

## **New major theory on comets and process of creation announced by Dr. Hannes Alfvén, Dr. D. Asoka Mendis developed theory**

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Those spectacular space-voyagers known as comets, which now and again blaze across the night sky to thrill earthbound observers, may soon give mankind something even more spectacular than a show. According to scientists at the University of California at San Diego, they may in the near future help to unlock the mysteries of how earth and the solar system were created.

A major new theory regarding comets and the process of creation was announced yesterday by Dr. Hannes Alfvén, Nobel laureate in physics and UCSD professor of applied physics in residence, and Dr. Gustaf Arrhenius, professor of marine geology at UCSD's Scripps Institution of Oceanography. They reported that one of their colleagues at UCSD, Dr. D. Asoka Mendis has developed a theory which sees comets as forming, disintegrating and regenerating continuously.

"Thus, in comets, we can see the process of creation going on, right now, before our eyes," Alfvén said. "It is a process basically similar to that which brought earth and the solar system into being some four or five billion years ago."

Until now, the accepted view has been that comets came into being at the same time as all other matter in the solar system, some 4.5 billion years ago. Mendis' theory upsets this view, holding instead that comets are dying and being born or re-born now.

Mendis, an assistant research physicist in the Department of Applied Physics and Information Science at UCSD, said there appears to be a marked relationship between the orbits of comets and meteor showers.

"These showers, which often can be seen on clear nights, contain some of the 'falling stars' which have fascinated man since the beginning of history," he noted. "The 'stars' are, in reality, meteors of varying sizes, though most of them are no larger than a grain of sand."

Orbits of the meteor "streams" which, on intersecting earth's own orbit, provide the raw materials for these meteor showers, are known to be very similar to the orbits of certain comets, according to Mendis.

"There is now reason to believe that comets may, at one stage, dissolve altogether into an immense number of small meteors, which become the meteor streams. Subsequently, these meteor streams pick up new materials from space, and possibly regroup, to form a new comet.

"Thus we have a kind of celestial version of the hen-egg riddle. We don't know which came first, the hen or the egg. But we have reason to believe that each derives from the other in a continuous cycle of birth, degeneration and regeneration. Like the hen, which requires nourishment, the comet requires new material, picked up from space, for its formation."

Spacecraft observations of these cyclic changes, and chemical analyses by instruments mounted on spacecraft, would provide man with immensely valuable data on the creative process, according to Alfvén and Mendis.

The comets, and those other primitive space-voyagers - the asteroids - are uniquely endowed to give man keys to secrets which may never be unlocked by studies of the earth, the moon, or the other planets.

"It can be stated as a general rule," said Alfvén, "that the smaller the body, the farther back in time the study of it will take us. Studies of large bodies like the planets, while fascinating, yield only limited value in terms of studies of the origin of the solar system."

Mendis noted that comets "may well be constructed of the same primordial 'building blocks' out of which the entire solar system was created."

"And, in comets, these 'building blocks' may have come forward in the same state in which they were formed, several billion years ago."

Earth and the other planets, said Alfvén, have lost most of the record of their early formative process. These have been obliterated by such geological forces as heat and gravity, and by meteoric impacts and weather. Over the eons, these forces have worn away all surface evidence. But the asteroids and comets probably voyage through space, now as in eons past, undisturbed and unaltered by such forces. Of all celestial bodies, the UCSD scientists believe, the comets and asteroids are probably the most primitive available for study.

Alfvén is one of the leading space scientists who are urging the National Aeronautics and Space Administration (NASA) to send unmanned missions to comets and asteroids before the end of the 1970's to seek clues to the processes of creation. NASA has expressed strong interest in such missions, and has named a special group, the Comet and Asteroid Mission Study Panel, to examine the possibilities and make recommendations. Alfvén and Arrhenius are among the 10 distinguished investigators serving on this panel.

One strong argument favoring missions to comets, the panel report noted, is the possibility that comets even harbor very primitive forms of live organisms," or at least very complex molecules of the kind which were essential to the start of life on earth.

"In many ways comets and some types of asteroids would seem to offer...better possibilities (than the planet Mars) for sustaining life, as they are in a more open interchange with possible life reservoirs than is Mars," the report said. "Cometary surface material, which never arrives on earth, contains molecules capable of yielding fragments such as ammonia, carbon monoxide and methane. Present evidence points at the comet-asteroid complex as an object for life research which should be at least as promising, if not more so, than the surface of Mars or the atmospheres of Jupiter or Venus ... In comets, organic molecules are probably omnipresent with a potential biological interest."

Commenting on the panel's report, Homer E. Newell, NASA's associate administrator, said:

"These future missions to the comets and asteroids are extremely challenging. They are bound to be most fruitful and revealing. Moreover, we know that they can be done. It remains only to do them."

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