

The Camp David Asteroid

On Sept. 10, while President Carter, Israeli Prime Minister Begin and Egyptian President Sadat were at Camp David, Md., studying the future of the Middle East, astronomers on Palomar Mountain in California were studying the sky — a tenuous connection, except for an asteroid discovered on one of that night's photographic plates by Eleanor Helin of the California Institute of Technology. In commemoration of the Camp David peace talks, Helin has proposed that the object be officially named Ra-Shalom, for "the Egyptian sun god Ra, who symbolizes enlightenment and life, and Shalom, the traditional Hebrew greeting meaning, 'peace'." (It also turns out to be a play on the asteroid's identification number, 1978 RA, which embodies a two-letter code indicating the time of year and sequential position of the object's discovery.)

There the Camp David connection ends. But Ra-Shalom's distinctions do not.

Most such objects, technically referred to as "minor planets," circle the sun in a belt between the orbits of Mars and Jupiter. A few dozen have been identified on paths that take them inside Mars, but Ra-Shalom is one of only 26 known asteroids whose orbits extend inside the orbit of the earth, a class known (for the first of their kind to be discovered and named) as "Apollo asteroids."

Among those 26, furthermore, there are only three whose semi-major axes — essentially, the object's mean distance from the sun — are less than the earth's, and Ra-Shalom has the shortest semi-major axis of all. As a result, it takes less time to circle the sun than does any other known asteroid: A "year" on Ra-Shalom is only 0.759 earth-years long — about nine months. Because its orbit is so elongated (eccentricity 0.436), it does not spend all its time cruising just inside the earth's path. Instead, it ranges from just outside earth's orbit, about 180 million kilometers (1.195 astronomical units) from the sun, to within the orbit of Venus, only about 71 million km (.469 AU) from the sun.

The object was actually photographed in 1975 by astronomer Richard West of the European Southern Observatory in Chile, but those observations were too few to yield clear orbital measurements for an official "discovery." James G. Williams of Jet Propulsion Laboratory now has determined that the 1975 and 1978 observations are of the same object.

But there's still more to Ra-Shalom. Color measurements by Edward Bowell of Lowell Observatory in Arizona indicate that the object may be a carbonaceous chondrite (only the tentative second Apollo asteroid ever to be so identified), a



Asteroid Ra-Shalom, photographed by Hale Observatories' 46-cm Schmidt telescope (20-min. exposure).

class of meteorites rich in organic material and believed to represent some of the most primitive material in the solar system. Polarization measurements by Benjamin J. Zellner of the University of Arizona are consistent with a similar conclusion, in which case its diameter is about 3 to 4 km, and Bowell has calculated from the preliminary observations that it may rotate once on its axis about every 12 hours.

The carbonaceous nature of the object is not completely certain, however. The low infrared emissions recorded by the University of Arizona's Larry Lebofsky would normally be interpreted as indicat-

ing a smaller diameter and a noncarbonaceous composition. The same problem arose during 1976 studies of the asteroid Petulia, and in that case there were radar data confirming the larger size. One way to reconcile the matter would be to assume a hard, rocky surface rather than the fine rubble typical of most asteroids, and Lebofsky suggests that the low gravity of carbonaceous objects in this size range may indeed let their loose surface material escape into space. Or if the color measurements are slightly off, says Bowell (who made them), perhaps Ra-Shalom is a different class, such as a metallic type M. □

Cancer and the workplace: 'A disaster'

Between 20 percent and 40 percent of all cancers that can be expected to occur during the next several decades may be caused by exposure to various chemicals in the workplace, according to a study released by the Department of Health, Education and Welfare. The report concludes that previous studies, which put the figure at closer to 5 percent, were inadequate because they generally overlooked the multiple causes of cancer and the time lag between exposure and illness.

Much of the impetus for HEW's revised estimate comes from recent studies showing a much greater incidence of cancer among asbestos workers than had previously been expected. Since the beginning of the Second World War, about 4 million workers have received "heavy exposure" to asbestos, and of those that have already died, between 35 and 44 percent have died of cancer. Only 8 or 9 percent would ordinarily have been expected to die from the particular kinds of cancer afflicting these workers.

These mortality figures are only now becoming evident because of the latency period of perhaps 30 years that can intervene between initial exposure to asbestos

and the development of asbestos-related cancer. Generally, the workers in wartime shipyards were young men who only now are reaching the age when cancer becomes prevalent. The conclusion is that as other hazardous chemicals have become common since the end of the war, another generation of workers has inadvertently been exposed and that their cancers will begin to show up in years to come.

Concludes the report: "Perhaps the most important lesson to be learned from the asbestos story is that a major public health disaster can develop while its early manifestations are lost by being attributed to other factors. This would support the argument that the earlier estimates for industrially related cancers may be deceptively low — having left out such information as the asbestos situation has now brought to our attention."

The report was prepared by a team of 10 scientists, representing the National Cancer Institute, the National Institute of Environmental Health Sciences and the National Institute for Occupational Safety and Health.

Out of 400,000 to 500,000 cancer deaths each year, the report estimates that be-