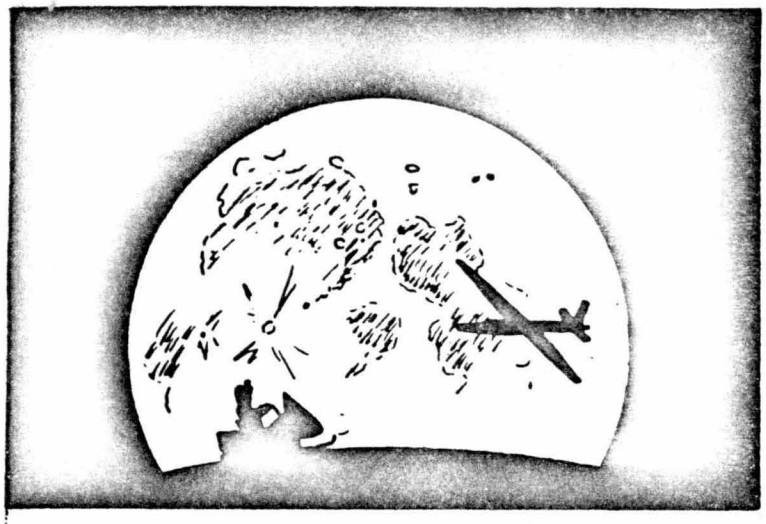

LUNAR SAMPLE NEWSLETTER

NUMBER 41

SPRING 1984

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Houston, Texas 77058, 713-483-3274

CONTENTS

I. JAPANESE ANNOUNCE DISCOVERY OF A SECOND LUNAR METEORITE

Keizo Yania and Hideyasu Kojima of the National Institute for Polar Research (NIPR) have announced the identification of a meteorite in their collection of meteorites returned from Antarctica that is distinctly lunar in origin. The meteorite, Yamato 791197, is a 25 gram dusty-gray sample that appears to be a shocked, anorthositic regolith breccia. The discovery was announced at the Ninth Symposium on Antarctic Meteorites held in Tokyo in March.

Drs. Yania and Kojima have sent a thin section of the meteorite to Jeff Taylor and Klaus Kiel at the University of New Mexico and a sample for oxygen isotope analysis to Robert Clayton at the University of Chicago. These investigators have confirmed the conclusions of the Japanese scientists that the meteorite is of lunar origin.

The Planetary Materials Branch at Johnson Space Center does not have samples of this latest lunar meteorite. Sample requests should be directed to Dr. Yania at the NIPR. A copy of instructions and a sample request form from the Japanese Meteorite Newsletter are appended to this newsletter.

II. LUNAR AND PLANETARY SAMPLE TEAM MEETS IN JUNE

The Lunar and Planetary Sample Team (LAPST) met at the Johnson Space Center March 9-11, 1984. LAPST reviewed seven requests for lunar samples from four investigators and one request for a long-term Lunar Sample Display from the Public Affairs Office at the Johnson Space Center. LAPST commended allocation of 76 samples and 14 thin sections weighing a total of 86.4 grams to the investigators and a display sample weighing up to 150 grams to PAO. LAPST endorsed the curator-recommended allocation of 31 samples and 48 thin sections weighing a total of 10.27 grams in response to nine lunar sample requests from six investigators between the December 1983 and March 1984 meetings.

Studies of the regolith and regolith breccias generated five requests from three investigators and accounted for about onethird of the allocated samples. Consortium studies of clasts from Lunar Highlands breccias generated two requests.

Approximately half of the samples were allocated in response to two requests from an investigator who is using newly developed equipment and improved techniques to determine more accurately the Zr/Hf ratios in lunar samples.

Other requests supported:

- A petrographic study of lunar anorthosites
- A search for zircon crystals suitable for age dating
- Chemical characterization of a sphere that may be high-silica glass
- The NASA-JSC Public Affairs Office Long-Term Display Program

LAPST will next meet June 8-10, 1984; the following meeting is tentatively scheduled for September. You are reminded that sample requests can be made at any time. Many of the requests that we receive can be handled through Curatorial allocations under the guidelines detailed in the newsletter of May 1983. Most returned samples, pristine samples less than 100mg and nearly all thin sections can be allocated directly at the discretion of the Curator.

