

AAAS notes

Items on this page and the following one were gathered by Science News reporters at the annual meeting of the American Association for the Advancement of Science in New York.

ARCHAEOLOGY

Obsidian Dating Finds Earlier Mexicans

A recently developed archaeological dating method reveals that a primitive culture flourished in parts of Mexico about 2,800 years earlier than had previously been believed, according to an anthropologist from the Pennsylvania State University.

Primitive people thrived in the Teotihuacan section of the Valley of Mexico as far back as 5000 B.C., Dr. Joseph Michels reports. Previous finds of pottery and buildings he said, had suggested that the valley was not extensively occupied until about 1500 B.C.

Dr. Michels used a technique called obsidian hydration dating, based on the fact that obsidian glass absorbs water into its surface at a definite rate. The age of the glass—usually a translucent green or black color—can be determined by measuring its hydration rim; that is, the extent to which water has penetrated the obsidian. Obsidian is useful in dating Mexican materials because it was commonly used for tools, weapons, adornments and religious artifacts by early men of the region.

First studied in 1958 by scientists of the U.S. Geological Survey, obsidian dating has several advantages over other types, Dr. Michels said. It can cost less than one-eighth as much as commercially processed radio-carbon dating, he said. Also, it is so fast that in one year Dr. Michels was able to date 1,600 different samples spanning more than 5,000 years. The Teotihuacan findings are not the oldest in Mexico; recent findings in other parts of the country have been dated as far back as 40,000 years.

ECOLOGY

Entire Islands Fumigated

Huge nylon tents covering entire islands have been used by two Harvard zoologists to kill all animal life on the islands in a study of re-colonization by insects and other small invertebrates.

The sites selected have included half a dozen small mangrove islands in the Florida Keys, 30 to 50 feet in diameter and up to 500 yards from the nearest shoreline. Dr. Edward O. Wilson and Daniel Simberloff would cover an island with one of the tents, then fumigate it with methyl bromide in sufficient concentration to kill all land invertebrates but not the mangrove trees themselves.

In five of the first six islands, Dr. Wilson reports, the original number of species before fumigation (between 20 and 28) was regained in 300 days or less and is currently holding at about this level. This, he said, is the first direct evidence of a species equilibrium in a fauna of this size. On the other hand, the composition of the 20-plus species differs widely from the original one, and extinctions occur at a rate as high as one species every 10 days. This extinction rate was predicted theoretically before the tenting technique was used, Dr. Wilson said.

OCEANOLOGY

Laws Tempting Aquaculture Needed

Legal changes are vitally necessary to make it more profitable for private industry to raise food in the sea, according to the ranking biologist at the Woods Hole Oceanographic Institution.

Because of the lack of such laws, and because of "the traditional attitude, almost unique to the United States, that fishing grounds are in the public domain," the U.S. lags far behind the rest of the world in aquaculture, reports John H. Ryther, chairman of the Woods Hole biology department. Less than five percent of U.S. oyster grounds, for example, are privately owned, he points out, yet more oysters are harvested from those 165,000 private acres than from the more than 4 million acres of public grounds.

Given the proper incentive, Ryther says, the 1.25 million acres of mangrove swamp which have been identified by the Philippine Government as available for pond construction could produce an annual crop of milkfish nearly equivalent to the total fish landings of the U.S.

An area the size of Long Island Sound, if devoted to the raft culture of shellfish, could produce an annual crop of mussel meat equivalent to the commercial fish landings of the entire world, he declares.

MOLECULAR EVOLUTION

Self-Ordering Proteins

Proteins with an ability to order their own formation—requiring the intervention of neither nucleic acids nor enzymes for their synthesis—could have preceded the first living molecule.

Under contemporary conditions, nucleic acids tell amino acid molecules how to hook up with one another to make a specific protein. But that may not have always been true, Drs. Angus Wood and Sidney W. Fox of the University of Miami's Institute of Molecular Evolution report. It is possible that some matter had the properties for assembling itself.

Some pre-life molecules may have been able to produce compounds from simple starting materials plus light energy, as in plants, the researchers believe. Self-assembly, they say, may be the key to narrowing down the number of experimental possibilities in retracing the path from elementary particles to man.

The hypothesis on the self-assembly of matter prior to the first living organisms is founded on recent research showing that proteinoids—protein-like polymers obtained by heating amino acid molecules—have weak enzyme-like catalytic properties and that a yellow pigment occurring when amino acids are heated and broken down into many molecules, binds to the proteinoid. This pigment, Drs. Wood and Fox find, photosynthesizes the loss of carbon dioxide from several biochemically important molecules when the proteinoid-pigment system is irradiated with visible light.

13 january 1968/vol. 93/science news/35

AAAS notes *(Continued)*

ASTRONOMY

Cosmic Rays, Magnetic Fields Aid Star Formation

The collapse of interstellar gas clouds leading to the formation of stars is due, at least in this galaxy, not only to the gravitational fields of the clouds themselves, but to the actions of magnetic fields and cosmic rays, an astrophysicist declared.

