LETTERS

Lunar Studies

Richard A. Kerr's carefully constructed article "Ten years later: Whence the moon?" (Research News, 20 July, p. 292) treats the scientific study of the moon—discovery, solution, and enigma—as a matter of geology and geochemistry. To a substantial degree, our present understanding of the moon arises as well from the extensive program of physical measurements that has always been an integral and substantial part of lunar science. In the space program, the work in lunar physics began even before Apollo, and included Explorer 35 as well as earlier attempts, although unsuccessful, extending back to the late 1950's (Pioneers 1 and 2 and Atlas-Able). In the Apollo program the physical exploration of the moon included automated observatories at fixed locations on the lunar surface (ALSEP), instruments carried by the astronauts, experiments set up by the astronauts and operated subsequently by remote control, the Apollo subsatellites, and, as part of the study of the moon's gravitational field, the Apollo command and service modules themselves. Since the emplacement of hardware and the acquisition of data depended upon the capabilities and expertise of the astronauts, lunar physics shared the manned experience with lunar geology. As with the geochemistry of the moon, the verdict is not in as to the meaning of all the information on the physics of the moon gathered in the course of this remarkable program. Thus, lunar physics shares some of the enigmas of lunar chemistry and geology, as it has shared in the discoveries. Clearly, any viable hypothesis of lunar origin and evolution must account for the relic magnetism of the moon. Even among those physical measurements which are not yet well understood conceptually, important connections have already been made with the other terrestrial planets. These include the absence of a so-far-detectable dipole moment, the seismicity of the crustal scattering layer, the structural support for the mascons, the heat flow from the interior, the rate of retreat of the moon from Earth, the interaction of solar wind with the moon and the associated downstream cavity and reimplantation of argon into lunar rocks by the associated electric field, and the gravitational field of the moon. The last of these has now provided meaningful constraints on the value of the mean moment of inertia, eagerly awaited by aficionados of the moon for some 200 years.

By way of emphasizing the interdisci-

plinary nature of lunar science, we note that the dating of samples places the remanent magnetic field in a chronological sequence, showing that the field was acquired very early (3.2 to 3.95 billion years ago) in lunar history. If the source of the background field is eventually found to have been the result of a regenerative dynamo operating within the moon, then, to a considerable degree, the very early thermal regime leading to the iron fractionation required for core formation, and the subsequent source of power for this dynamo, become fundamental problems in selenophysics and selenochemistry, jointly associated with the very young moon. Their answers would place serious constraints upon models of early lunar evolution and, in turn, of the evolution of the early solar system.

P. J. COLEMAN, JR.
Institute of Geophysics and Planetary Physics, University of California, Los Angeles 90024
M. FULLER
Department of Geological Sciences, University of California, Santa Barbara 93106
R. M. HOUSLEY
Rockwell International Science Center, Thousand Oaks, California 91360
G. V. LATHAM
Geophysics Laboratory, Marine Science Institute, University of Texas, Galveston 77550
S. K. RUNCORN
Lunar and Planetary Institute, School of Physics, University of Newcastle upon Tyne, Newcastle, United Kingdom
W. J. SJOGREN
Jet Propulsion Laboratory, Pasadena, Calfornia 91103
SEAN C. SOLOMON
Department of Earth and Planetary Sciences, Massachusetts Institute of Technology, Cambridge 02139
C. P. SONETT
Department of Planetary Sciences, Lunar and Planetary Laboratory, University of Arizona, Tucson 85721

Soviet Anti-Semitism: Reply by Pontryagin

My name was mentioned several times in the article "Anti-Semitism alleged in Soviet mathematics" published in *Science* (News and Comment, 15 Dec. 1978, p. 1167). Except for the unfounded statement that I am an anti-Semite based on the evidence of persons unknown to me, the concrete accusations consist of the following:

1) "Pontryagin represents the Soviet Union in the International Mathematical Union."

2) "He leads the editorial board that makes the final decision on every book in mathematics proposed for publication."

3) "He is editor of the prestigious journal *Matematicheski Sbornik*."

4) "He controls a voting bloc on the National Committee of Soviet Mathematicians and thereby determines the international contacts of Russian mathematicians."

5) "Two independent sources say that Soviet authorities were embarrassed by Pontryagin's denial of a visa to Margoulis, whose absence at the International Congress highlighted Pontryagin's policies."

6) "Pontryagin . . . was called to account for Margoulis' absence. Pontryagin angrily said that Margoulis could not be nominated for a Fields Medal because he was not a Russian nominee."

7) "The sources say he then got himself in deeper trouble by writing to every Soviet satellite, telling them they must support him in his threat."

8) " . . . Pontryagin invited a writer, Ivan Shetsov, . . . to speak at the prestigious Steklov Institute."

9) " . . . Soviet émigrés . . . report that since 1975 the number of published papers by Jewish authors in *Matematicheski Sbornik* has declined to zero."

10) "Particulary offensive to the Jewish mathematicians, sources say, is the habit of Pontryagin and his supporters of referring privately to this and several other journals as 'judenfrei'—the German expression for 'free of Jews.' "

I answer point by point:

1) I actually represented the Soviet Union on the executive committee of the International Mathematical Union from 1971 till 1978. But I have never done anything which could be considered as anti-Semitism. I believe my colleagues from the executive committees of 1971 to 1974 and 1975 to 1978 will confirm this.

2) I lead the mathematical group of one of the sections of the publishing house Nauka. This group inspects only a small part of the mathematical books printed in the Soviet Union and only prepares all necessary documentation for the mentioned section. I believe that this group has actually improved the publication activity, but it does not undertake any actions against Jews.

3, 9) I have actually been the editor-in-chief of the journal *Matematicheski Sbornik* since 1975. It may be seen from the table in *Science* that from 1970 till 1974 the number of Jewish papers in the journal constituted 36 percent of the total amount and from 1975 till 1978, 9 percent. I cannot consider that evidence of edito-