space sciences

A spun-down sun

Examination of the thermal history of some meteorites and observations of the class of stars known as T-Tauri have led three scientists to propose that at about 4.6 billion years ago, shortly after the birth of the solar system, the sun was a T-Tauri star spinning 200 times faster than it is today. They believe that since then it has been gradually slowed down by magnetic braking.

According to Charles P. Sonett and David S. Colburn of NASA's Ames Research Center and Kenneth Schwartz of American Nucleonics Corp., this high rotation rate (believed to be characteristic of most newly formed stars) and other mechanisms typical of these stars could have forced a huge flow of electrified gases out from the sun. This flow could have completely melted Mercury, portions of the earth's moon and small bodies (such as asteroids) with diameters of about 160 kilometers or less. The melting would occur as the result of heating by electrical induction on a large scale. As the currents flowed through planets, electrical resistance in the planets would have produced continuous heating.

This theory could explain why some meteorites—the basaltic achondrites and iron-nickel meteorites—appear to have been melted 4.6 billion years ago. At that time, some of these meteorites were part of larger planetary bodies (with diameters 160 kilometers or less). "The only theory that we have with conviction," says Sonett, "is that this thermal process was caused by electrical heating mechanism."

Many scientists believe that T-Tauri stars are examples of the early development of stars. These stars are losing mass rapidly and are shrouded in clouds of gas and dust. Clouds such as those if they were around the sun would have retained the early sun's heat and thus heated up the planetary bodies, improving their electrical conductivity.

Isolating the magic component

Although apparent uranium-lead ages of the lunar soil cover a range of from 4.2 to 4.9 billion years, there appears to be what some scientists term a "magic component" in the soil that always has a date of 4.5 billion years.

Now Mitsonubu Tatsumoto and Bruce Doe of the U.S. Geological Survey in Denver think they may have a clue to what that component is.

They have melted three Apollo 12 and 14 soil samples and volatilized the lead at temperatures from 1,000 to 1,350 degrees C. The lead that boils off at those temperatures always gives a date of 4.5 billion years. They believe this is indicative of a highly refractory component (one capable of enduring high temperatures) in the soil. The ratios of lead 208 to lead 206 in the material suggest that it came from a source that had a thorium-uranium ratio of 2 to 3. (Thorium 232 has a half-life of 14 billion years and decays to form lead 208; uranium 238 has a half-life of 4.5 billion years and decays to form lead 206.)

Only one mineral from the moon appears to have these thorium-uranium ratios—tranquillityite (a zirconium-titantium mineral). If this is the source of the lead, they may have found a primordial mineral—or at least, says Doe, one that has perservered in the soil for 4.5 billion years.

medical sciences

Prostaglandins and arthritis

Prostaglandins, chemical compounds derived from fatty acids, are found in various tissues and organs. Although their natural physiological purposes are not proven, various types of prostaglandins show a variety of therapeutic promises—as an abortive, as a post-coital contraceptive (SN: 10/10/70, p. 306). They have also been shown to have an effect on asthma, emphysema and high blood pressure. There is now increasing evidence that the class of prostaglandins known as the PGE's might help arthritis.

Two years ago R. L. Aspinall and P. S. Cammarata of the G. D. Searle Co. in Chicago showed that the prostaglandin PGE_2 could modify laboratory-induced arthritic inflammation in the paws of rats. Now Robert Zurier and Franco Quagliata of the Rheumatic Diseases Study Group, New York University School of Medicine, have found that the prostaglandin PGE_1 can not only suppress but also prevent laboratory-induced arthritis in rats. Severe arthritis developed in control rats not given this prostaglandin.

There has been previous concern that prostaglandins' adverse effects on the central nervous system and heart might preclude using them for treating patients with arthritis. Zurier and Quagliata report in the Dec. 3 NATURE, however, that the most pronounced side effects they noticed in their study were drowsiness and diarrhea.

Aspirin poisoning and children

Aspirin is the leading cause of poisoning among young children, according to the National Clearinghouse for Poison Control Centers. Thus Robert Scherz of the University of Washington School of Medicine made a study from 1967 to 1971 of the effects of safety packaging on aspirin poisoning in children age five and under.

The youngsters were tested at home or in nursery school. Each was given three aspirin containers and asked to open them. Scherz reports, in the Dec. 9 NEW ENGLAND JOURNAL OF MEDICINE, that 97 out of 100 children were able to open the first bottle, with a plastic friction cap, or snap-top, closure. They bit off the cap with their teeth. Only 17 children were able to open the second container, a plastic vial with a 34-millimeter plastic press-lug cap. None were able to open the third container, a bottle with a 23-millimeter plastic press-lug, or screw-lock, top.

Scherz also found that most children treated for accidental aspirin ingestion at a Tacoma, Wash., hospital had gotten aspirin out of the snap-top kind of bottle, and some out of the vial with a press-lug cap. None of the victims had opened a screw-lock closure.

Quick-birth hormone and the fetus

Oxytocin has been traditionally called the "quick-birth" hormone. It is believed to be released by the mother during delivery, to stimulate the uterus. Now C. N. Hudson and his obstetrics-pathology team at St. Bartholomew's Hospital Medical School in London have found that fetal blood in the umbilical cord contains high levels of oxytocin. Such levels, the authors write in the Dec. 10 NATURE, suggest that the fetus also produces oxytocin during birth, perhaps to meet the stress of labor.