-sun libration points but also the moon can become a candidate for the special seat of the Earth watcher, in this respect.

The visual signal of the object which we showed by this paper is obviously

more artificial than the well known "Big WOW" signal. We insist that such an important signal must not be overlooked by the researcher's prejudices.

Our new vista is spurred on by Jet Propulsion Laboratory scientist Scot Stride's[23] opinion that "optical signals from an ETI probe may be illuminating Earth right now, and we would never know it." And we ask NASA for the disclosure of more information while refraining from emphasizing premature explanations for the object.

Notes

[1] Oberg's response. A private letter by email dated 19 December 2001 to the reviewer from James Oberg. The email was provided to the author from the reviewer with Oberg's permission. Oberg's web site is http://www.jamesoberg.com.

[2] Internet web page, German UFO-Server ALIEN.DE. Available at http://www.alien.de/alien/sichtungen/videos/apollo16/.

[3] The interested reader should access one or both of these web sites to see the film and note the dynamics of the "sighting." This is particularly important when considering the image reflection hypothesis to be discussed.

[4] Lunar and Planetary Institute (1998). Apollo Missions. Available at http://www.lpi.usra.edu/expmoon/apollo_landings.html.

[5] Internet home page, John Walker's computer simulator. Available at http://www.fourmilab.ch/earthview/vplanet.html.

[6] AS16-3005, Apollo 16 Orbital Photography. Internet site of Lunar and Planetary Institute. Available at http://www.lpi.usra.edu/expmoon/Apollo16/A16_Photography_orbital.html, http://www.lpi.usra.edu/expmoon/Apollo16/A16_MP.OrbitalMapping3FS.gif, and http://www.lpi.usra.edu/expmoon/Apollo16/A16_MP.OrbitalMapping4FS.gif.

[7] AS16-3008, Apollo 16 Metric and Panoramic Photography. Internet site of Lunar and Planetary Institute. Available at http://www.lpi.usra.edu/expmoon/Apollo16/A16_Photography_metric.html and http://www.lpi.usra.edu/expmoon/Apollo16/A16metric3008.gif.

[8] AS16-3021, Earth's Moon—Apollo 16. Lunar far side and the eastern limb of the Moon. Internet site of National Space Science Data Center. Available at http://nssdc.gsfc.nasa.gov/imgcat/html/object_page/a16_m_3021.html and http://nssdc.gsfc.nasa.gov/imgcat/hires/a16_m_3021.gif. Internet site of National Aeronautics and Space Administration. Available at http://www.hq.nasa.gov/office/pao/History/SP-362/ch2.htm.

[9] PLANETARY IMAGE ATLAS MOON ADVANCED VERSION. Available at http://www.pdsimage.wr.usgs.gov/PDS/public/explorer/html/moonadvc.htm.

[10] Nozomi, Japanese spacecraft going to Mars. The Institute of Space and Astronautical Science, which is Japan's national space research center. NOZOMI home page curator, Ai Inada, Faculty of Science, Kobe University, Mars Im-

aging Camera. Available at http://www.planet-b.isas.ac.jp/MIC/1219_j.html and http://www.planet-b.isas.ac.jp/MIC/mosswb2.jpg.

[11] The Altitude of Nozomi. A private letter by email dated 2 August 2001 to the author from Ai INADA (inada@komadori.planet.sci.kobe-u.ac.jp).

[12] Nakamura, Y., Latham, G. V., Dorman, H. J., and Harris, J. E. (1981). Passive Seismic Experiment Long Period Event Catalog, Final Version, 1969 Day 202–1977 Day 273, ALSEP Stations 11, 12, 13, 14, 15, and 16. GMGL, June 19, 1981. UTIG Technical Report No. 18.

[13] The author will deny the hypothesis that UFOs are the time machines of the persons in the immediate future, which seems to be the main focus of next BUFORA Research Bulletin.

[14] Their images are Apollo 16 Metric photos from M-3032 to M-3062. They were scanned and provided to the author by Debra Rueb, who is a photographer of Lunar and Planetary Institute in Houston. Available at ftp://www.lpi.usra.edu./pub/outgoing/december-28.

[15] Crick, F. H. C., and Orgel, L. E. (1973). Directed Panspermia. *Icarus, 19,* 341–346.

[16] Marx, G. (1979). Message through time. *Acta Astronautica, 6,* 221–225.

[17] Yokoo, H., and Oshima, T. (1979). Is Bacteriophage ϕX174 DNA a message from an ETI? *Icarus, 38,* 148–153.

[18] Nakamura, H. (1986). SV40 DNA a message from εERI? *Acta Astronautica, 13,* 573–578.

[19] Lunan, D. A. (1973). Space probe from Epsilon Bootis. *Spaceflight, 15,* 122–131.

[20] Freitas, R. A. Jr. (1983). The Search for Extraterrestrial Artifacts (SETA). *The Journal of the British Interplanetary Society, 36,* 501–506.

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[22] Freitas, R. A., and Valdes, F. (1985). The search for extraterrestrial artifacts (SETA). *Acta Astronautica, 12*(12), 1027–1024.

[23] The SETI League, Inc. SETI Editorial; Probing for ETI's Probes in the Solar System, by Scot Stride. Available at http://www.setileague.org/editor/stride2.htm.

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