

Moon-dust Arrives at University Rocks Undergo Tests

"We know pretty well what's in the lunar material," says a University geochemist. "Now we want to know how it got there."

The interpretive stage of lunar material investigation is now beginning and the University has been chosen as one of the institutions to undertake it.

The first of what will amount to about a thimbleful of moon-rock and moon-dust from the Apollo 12 flight has arrived here. But to scientists accustomed to studying solids "by the atom" it's as good as a carload.

The first material is a thin slice of lunar rock #12038. More will follow in ensuing weeks. Public display of a portion of the consignment is being explored with NASA officials.

"It's very beautiful under the microscope," says Arnulf Muan, one of the men who will work with the first sample. "One can see at a glance that one is looking at something quite different from earth rocks. It is fresh, unscratched, uncorroded — altogether most impressive and breathtaking."

In University laboratories some of it will be melted, some vaporized with a laser, some probed with light and some will be photographed with a unique, computerized scanning electron microscope.

All the investigators will in effect be asking: What went on in the moon (or at its surface) to bring these materials to their present state? Each group will be trying to reconstruct some process of lunar development.

This work is interpretive; it should ultimately contribute to man's understanding of the origin of the moon, and perhaps of the solar system.

Arnulf Muan and E. F. Osborn will melt tiny chunks of lunar material to 2500 degrees (F), hold it at that temperature then quickly cool it. They will be using a melting crucible and techniques developed by them for the study of the phases through which terrestrial rocks and minerals develop.

It is of considerable importance for lunar-origin theories that geochemists know precisely how the minerals were formed; whether they were the products of melting associated with volcanoes or of melting associated with meteorite impact — or both. Muan and Osborn, working with earth-rocks, have developed an understanding of such processes against which they can now compare lunar-rock data. They will be working in cooperation with J. F. Schairer of the Carnegie Institution Geophysical Laboratory in Washington.

One of the big scientific surprises of the Apollo findings is the presence of large quantities of glass, particularly in the powdery moon-dust.

A measure of the surprise is the fact that only one proposal was submitted to NASA for the investigation of lunar glass — technically: amorphous-non-crystalline-material. That proposal came from the University's Materials Research Laboratory, one of the few U.S. laboratories that have intensively specialized in amorphous materials.

Under the direction of Rustum Roy, a materials group will be trying to determine the size and shape of the tiny particles described as "glass beads" by some reporters,

and the way in which they are distributed in the moon dust. The laboratory has been doing this kind of work on certain particles found in polluted air. The lunar particles will be photographed by what was the first scanning electron microscope in the world hooked-up to a computer. As the microscope scans a group of particles, photographing them with three-dimensional realism, the computer stores size-and-density information which can be retrieved in seconds when interpretative analysis is under way.

Again, the scientists will be asking: how did the glass form? And again, they will be able to relate their findings to knowledge about amorphous material "evolution" gained in many years of experimentation. Again, too, lunar origin theories may stand or fall on the results of such studies.

Amorphous material is, by definition, all a-jumble; it has no regular structure characteristic of crystalline matter. Yet, there are new ways to get at the jumble; one was developed at the University and is known as laser-mass spectrometry.

Its developers, Bruce Knox and Francis Vastola, will vaporize tiny sections of moon-dust by bombardment with a laser beam. The resulting vapor will contain relatively large fragments of the solid. These are detected in a time-of-flight mass spectrometer. From the findings the scientists can work backwards to reconstruct the "jumbled" structure which, though not orderly, nevertheless needs to be understood if interpretations about the origin of the material are to be made.

Others in the Materials Research Laboratory will be looking at the constituents of the moon-glass by causing it to emit x-rays whose distribution yields clues to structure; and still others will be studying luminescence of the tiny glass particles, again for clues as to structure. Finally, the glass will be subjected to a wide range of pressures as the scientists try to find out how much force it takes to generate a certain density. A bit of amorphous material that has been melted and cooled contains a built-in record of the pressure involved in making the melt.

All of these experiments will be going on simultaneously at the University and the results will eventually be correlated with other findings relative to the lunar material.

State Conservation Laboratory Celebrates Silver Anniversary

Twenty-five years ago they called it "conservation education."

Today it's "environmental concern."

But the product is the same — a generation of teachers, many of whom took their first walk through a virgin forest or stood for the first time on the banks of a sparkling mountain stream under the auspices of a pioneering program.

Sponsored by the University, this program, known as the Pennsylvania Conservation Education Laboratory, enrolled its first class of summer students in 1946. They called themselves "The Guinea Pigs."

"The whole idea of conservation education was new then, and our lab was the first of its kind," George J. Free, who retired as a professor of education at the University in 1966, said.