Another function that LAPST does very well is that of planning and advocacy for continued vigorous program of lunar sample research. You are invited to make your views and opinions known to the members of LAPST. A list of the present membership of LAPST, their home institutions and phone numbers is in the appendix.

III. CONFERENCE ON THE ORIGIN OF THE MOON (October 13-16, 1984)

A major unsolved problem in planetary science is the origin of the Moon. The hope of solving this problem was one of the major scientific justifications for the Apollo Program. Although several new models for lunar origin have been proposed since the return of Apollo and Luna samples, there has never been a conference devoted exclusively to this topic.

The Lunar and Planetary Institute (LPI) and the Division of Planetary Sciences (DPS) of the American Astronomical Society will co-sponsor a topical conference that will concentrate solely on how the Moon may have formed. The conference will be held October 13-16, 1984, in Kona, Hawaii, following the 1984 DPS meeting at that location. Conference organizers are William Hartmann, Planetary Science Institute; Roger Phillips, Southern University; and G. Jeffrey Taylor, University of New Mexico.

The conference will deal with both constraints and origins. Under constraints, for example, it seems fairly certain that the Moon is depleted in volatile elements compared to either Earth or chondrites. Any model for lunar origin must explain this. But how sure are we that the Moon is also depleted in siderophile elements and enriched in refractory elements? The conference also will focus on specific models for lunar origin, on how well the models satisfy the constraints, and on how we might test the models.

Some speakers will be invited to summarize certain areas, but contributed talks will make up the bulk of the program. The Program Committee will accept only papers that directly address the topic of the conference. The program will be organized in three parts: invited review talks, contributed talks, and summary talks. Tentative session topics for contributed talks include:

1. What chemical and petrologic constraints can be placed on the origin of the Moon?

2. What geophysical constraints can be placed on the origin of the Moon?

3. What dynamical constraints can be placed on the origin of the Moon?

4. When we return to the Moon, what new experiments and observations could help constrain the origin of the Moon?

5. How did the Moon form?

Abstracts will be due July 15, 1984. The proceedings of the conference will be published in book form, with papers due December 15, 1984. Questions pertaining to the meeting may be directed to any of the conveners, or to Pam Jones, LPI Projects Office, (713)486-2150.

IV. LUNAR EDUCATIONAL THIN SECTION PACKAGE

One of the most popular services of the Lunar Curatorial Laboratory is lending of the Lunar Educational Thin Section to colleges and universities for use in their geology and petrology courses. With the package comes a lengthy booklet written by Jeff Warner in 1975 to explain the significant features in the thin sections. We are presently reviewing Jeff's booklet and replacing some of the thin sections of soils with more thin sections of rocks.

We encourage you to use this teaching resource and to encourage your professional colleagues to incorporate the package into their courses, also. We would also welcome your comments on both the choice of sections and the documentation. We discourage use of research thin sections for general educational purposes. The educational package has sturdy section mounts to minimize damage to the sections through normal use.

Appended to this newsletter is a flyer that describes not only the Educational Thin Section Packages available from the Curator, but also the other Display and Educational Programs available through the JSC Public Affairs Office.

V. PERSONNEL CHANGES IN THE PLANETARY MATERIALS BRANCH

We have bid farewell to two of the more familiar faces in the Planetary Materials Branch. Ruth Fruland has retired from NASA to move to Richland, Washington. Ruth had been at JSC for her entire professional career and was one of the rare, native Houstonians in the Division.

Our secretary, Jeanette Simon, is leaving the branch to join the corporate world of IBM. We wish her well in her new job. Her replacement has not been named.

Charles Meyer has joined the Branch and has assumed some of Ruth's duties and will assume the LAPST secretary's role. He will also continue his work as a Lunar Sample Principal Investigator, investigating the chemistry and geochronology of minor phases in lunar samples.

Two new processors have been added to the ranks of our support contractor, Northrop Services Incorporated. Kim Willis and Charlie Galindo have been hard at work since the beginning of the year. They have been working primarily in the lunar labs and have helped make good progress our backlog of lunar allocations.

