

GENERAL SCIENCE

Predict Super Rocket Fuel

Topics ranging from tooth decay to the effect of lunar tides were discussed at the American Association for the Advancement of Science meeting—By Watson Davis

► SUPER FUELS for space rockets, giving 50% more efficient performance for only 2% more weight, were predicted by Dr. H. J. Bernstein, chemist of the National Research Council of Canada, Ottawa, as the result of a theory which he believes can be applied eventually with 100% efficiency.

He told the American Association for the Advancement of Science meeting in Montreal that any fuel with a basic nitrogen or oxygen atom can, according to the theoretical studies, be stepped up in power punch.

Injection of this souped-up fuel into conventional rocket propellants could increase the efficiency by 5% to 15%, he said, by applying hydrogen bonding techniques.

Plasma, the fourth state of matter, needs to be understood if plasma shields created around space vehicles are to be countered and interruptions to communications with our space probes are to be prevented, Dr. M. P. Bachynski of RCA Victor Research Laboratories, Montreal, warned.

Plasma is the most abundant state of matter in the universe, more plentiful than solids, liquids and gases. A mixture of many free electrons and ionized atoms, it makes up probably more than 99.9% of the universe's matter.

When a spaceship comes back to earth or descends on another planet, a shock-induced plasma of ionized gas will surround it and block radar or radio contact.

The solar wind plasma consists of charged particles which, plunging into the earth's electrical field, cause magnetic storms and auroras.

If plasma can be controlled, the fusion reaction of the H-bomb can be tamed and used to release large amounts of energy, Dr. Bachynski explained.

A new kind of neutrino-detecting telescope that would be placed not on mountain peaks but underground in the deepest mine shafts was forecast for the future by Dr. Philip Morrison, physicist of Cornell University and Massachusetts Institute of Technology.

These massless neutrino particles are enormously more penetrating than any light. They are emitted by the sun and amount to some 5% to 10% of the whole solar power output. They come from the thermonuclear furnace of the sun's core. They are "our only chance to study directly what otherwise we can only calculate, the nature of the conditions under which the sun burns hydrogen," Dr. Morrison explained.

Study of cosmic rays from the depths of the galaxy is another new astronomical investigation for the future, he predicted. Gamma rays from all parts of the sky, seemingly connected with exploding stars,

will also be studied by astronomers who are not limiting themselves to radio signals and rays of light.

Tooth Decay Is Plague

► A SLOW-MOVING PLAGUE of civilization is enveloping the world, causing few direct deaths but bringing ill health and costing millions of dollars.

It is tooth decay, dental caries. Medical scientists studying the disease find that it is extremely complex in its nature, like cancer in this respect. They can not yet assign any one cause or any completely sure cure or prevention.

The American Association for the Advancement of Science meeting concentrated on the environmental effect upon tooth decay and gum disease.

Dr. Albert L. Russell, chief of the National Institute of Dental Research's epidemiology and biometry branch, Bethesda, Md., heads a six-man team that has ranged the world studying the puzzling differences.

Drinking water containing natural or added fluorides during childhood seems almost the only known way to be sure to have good teeth. In distant localities like Jordan, in U.S. areas like the Dakotas and elsewhere, even if the excessive fluorides do cause ugly staining, the teeth are remarkably free of cavities.

This effect of fluorides is one of the great dental discoveries, proved by extensive large-scale tests that led to the addition of the anti-decay chemical to city water sources throughout the world. That some American cities under mistaken propaganda have rejected at the ballot box this simple preventative is one of the tragedies of public health.

One other thing the dental researchers are sure of is that caries is a disease of civilization.

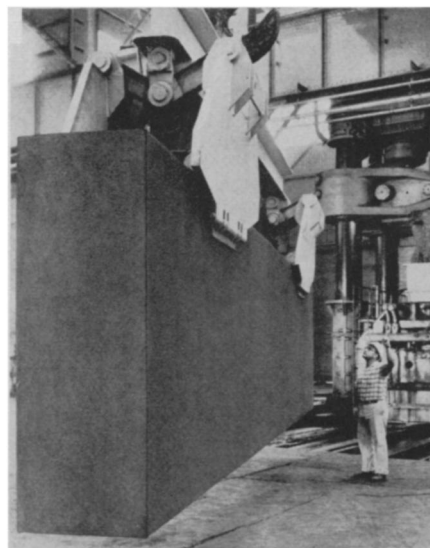
Transplant Alaskan Eskimos or East Indians with good teeth in their native habitat to modern cities and they will have a higher number of cavities.

They are sure that sugar, sucrose, is bad for the teeth. Various additions to sugar or to the diet have been unsuccessfully tried to "neutralize" the sugar effect.

No method that Madison Avenue can exploit in advertisements to prevent decay has been proved.

Caries does seem to be a bacterial disease, at least in animals. Strains of various streptococci cause cavities, but the kind that causes the trouble in hamsters does not cause it in rats, and the one that does damage in rats does not produce the trouble in guinea pigs.

Animals raised under germ-free conditions do not have tooth decay. But no scien-



Union Carbide Corporation

CHIP OFF THE OLD BLOCK—This 34,000-pound graphite block which is two by six feet in cross-section and 26 feet long is the largest ever made—twice as big as its nearest competitor.

tists have been able to infect human beings with the tooth decay germs from animals.

There are puzzles that Dr. Russell has discovered that are not explained. In Viet Nam and Lebanon, for instance, permanent teeth are good and free from decay, while baby teeth in the same mouths are not.

Similarly, the researchers are not able to determine the guilty cause of periodontal, or gum disease, the greatest cause for loss of teeth after age 35. Two factors, increasing age and poor oral hygiene, seem to have causative roles.

It is hard to get one's scientific teeth into this dental problem, although there is no question but that dental disease is on the rise and that the danger is greater in some parts of the world than in others.

Learn From Animals

► SCIENTISTS learn from lower animals many interesting things that help to understand human beings.

Take the wild rat, not the kind pampered in the medical laboratory. The wild ones have a sweet tooth, like the lab beasts, but wild rats do not eat all the sugar they can even if offered an unlimited amount of sugar water.

The wild rats watch their body weight carefully, thus being wiser than fat men and the domesticated rats that indulge in triple sugar rations when they can. Jungle fowl too watch their weight better than domestic chickens.

The American Association for the Advancement of Science meeting heard such facts from Drs. Morley R. Kare and Owen Maller of North Carolina State University, Raleigh, because "an understanding of the role of taste on food intake could be critical in providing nourishment for the exploding populations of animals and man."