Previous theories of star formation have centered on the idea that the clouds compressed themselves to stellar density almost entirely due to their own gravitation, says Dr. Eugene N. Parker of the University of Chicago's Institute for Nuclear Studies. Actually, Parker believes, without the magnetic fields and cosmic rays, "there would be no collapse in the gas to form new stars. Self-gravitation is just not enough."

In the disk-shaped galaxy which contains the earth, both the magnetic fields and cosmic rays tend to expand, but are held in check by interstellar gas. Because the galactic magnetic field is unstable, Parker says, it bulges out into irregular areas on the faces of the galactic disk. This leaves "low" areas where interstellar gas can concentrate into clumps that are dense enough for self-gravitation to take over. The cosmic rays, following the magnetic field lines, intensify this effect by creating turbulence that increases the bulging.

URBAN PLANNING

Experimental Cities: No Noise, Cars, Pollution

Urban dispersal instead of urban renewal is the answer to the problem of overcrowded cities according to Dr. Athelstan Spilhaus, director of Philadelphia's Franklin Institute. Dr. Spilhaus calls for the development of new cities to accommodate about 250,000 persons apiece at sites about 100 miles from existing urban centers.

The Departments of Commerce, Housing and Urban Development, and Health, Education, and Welfare, with private sources, have invested \$300,000 in the initial planning of such cities, which would cost an estimated \$4 billion to construct. The cities which Dr. Spilhaus envisions would not be self-contained, as are some new towns now planned or built, but would partially depend on the centers they are near.

Fume-producing traffic would be kept underground, a venting system would carry smoke and other air pollutants to a scrubbing plant to purify the air. Sewage and other waste materials would be processed in semiliquid form with at least partial recovery of reusable matter.

Dr. Spilhaus likened the model cities, which will not be developed for at least 10 years, to great hotel complexes that are really "infant cities." To avoid urban sprawl, the new cities, like medieval towns, would be compact, with miles of countryside and farmland surrounding them.

PSYCHOCHEMISTRY

Brain Injections Enhance Memory

An injection of brain extract from an appropriately trained animal will act as a memory booster in the recipient animal, enabling it to remember its infantile experiences.

On the basis of on-going research on memory in rats,

three University of California scientists conclude that an early traumatic experience results in a change in some chemical substance in the brain. By giving brain chemicals from a rat that has been subjected to a painful experience to another rat that once had but no longer remembers the same painful experience, the scientists believe they can revive the memory in the latter animal.

In a series of seven experiments, Drs. David Kresch and Edward L. Bennett, with Peter Ragan, trained weanling rats to associate a black box with a traumatic episode of electric shocks and a white box with quiet rest. When given a choice, the weanlings chose to enter the white rather than black chamber. A month later, rats that had not received injections of brain extract from animals which had had the same painful experience showed no particular inclination to shun the black box but rats that had received such injections clearly preferred the white box.

Although their tests have been limited so far to reviving traumatic infantile experiences, the researchers suggest there is no theoretical reason why other stored memories cannot be similarly affected by chemical substances extracted from the brain. Before pursuing this, however, they plan experiments to identify the chemicals that act as memory boosters.

PATHOLOGY

Cigarette Smoke Alters DNA

The relative effectiveness of cigarette filters can be evaluated by a highly sensitive test that measures the DNA (deoxyribonucleic acid) content of cells in the mouth.

In experiments involving more than 1,000 individuals, Dr. Daniel Roth of New York University Medical Center and co-workers show that heavy smokers have an abnormally high DNA content in the cells of their mouths, indicating that cigarette smoke affects cellular metabolism. While not suggesting that smoking is in itself a cause of oral cancer, Dr. Roth states it is certainly something that predisposes an individual to cancer.

Comparative studies of DNA levels in non-smoking controls and heavy smokers (a pack and a half or more a day) who had abstained for at least six months reveals that when cigarette smoking stops, things can return to normal. "During the course of the six months, excess levels of DNA in cells gradually tapers off," Dr. Roth says. Measurements on subjects who smoked a pack or less a day resulted in no observable increase in cellular DNA, Dr. Roth explained, cautioning that this in no way suggests that smoking a pack a day is safe. "DNA levels are only one indication of what smoke does to a cell. There may be other things going on that we can't spot yet."

Speaking about the applicability of the specially designed technique which involves using dyes that bind to DNA so that it can be quantitatively measured, Dr. Roth says it can be used for early diagnosis of persons whose smoking may be predisposing them to oral cancer. And, he said, it can be used to tell how effective a cigarette filter is by measuring how many cigarettes, over what period of time, of any brand must be smoked before DNA is affected. Dr. Roth reports that he and his group have offered to test the controversial Strickman filter that, it is claimed, cuts tars and nicotine by 70 percent. So far, neither Robert Strickman nor his sponsor, Columbia University, have shown any interest in the offer.