VI. SPECIALLY PREPARED THICK SECTIONS AVAILABLE

Lincoln Hollister has return two specially prepared, doubly polished thick sections of 14303,28. He has noted that these samples would be excellent candidates for fluid or melt inclusion studies as well as for studies of three dimensional matrix microstructure. The samples are available for re-allocation. Their numbers are 14303,28 and 14303,232. Dr. Hollister has volunteered to provide detailed information on the preparation of the samples to interested parties.

VII. APOLLO FIELD GEOLOGY REPORTS AVAILABLE

Three lengthy Field Geology Reports for Apollos 14, 16, and 17 are available from the Geological Survey (Professional Papers 880, 1048, and 1080). The reports contain many maps and details of the landing sites and of the samples collected. They are an excellent source of information for planning experiments and preparing proposals involving lunar samples. The reports are available from the U.S.G.S.

VIII. ANNUAL LUNAR SAMPLE INVENTORY AND LUNAR SAMPLE ACCESS AGREEMENTS

All principal investigators who are holding lunar samples were sent their inventory print out for verification early this year. If you are among the few PIs who have not yet returned your inventory, please verify your inventory listing at your earliest convenience and send it back to us. The inventory procedure requires someone associated with your institution's security force sign the listing as a witness to the inventory. If your particular institution does not have a formal security force, please have some other responsible person sign as a witness to the inventory.

All PIs in the United States who have approved lunar research proposals with NASA or the NSF were also sent an Extraterrestrial Sample Scientific Study Loan Agreement. This document was patterned after the document we use for the loan of Educational Thin Section Packages and was intended to be a simple blanket agreement for study of lunar samples regardless of the source of funding for the research. The generalized security agreement, also patterned after the thin section loan agreement, has caused difficulty for several investigator groups. Please feel free to make pen and ink changes to the agreement or retype it if you need to in order to make the document reflect the special circumstances at your institution. We will review the changes here and sign off if they are acceptable.

We were unable to find current agreements for several investigator groups that have lunar samples. We asked that those groups turn in the lunar samples in their custody or explicitly request permission to keep them for continued study. We anticipate that some groups will want to continue their work and we encourage that. We will send an agreement to any group that can justify their continued custody of lunar samples. Other groups who have finished their work should return their samples. Our goal is to have a valid access agreement with every group that has lunar samples and recover the samples from those that do not have a current agreement.

Most agreements will have a three year period.

RESEARCH ON JAPANESE COLLECTIONS

Formal requests for Antarctic meteorite samples for scientific research and display should be submitted in writing along with the formal request form to Professor Takesi Nagata, Chairman, Antarctic Meteorite Research Committee, National Institute of Polar Research(NIPR), Tokyo.

Requests are welcome from all qualified scientists in the world and will be reviewed and considered two or three times each year by the Antarctic Meteorite Research Committee of the NIPR in Japan. Consortium-type sample requests may also be submitted. When your proposal is accepted by the committee, the requested samples will be sent to you from the curator, Department of Meteorites of the NIPR.

SAMPLE ALLOCATION

1. Sample allocation may be limited under few grams for each sample.
2. Sample allocation may be under 10 samples for each research proposed.
3. All samples are provided as a lone.
4. In a case of museum display, it may be provided on an exchange basis.
5. Sample requests should include detailed sample numbers, preferable weight and minimum weight requirements, sites(crust, outer part, inner part and central part, etc.,), shaps(powder, grains, fragments, chips, cubes, plates, thin section and polished thin section) etc.

SAMPLE DISTRIBUTION

1. Sublease of meteorite samples is not permitted to anybody except coinvestigators of the proposed research. If sublease is required to other investigators, a new separate proposal form must be submitted to the Antarctic Meteorite Research Committee prior to the sample transfer.
2. Return of unused meteorite sample to the curator is requested upon completion of the proposed research.

REPORTING RESULT

1. Any result of your studies is encouraged to be reported promptly. It is desirable to report at the Symposium on Antarctic Meteorites sponsored by the National Institute of Polar Research. The presented papers at this symposium will be published as the Proceedings of the symposium after review by the editorial committee of the NIPR. Two referees will read the paper. Instruction to contribution can be obtained from the Library of the NIPR. The symposium will be held each year, customarily in late February.
2. It is also possible to submit paper to the Antarctic Record and to the Memoirs of the National Institute of Polar Research.
3. Twenty reprints of each article which was published in other journal than those of the National Institute of Polar Research should be sent to the curator by authors.

