space sciences

Region of young volcanics in lunar highlands

A. F. G. Goetz of the Jet Propulsion Laboratory in Pasadena and J. W. Head of Bellcomm, Inc., in Washington have pinpointed a unique region in the moon's Central Highlands that could be the result of volcanism as recently as 200 million years ago. Goetz presented the interpretation of the site from both lunar orbiter and ground-based data at the 2nd annual meeting of the American Astronomical Society's Division of Planetary Sciences in Hawaii, March 20 to 24.

The area has one of the highest albedos on the moon and is located about 50 kilometers southeast of the Apollo 16 landing site (see p. 235). Goetz and Head believe it was formed by an endogenic process. It is thought to be a young pyroclastic deposit mantling the older volcanic units of the Descartes formation.

Accretion temperatures of inner solar system

Scientists use certain volatile metals as "cosmo-thermometers" to establish the accretion temperature of solid bodies from the solar nebula. According to Edward Anders, J. C. Laul, R. Ganapathy and J. W. Morgan of the Enrico Fermi Institute and the University of Chicago, seven meteorite classes, the earth and the moon consistently give accretion temperatures of 420 to 500 degrees K., with a possible systematic error of plus or minus 50 degrees K. owing to uncertainties in pressure.

They conclude that if these meteorites come from the asteriod belt, then temperatures in the inner solar nebula must have been nearly independent of distance from the sun.

Predicting properties of planets and satellites

John S. Lewis of the Massachusetts Institute of Technology has been exploring the chemical process by which planets formed out of gas of the same composition of the sun. Using a model developed by A. G. W. Cameron for the temperatures of the solar dust right after the collapse of the nebula, he has developed computational techniques for predicting the composition of the planets. The model has already predicted the correct densities for the inner planets. The only thing that varies from planet to planet is the temperature at formation. For the model he assumes the planets were formed at the same distances from the sun as they are now.

In his model, Mercury should have accreted at high temperatures and should be rich in iron. The silicates would not have completely condensed from the gas. Venus would retain everything except the sulfur. The earth would have a sulfur-rich iron core. Potassium would also end up in the core. The model for the Martian core agrees with a recent model by Don Anderson of the California Institute of Technology for a Martian core devoid of metallic iron. It would be a small iron-sulfide core with a denser mantle because of the higher iron oxide content.

He has also applied the model to outer-planet satellites. The satellites of Jupiter would have formed at temperatures of 130 degrees below zero C. Rocks and ice would have condensed out together to form the planet. The silicon-to-oxygen ratios would be the same as that of the sun (SN: 6/19/71, p. 422). The satellites of Saturn would be formed at temperatures low enough to retain a very stable solid hydrate of methane.

behavioral sciences

Alcohol on the brain

The exact mechanisms of alcohol's chemical reactions in the brain are unknown, but Robert D. Meyers at Purdue University believes they may be the basis for alcohol addiction. Small amounts of ethyl alcohol were pumped directly into the cerebral ventricles of rats every 15 minutes. The rats were given a choice between water and alcohol. In a few days, even the rats that would not voluntarily drink alcohol had become alcohol seekers.

Meyers believes alcohol affects the brain's chemical pathways of electrical transmission and triggers an unknown mechanism. Involved in this mechanism may be serotonin (a constituent of blood platelets). Serotonin is known to be a constrictor of blood vessels, but Meyers feels its function in the brain is different. It is possibly one of the brain's transmitter substances. He attempted to lower the serotonin levels in the brains of the alcohol addicted rats with oral doses of p-chlorophenylalanine (p-CPA). The rat's consumption of alcohol dropped immediately.

End of the line

Frustration often heightens the probability of aggressive behavior. R. Bob Smith III of the State University of New York at Albany tested this hypothesis on 47 students. They were assigned tasks that could not be completed in the allowed three minutes. After two attempts, and the onset of frustration, they were given the ability to threaten a simulated target within the context of a game. As predicted, the frustrated subjects threatened and followed through with threats more often than did nonfrustrated subjects.

In an effort to increase production at an automobile plant, workers were asked to do more assembly line work in less time. "At the same time," says New York management consultant Roy W. Walters, "there were acts of sabotage and vandalism that grew out of worker frustration." This, he says, signals the end of the assembly line as we know it. Its boring, dehumanizing aspects must be replaced by less oppressive work situations. He suggests a team-approach method in which semi-autonomous groups of workers assemble and install complete units themselves.

Computerized suicide

An Index of Potential Suicide (IPS) has been developed and is in use at the Veterans Administration Hospital in Durham, N.C. All patients who enter psychiatric service there are interviewed and complete a data sheet. In addition, 19 other variables are counted. For example, suicide is seasonal (March, April and May have the highest suicide rates). If a patient enters during one of these months he receives one point on a variable score. Age, sex, race, education, drug use, past history, marital and job status are scored similarly and fed into a computer. A suicide potential profile comes out. William W. K. Zung of Duke University developed the suicide predictor. He says, "This type of approach represents the science of suicide prediction. The art of suicide prevention, however, is like the art of medicine—it is something that cannot be put on paper and must be practiced in a doctor-patient relationship."