

physical sciences

A new solar cycle begins

Down near the sun's south pole evidence of the beginning of a new 11-year cycle of solar activity has been seen. The evidence consists of new sunspots and is reported in the Dec. 1 *ASTROPHYSICAL JOURNAL LETTERS* by Bruce A. Gillespie, Jack W. Harvey and William C. Livingston of Kitt Peak National Observatory and Karen Harvey of the Lockheed Solar Observatory in Burbank, Calif. The observations were done with Kitt Peak's McMath Solar Telescope.

The new cycle will be the 21st since astronomers began recording these things in 1755. As usual, the first evidence for the new cycle appears about a year before the minimum activity point of the previous cycle, which is expected in 1975. Activity belonging to the new cycle begins to appear in the polar regions of the sun, while that of the dying old cycle draws near the solar equator. The cycles thus overlap in time but not in space. The peak of the new cycle is expected about 1980.

Alcator at 100,000 gauss

Alcator, the thermonuclear fusion machine at the Massachusetts Institute of Technology, has achieved a magnetic field of 100,000 gauss according to an announcement by the institute. Alcator is a device of the class called tokamak, in which the magnetic field is used to confine a plasma of ions and electrons in a toroidal space in the hope of inducing energy-yielding fusions among the nuclei of the plasma.

The field of 100,000 gauss, a very high field for any kind of magnetic application, is the highest ever achieved in a fusion device. The previous record was 60,000 gauss, which was reached in a French experiment at Fontenay-aux-Roses near Paris.

It is not expected that a field of such great strength will be needed for the operation of a fusion reactor, if and when one comes to be. Fifty thousand gauss is believed sufficient. The higher fields are being studied to gain an understanding of how plasma confinement varies with increasing magnetic field, information that will be important for the design of eventual fusion reactors. The record field was produced by cooling Alcator's electromagnets to a temperature of 77 degrees K., lessening their electrical resistance and allowing them to carry higher currents and produce the strong field.

A europium gas laser

Efficient and powerful lasers that emit frequencies in the visible part of the spectrum have developed from the use of metal vapors as the active material. Yet, as P. A. Bokhan, V. M. Klimkim and V. E. Prokop'ev of the Institute of Atmospheric Physics of the Siberian Division of the USSR Academy of Sciences, point out in *JETP LETTERS* (Vol. 18, No. 2), there remains quite a number of metals whose possible lasing properties have not been investigated, especially the rare earths.

To fill some of the gaps the three Siberian physicists have been experimenting with the lasing possibilities of rare earths. So far they have succeeded in producing a laser that uses ionized europium vapor. The europium is mixed with helium and energized by an electrical discharge. The lasing comes in pulses of between 3 and 150 microseconds with a maximum power of 50 watts. Radiation at a wavelength of 1.361 microns appears at low helium pressure. At higher helium pressures the spectral lines at 1.002 microns and at 1.017 microns also appear.

behavioral sciences

An antique tool kit

Crudely chipped pieces of volcanic rock have been identified as the earliest "tool kit" used by humans. Anthropologist Glynn Isaac of the University of California in Berkeley has found nearly 600 such tools during four years of field work in Kenya. Last week at the second annual Louis Leakey Memorial Symposium in San Francisco, Isaac explained that the stones, found in patches among groups of broken animal bones, have been dated at 2.5 million years of age.

Isaac, co-leader with Richard Leakey of the Kenya expedition, says the "simple stone implements which took about five or six blows to produce" are very important because they provide information about the origins and life-styles of early humans. Finding the stones among broken bones, for instance, indicates that the primitive tool users were meat eaters who liked to establish central bases of operation and food-sharing collectives. Gazelle, waterbuck, pig, porcupine and hippopotamus may have been part of the meat diet. Bones of all of these animals were found with the stones. Although it is difficult to determine the function of the tools with certainty, Isaac noted that humans have always had difficulties in breaking up animal carcasses without implements.

In addition to the 2.5 million-year-old tools, Isaac has unearthed thousands of tools estimated to be 1.3 million years old. The later implements varied considerably from the early tools in numbers as well as sophistication. Comparing them to the older ones yields more information. The later tools, says Isaac, were made with a definite purpose in mind and took 15 or 20 blows to produce. They also included much larger specimens, which indicate that they were made by a "muscular, beefy character." During the one million years separating the early site from the later one, Isaac says, our ancestors obviously "became quite slaphappy about making tools."

Suicide: An occupational hazard?

Suicide rates are highest among job holders who have the least opportunity for significant social contact, says Leonard L. Linden of the University of Georgia's Institute for Behavioral Research. He examined national death rates and found that professionals with opportunity for deep, meaningful relationships in the course of their work, such as doctors and lawyers, were less suicide prone than others, such as farmers, who lacked these social opportunities and had the highest suicide rates. "The most important factor," he stresses, "is not occupation per se, but how the work affects individual social contacts."

Tackling football fever

Just in time for the Super Bowl, the American Medical Association has published *Comments in Sports Medicine*. The volume, edited by Timothy T. Craig, warns coaches to take it easy on their tears during halftime. Stimulating an athlete, it says, is one thing, but when the excitement reaches an anxiety level, player performance is likely to be adversely affected. The event itself and the spectators will usually create enough psychological arousal for any athlete, says the AMA.

In addition to supplying psychological, nutritional and physical fitness facts for coaches and players, the book urges that sports arenas have facilities available to cope with the spectator who becomes overexcited and suffers a heart attack.