Please mail to;

Keizo Yanai
Curator, Antarctic Meteorites
Department of Meteorites,
National Institute of Polar Research,
9-10, Kaga 1-chome, Itabashi-ku, Tokyo 173
Japan

RESEARCH PROGRAM FOR METEORITES

Date: 19 . . .

Research title: _____

Name in full: Signature:

Address:

Professional title and degrees: ☎

Joint member: _____

Summary:

(Continue)

Period of the program: ~ ( )

Request (name, weight and shape):

Curator:

Received Date: 19 . .

Signature:

LAPST MEMBERS -- MARCH 1984

Dr. Lawrence A. Taylor, Chairman
University of Tennessee
Department of Geology
Knoxville, TN 37916
(615)974-6013

Dr. Donald E. Brownlee
University of Washington
Astronomy Department, FM-20
Seattle, WA 98195
(206)543-2888 OR -8575

Dr. Randy Korotev
Dept. of Earth & Planetary Sciences
Washington University
St. Louis, MO 63130
(314)889-5637

Dr. Gunter W. Lugmair
Chemistry Dept., B-017
University of Calif., San Diego
La Jolla, CA 92093
(619)452-2433 or -2746

Dr. David McKay
NASA/Johnson Space Center
SN4/Experimental Planetology Br.
Houston, TX 77058
(713)483-3816; FTS: 525-3816

Dr. Graham Ryder
Lunar and Planetary Institute
3303 NASA Road One
Houston, TX 77058
(713)486-2141 or 483-2666

Dr. G. Jeffrey Taylor
University of New Mexico
Department of Geology
Institute of Meteoritics
Albuquerque, NM 87131
(505)277-3041 or -2747

Dr. Paul Warren
Earth & Space Sciences Dept.
University of California
at Los Angeles
Los Angeles, CA 90024
(213)825-2015

NASA Facts
National Aeronautics and
Space Administration

JSC-16652

Lyndon B. Johnson Space Center

Lunar Samples For Display

The landing of the Apollo astronauts on the Moon was a magnificent technological triumph. These missions also ushered in a new era in our study of the solar system and the universe around us. For the first time in our history, we could study another world at close range. Astronauts stood on the Moon, photographed the small details of its mysterious surface, and set up instruments to probe into its interior. From orbit around the Moon, other sensitive instruments in the Apollo spacecraft measured the chemical composition, gravity, and magnetism of the Moon.

The Moon Rocks and What They Tell Us

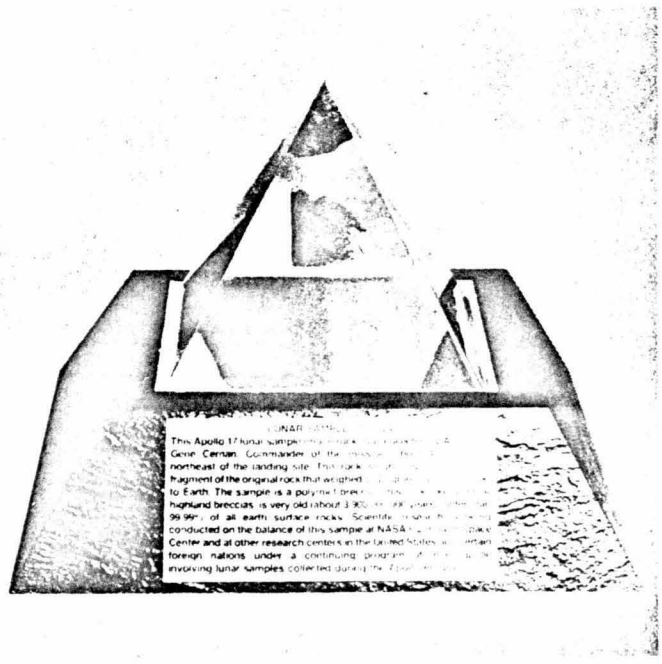
The actual return of lunar samples to Earth was the major scientific achievement of the Apollo program. Only by studying moon rocks with all the resources of laboratories here on earth could we determine the exact nature of the Moon, unravel its long and complicated history, and learn how the Moon had recorded solar system history for 4-1/2 billion years.

