

Aluminum emerges as early timekeeper

It isn't easy trying to determine when objects formed in the early solar system. What planetary scientists need is an accurate timekeeper, and a new study supports the notion that a short-lived isotope of aluminum fills the bill.

By analyzing some of the oldest known bits of rock, the scientists say, they have found strong evidence that aluminum-26 was widespread in the early solar system. The isotope's ubiquity, together with its half-life of only 730,000 years, gives researchers a means of clocking key events during the first few million years of the solar system's existence.

Because earlier objects would capture a higher proportion of this isotope, its relative abundance in asteroids and other rocky bodies provides a clue to when they were formed. Some of these bodies provided the building blocks for planets.

Scientists have known since the 1970s that significant amounts of aluminum-26 resided in some meteorites that have fallen to Earth. However, these ancient rocks, called carbonaceous chondrites, are rare, so astronomers had no guarantee that this aluminum isotope was widely distributed and bore witness to events throughout the newborn solar system.

In the new study, Glenn J. MacPherson of the National Museum of Natural History in Washington, D.C., and his colleagues measured the amount of magnesium-26—the isotope produced when aluminum-26 decays—in a far more common class of meteorites, the ordinary chondrites. They deduced that, early in the solar system's existence, the ratio of aluminum-26 to its stable sister isotope, aluminum-27, had been the same in ordinary chondrites as in the much rarer carbonaceous chondrites.

Their results indicate that aluminum-26 was common throughout the inner solar system in its early days, the team reports in the Aug. 9 *SCIENCE*.

The study "does seem to suggest that aluminum-26 was widespread," says Conel M. O'D. Alexander of the Carnegie Institution of Washington (D.C.).

In the ordinary chondrites, MacPherson's team studied both tiny, gray-white inclusions and small, silicate droplets known as chondrules. They found that a higher proportion of aluminum-26 appeared in the inclusions than in the chondrules. Inclusions and chondrules formed independently of meteorites and were later incorporated into them.

These findings suggest that chondrules formed from 2 million to 5 million years after inclusions appeared. This, in turn, indicates that the swirling disk of gas and dust that orbited the infant sun and provided the raw material for asteroids and planets might have lasted for at least 5 million years. Thus, some asteroids, and perhaps planets, may not have formed until 5 million years after the sun's birth.

One perplexing aspect of this scenario, notes Alexander, is the proposed formation of inclusions and the earliest chondrules about 3 million years before asteroids.

It's unclear, he notes, how these tiny amalgams of solid material could have remained within an orbiting disk of material for so long without getting dragged into the sun.

A chondrule in the Chainpur meteorite. Dark purple areas are glass in which the scientists deduced the early presence of aluminum-26.



MacPherson/SCIENCE

Bruce Bower reports from Toronto at the annual meeting of the American Psychological Association

New pitch for placebo power

Much fanfare has greeted drugs touted as balms for depression, such as fluoxetine (Prozac). These medications indeed elicit chemical changes in the brain linked to mood improvements, but the lion's share of their effectiveness stems from the placebo effect, according to a statistical analysis of 39 studies of treatments for depression.

"How people think about an antidepressant drug and its effect on how they feel may influence improvement more powerfully than the chemical substance itself," contends Guy Sapirstein of Westwood Lodge Hospital in Westwood, Mass.

Sapirstein and Irving Kirsch of the University of Connecticut in Storrs compiled data from published studies consisting of 3,252 moderately to severely depressed individuals who had randomly received antidepressants (including Prozac or any of several related drugs), placebo pills, psychotherapy, or no treatment. Trial periods lasted from 2 to 15 weeks.

The researchers then calculated the extent to which each treatment, on average, yielded brighter moods.

From a comparison of these estimates, Sapirstein and Kirsch assert that the placebo effect—a measure of the psychological impact of being given a medication, even if it contains no active substances—plays a dominant role in sparking favorable responses to antidepressants. The placebo effect is twice as strong as either the pharmacological effects of antidepressants or "nonspecific" factors, such as the passage of time, they maintain.

This conclusion gains force from some prior evidence (*SN*: 10/10/92, p. 231), but it remains tentative until issues such as differences between placebo and no treatment effects are better understood, the researchers hold. Still, they say that available data probably underestimate the placebo effect.

For instance, antidepressant researchers typically do a pretest to weed out volunteers who respond strongly to a single placebo pill. Moreover, an unknown number of studies in which antidepressants fail to outperform placebos are either not submitted or not accepted for publication, Sapirstein adds.

Introspection, for better or worse

Go ahead, evaluate your life and think about what you want to achieve. But remember: Contemplate, don't ruminate.

These two mental processes represent separate but unequal ways to engage in introspection, the examination of one's own thoughts and feelings, according to a study conducted by C. Randall Colvin and Dawne S. Vogt, both of Northeastern University in Boston, and Jack Block of the University of California, Berkeley.

Self-contemplation entails a relatively accurate analysis of previous events, current concerns, and future desires, the researchers argue. Over time, this is associated with greater self-knowledge and emotional health. In contrast, rumination consists of an intense focus on real or imagined negative events, usually considered to be out of one's control, which in turn seems to amplify anxiety, depression, and social unease.

Colvin's group analyzed self-contemplation and rumination as reported by 51 women and 49 men at both ages 18 and 23. Trained observers rated participants on a set of 100 personality and social characteristics at those ages.

Self-reports and observer ratings held constant over the course of the study. Men and women who favored self-contemplation were described as compassionate, dependable, productive, and insightful about themselves; those who ruminated often came across as fearful, moody, nervous, defensive, and self-pitying.

Self-contemplation ushers in a flair for flexibly adjusting to difficult situations, Colvin theorizes, whereas rumination goes hand in hand with inflexible, maladaptive responses to stress.