"There were," said Free, "a number of forward-looking organizations in the Commonwealth who believed that all teachers, no matter what their subjects, could work material on conservation into the curriculum. The trouble was that many teachers had had no first-hand experience with our natural resources."

With the impetus of several State

bureaus and sportsmen's and women's clubs, the Conservation Lab came into being, he said, dedicated to showing teachers everything from the inside of a coal mine to a fish hatchery.

"There were two field trips, or one very long one, six days a week. Nights were devoted to lectures by professors of elementary and secondary education showing the students how to incorporate what they'd seen and learned into their teaching," he said.

Field trips found the teachers standing in a stream scanning the waters to get an idea of what fish feed on. They visited strip mines and became acquainted with the problems created for the countryside. There were excursions to tree nurseries, sawmills and farms.

"Don't forget," Free said, "that although conservation was important 25 years ago, we didn't yet have any answers for many of the problems that we saw. And the problems themselves were different. We didn't worry much about air pollution, for example, in 1946."

This year the Conservation Laboratory will celebrate a silver anniversary reunion, in what has become an annual affair.

"In the first years," Free said, "we took field trips throughout the State. But the group is largely retired now and we've become more sedentary. Our attendance, however, has never fallen below 80 per cent."

The current Pennsylvania Conservation Laboratory for Teachers is directed by H. Seymour Fowler, professor of secondary education. He said he expects some 40 teachers to attend the July 12-31 session. The group will be equally divided between men and women and elementary and secondary personnel.

"You can read a lot about conservation, but it won't inspire your teaching unless you've actually experienced it," Free said.

"Our graduates through the years have gone back to start conservation clubs throughout Pennsylvania. They've made the children they taught aware of their natural resources and the irreplaceable value of them," he said.

"We believe they were influential in helping focus public attention on the problems of land erosion, for example," Free said, "and may have helped a little to create the climate that has fostered today's tremendous public awareness of ecological problems."

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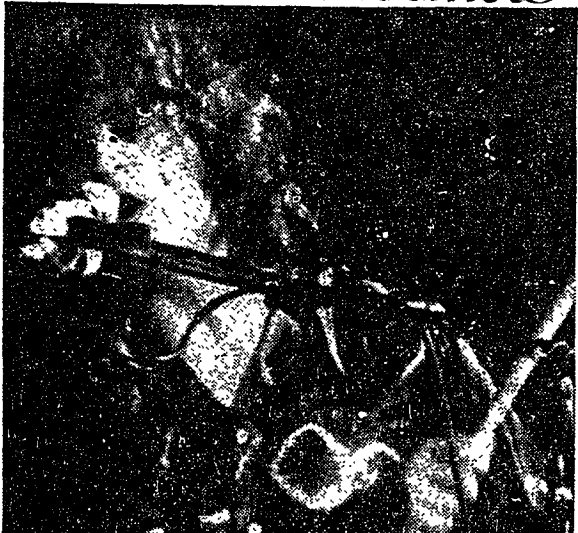
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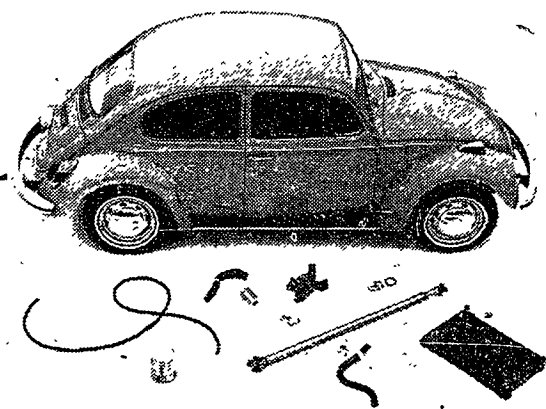
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PLACEMENT INTERVIEW SCHEDULE

Representatives of the following business firms, government agencies, and school districts will be on campus to interview students interested in applying for currently listed positions. Curriculum abbreviations following the interview date represent majors the firm desires to interview and not specific job titles. Additional information on listed positions is available in Room 12 (Basement), Grange Building. An appointment card and personal information sheet should be submitted approximately ten days prior to the date of each interview desired in General Placement. Sign-up sheets are available for desired interviews in Educational Placement.

FOR THOSE REQUIRING TRANSCRIPTS, PLEASE GIVE THE RECORDS OFFICE 5 DAYS NOTICE.
*Denotes employers who will also be interviewing for certain summer positions.