The six successful Apollo landings returned more than 2,000 different samples of the Moon - 842 pounds (342 kilograms) in all. From these samples we learned that the Moon is not a uniform and monotonous world, but a complex and individual planet with its own unique history. Despite all their important scientific value, the moon rocks are far more than just specimens. They are the tangible symbol of a great achievement. They are interesting and exciting to look at. And in a very special way, they bring us close to other worlds.

For these reasons, the Johnson Space Center Office of Public Affairs maintains a public display and education program involving the loan of lunar samples. This Lunar Sample Display Program is divided into three sub-programs: the Regular Display Program, the Educational Disk Program, and the Thin Section Program.

Regular Display Program

The JSC Public Services Branch manages a traveling display program that consists of display samples that range from 70-160 grams in size, and are encapsulated in clear lucite pyramids. These displays are distributed to the NASA Centers throughout the United States who service an area or region around their Center. These display samples, available for loan periods ranging from two weeks to two months, are available to museums and planetariums, or any non-profit organization sponsoring a community or civic event. General requirements for this type of display sample are: The sample must be hand-carried to and from locations; must be secured in a safe or vault-type safe when not on display; and must be under constant surveillance while on display. While all display sample requests are coordinated through the JSC Public Services Branch, additional information on this program may be obtained by contacting the Office of Public Affairs at the following Centers:



Lunar sample pyramid display.

If you live in the state of:	Contact:
Washington, Oregon, Idaho, Montana, Wyoming, California, Nevada, Utah, Arizona, Alaska, Hawaii	Ames Research Center Moffett Field California 94035
Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, Pennsylvania, Delaware, New Jersey, Maryland, District of Columbia	Goddard Space Flight Center Greenbelt Maryland 20771
North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, Texas, Colorado, New Mexico	Johnson Space Center Houston Texas 77058
Iowa, Missouri, Arkansas, Tennessee, Alabama, Mississippi, Louisiana	Marshall Space Flight Center Huntsville, Alabama 35812
Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota	Lewis Research Center 21000 Brookpark Road Cleveland, Ohio 44135
Virginia, West Virginia, Kentucky, North Carolina, South Carolina	Langley Research Center Langley Station Hampton, Virginia 23365
Florida, Puerto Rico, Virgin Islands, Georgia	Kennedy Space Center Florida 32899

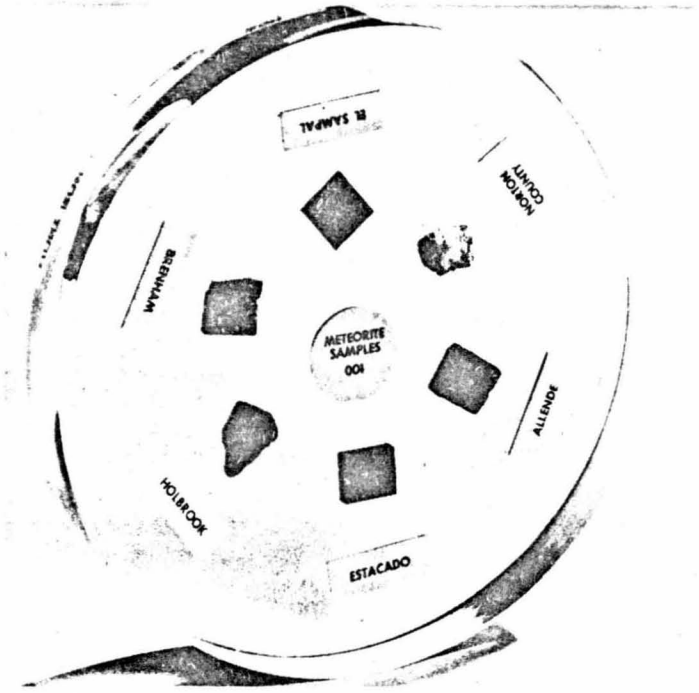
Educational Disk Program

This program consists of six samples of lunar material (three soils and three rocks) encapsulated in a six-inch diameter clear lucite disk. The disk is accompanied by written and graphic descriptions of each sample in the disk; a film; a sound and slide presentation; a teacher workbook; and additional printed material. This program was designed to be used as a science teaching aid in a classroom environment. Science teachers may qualify for the use of a disk in their classroom by attending one of the many workshops sponsored by NASA's Space Science Education Specialists. These workshops are scheduled during the year at different locations throughout the United States. Museums and planetariums that schedule educational programs may also request the disk for use. Basic requirements for using the disk are: The disk must be secured, while not in use, in a safe or vault-type safe or cabinet with a bar and combination lock; may be sent via registered mail to and from locations; and, must be under constant surveillance while in use. For additional information, schools should contact the Educational Coordinator at the Johnson Space Center; museum and planetarium personnel should contact the Exhibits Coordinator at the Johnson Space Center.

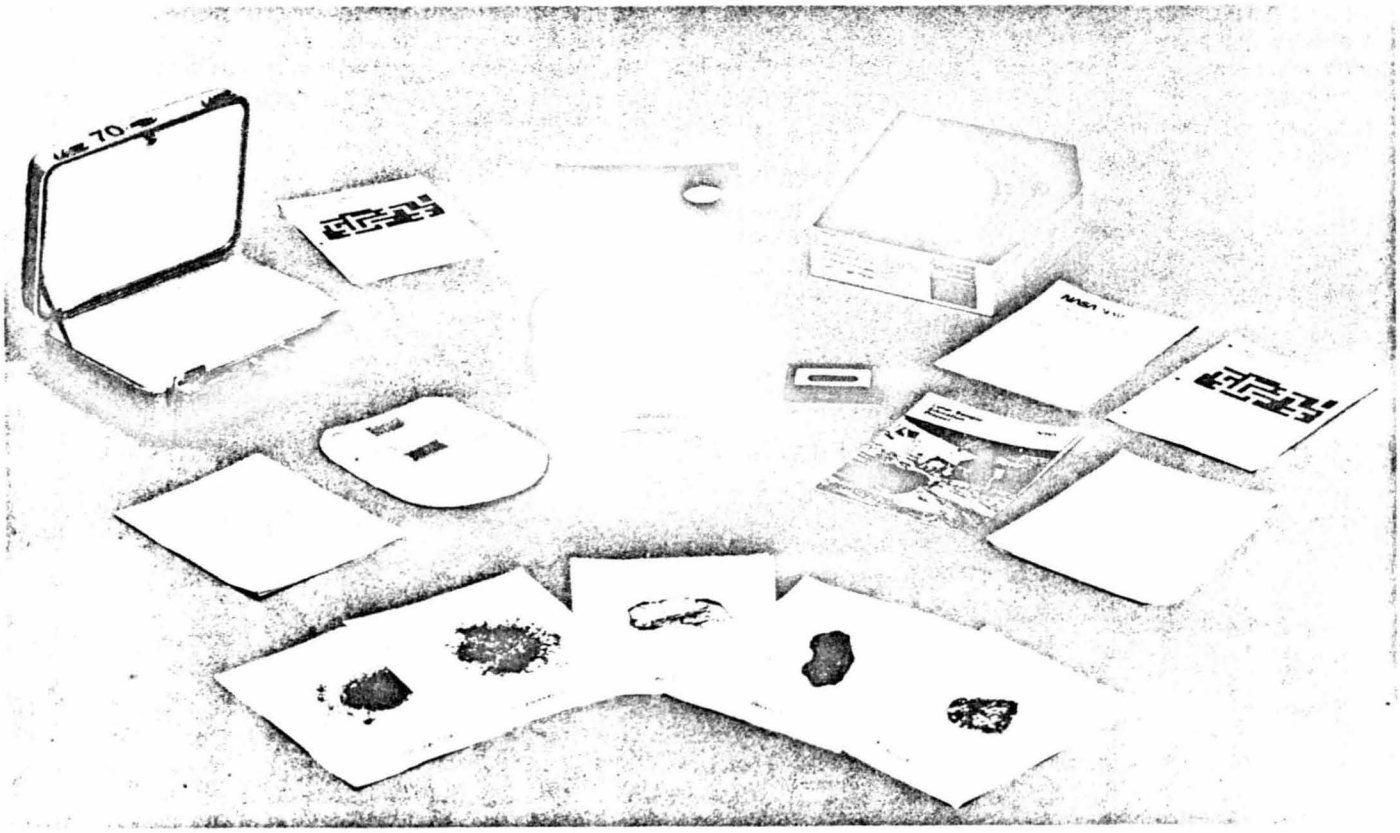
As a supplement to the lunar disk, a meteorite disk is available for use and study by museums and planetariums. The program is basically the same as the Lunar Disk Program. Information may be obtained, also, by contacting the JSC Public Services Branch.