Organization	Date	Major Desired
Boy Scouts of America	Apr 13	Bus Ad, Ed, LA, Rec Ed
Crucible, Div Coll Industries	Apr 13	Accg, EE, IE, ME, Met E
*Fidelity Union, Life Ins Co	Apr 13	Any major
FMC Corp, Syntex Div	Apr 13	EE, ME, MBA
Hoffman-LaRoche	Apr 13	Any major
*Johnson, Altvater	Apr 13	Accg
National Biscuit	Apr 13	Accg, Bus Adm with 12 crds Accs
Neville Chemical	Apr 13	ChE
New Holland, Div Sperry Rand	Apr 13	Bus Ad, IE, ME, Mkts, most Ag majors
Peat, Marwick & Mitchell	Apr 13	Accg, Engr with interest in tax or mgmt
Pennsylvania State Bureau of Fin Mgmt	Apr 13	Accg, any major with 15 crds Accs
*Worthington Corp	Apr 13	ME
U S Naval Air Development Center	Apr 13	Aerosp, EE, ME, Physics
B Altman & Company	Apr 14	Any major
Amoco International Oil	Apr 14	Accg
*Bell of Pennsylvania	Apr 14	Summer, Men, Most majors
General Electric	Apr 14	Accg, AerospE, Bus Ad, Comp Sc, Car Sc, Chem, ChE, Econ, EE, Engr Mech, Engr Sc, Fin, Fuel Sci, IE, LA, Math, ME, Metal, Nucl E, Physics
Gimbels, Pittsburgh	Apr 14, 15	Any major
Harris, Kerr & Foster	Apr 14	Accg
Health Survey	Apr 14	Agron, For, Hort
Hershey Medical Center	Apr 14	Biol, Chem, Med Tech, Nurse
Lord & Taylor	Apr 14, 15	Any major
Union Carbide	Apr 14	Accg, any major with 15 crds Accs
Upjohn Co, Ad Div	Apr 14	most Ag majors
U S Army Materiel Comm	Apr 14	Any major
*Bell of Pennsylvania	Apr 14	Summer, Women, Bus Ad, LA, Soc Sc, Math
Eastman Kodak	Apr 15	Accg, Bus Log, Bus Stal, Comp Sc, Econ, Fin, Math, Mkts, Mgmt
Leventhal, Krekstein, Horwath & Horwath	Apr 15	Accg, Accg Intern
*S D Leidesdorf	Apr 15	Accg
Penna State Civil Service Comm	Apr 15, 16	Most majors
Pomeroy's	Apr 15	Most majors
*Purdum & Jeschke	Apr 15	CE
Rohm & Haas	Apr 15	Accg
Sperry Systems Mgmt	Apr 15	AerospE, CompSc, EE, math, ME
Ernst & Ernst	Apr 16	Accg, any major with 12 crds Accs
Humble Oil	Apr 16, 17	Accg
New York Life	Apr 16	Ins, Real Estate
Onbrach	Apr 16, 17	Any major
Wyomissing Corp	Apr 16	Bus Ad, Chem, ChE, IE, LA, ME, Physics
Arthur Young	Apr 16	Accg, any major with 12 crds Accs
U S Dept of HEW, Food & Drug	Apr 16	Biol, Chem, ChE
Bucyrus-Erie Co	Apr 17	Accg, EE, ME, Mgmt
Columbia Gas	Apr 17	For, Geol, Home Ec, any Engr
Limbach Co	Apr 17	Arch E, CE, ME
Merck & Co	Apr 17	Comp Sc
Neisner Bros	Apr 17	Any major
Seldman & Seldman	Apr 17	Accg
L O Smoth	Apr 17	Accg, Bus Ad, Comp Sc, Econ, Fin, Math, Stat, most Ag major Incl Assoc despr.
Whiting-Turner Contracting	Apr 17	Arch E, CE
U S Dept of HEW, Audit Agency	Apr 17	Accg, any major with 15 crds Accs
U S General Services Adm	Apr 17	CE, EE, ME

EDUCATIONAL PLACEMENT

District	Location	Date
School District of Bristol Twp.	Bristol, Pa.	Apr 13
Los Angeles City School Districts	Los Angeles, Calif.	Apr 13
South Windsor Public Schools	Wapping, Connecticut	Apr 13
Pittsburgh Public Schools	Pittsburgh, Pa.	Apr 13, 14
Middletown Board of Education	Middletown, Connecticut	Apr 14
Montgomery County Public Schools	Rockville, Maryland	Apr 14
Upper Darby School District	Upper Darby, Pa.	Apr 14, 15, 16 (a.m.)
Newark School District	Newark, Delaware	Apr 15
Northern Tioga School District	Elkland, Pa.	Apr 15
Spring-Ford Area School District	Royersford, Pa.	Apr 16
Stamford Public Schools	Stamford, Connecticut	Apr 16
Board of Education of Carroll County	Westminster, Maryland	Apr 17
Central Dauphin School District	Harrisburg, Pa.	Apr 17
Montclair Public Schools	Montclair, New Jersey	Apr 17
Ramapo Central School District #1	Suffern, New York	Apr 17
Lake County Schools	Painesville, Ohio	Apr 17

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