Thin Section Program

A set of lunar thin sections is available for instructive and study purposes by college and university science courses. This program consists of twelve samples of soils and rocks and a descriptive booklet. College and university instructors may obtain information about this program by contacting the JSC Curator's Office, Code SN2, Houston, Texas 77058.



Meteorite sample educational disk.



Lunar sample educational disk package.

LUNAR SAMPLE THIN SECTIONS FOR EDUCATIONAL USE

National Aeronautics and Space Administration

LYNDON B. JOHNSON SPACE CENTER

Houston, Texas

August 1974

LUNAR SAMPLE THIN SECTION EDUCATIONAL PACKAGE

The National Aeronautics and Space Administration (NASA) has prepared a sample package containing thin sections of lunar material. The sample packages are being made available to educational institutions having a curriculum in the geosciences. The purpose of this program is to broaden the use of the lunar sample collection for scientific and educational purposes and to provide the samples as an educational tool.

CONTENTS

The Thin Section Educational Package consists of 12 polished thin sections of lunar rocks and soils specifically selected to be representative of the lunar sample collection.

The lunar rock samples are representative of the three general lithologic types found on the Moon.

- plutonic rocks
- volcanic rocks
- polymict breccias

The soil consists of:

- fragments of local bedrock
- fragments of rocks and glasses derived from remote sources
- agglomerates of fine particles with dark glass formed by rapid heating by small meteorite impacts on regolith material
- various glasses resulting in the fusion of rock material

A condensed description is provided which describes the thin sections, relates them to the suite of rocks and soils they represent, attempts to fit them into a broad picture of their relationship with the Moon, what we have learned of it, and what unsolved problems remain.

AVAILABILITY

The Thin Section Educational Package is available to any educational institution offering undergraduate or graduate course work in geosciences. The material will be supplied on a first-come, first-served basis.

APPLICATION

Any faculty member may apply for the use of the Thin Section Educational Package by writing to:

Lunar Sample Curator
Lyndon B. Johnson Space Center
Code SN2
Houston, TX 77058
Telephone: (713) 483-3274

Please include the following in your application:

Name of Institution
Address of Institution
Telephone Number
Department(s) Involved
Approximate Number of Students
Planned Seminars or Other Use
Desired Date for Use of Material
(please allow at least 2 months)

COOPERATIVE AGREEMENT

The Thin Section Educational Package is made available only after the Educational Institution and NASA have entered into a cooperative agreement. Lunar Samples are the property of the United States Government and are considered irreplaceable. It is therefore essential that rigorous security and accountability procedures be followed by all persons having access to the samples. Such procedures are included in the cooperative agreement which must be signed by NASA and the institutional officials. The agreement basically outlines the responsibilities of the institution and NASA for the use and safeguarding of the material during its use. Sample security requirements include, but are not limited to: (a) the samples must be under the constant control of an authorized official, (b) the samples must be stored in a safe with a combination lock when not in use, and (c) the sample storage area must be checked by appropriate security officials during nonworking hours.

RECEIPT

Lunar Samples may be hand-carried or they may be transported by registered mail. NASA will mail the package to the user, and it is the responsibility of the user to return the package to NASA. There is no other cost to the educational institution for the use of the material.

EQUIPMENT NEEDED

Standard petrographic microscope. A petrographic microscope with reflected light capability would be useful.

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