

ROCKETS AND MISSILES

Blows Soap Bubbles To Study Combustion

► BURNING GASES inside huge soap bubbles may help designers of rockets and jet engines learn why propellants frequently burn unevenly.

Such irregular combustion, said William A. Strauss of the Ohio State University Rocket Research Laboratory, Columbus, sometimes causes a portion of the propellant not to burn. Particles of unburned fuel could then accumulate, heat up and detonate, destroying the entire rocket chamber. The instability could also cause loss of propellant particles with the exhaust, resulting in poor performance.

Mr. Strauss is trying to determine the effect of pressure on the burning velocity of gas mixtures at pressures up to 1,500 pounds per square inch. The soap bubbles, which are in reality composed of glycerine and detergent and are about the size of tennis balls, are blown inside an 11-foot-long chamber in which the air pressure has been built up to about 1,500 pounds per square inch.

The gas explosive mixture is eased under pressure into an injector. The soapy solution on the injector tip is then blown to form a bubble and two electrodes are pushed to make a contact. When the gas mixture is ignited, the combustion begins in the center of the bubble and continues evenly outward in all directions until the walls are consumed in flame.

Mr. Strauss' research is being conducted for the U. S. Air Force on a contract with the university's Research Foundation.

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PHYSIOLOGY

Cerebrospinal Fluid, Nervous Disorder Linked

► A POSSIBLE key to the malfunctioning of the central nervous system has been discovered in the cerebrospinal fluid.

Further analysis of the cerebrospinal fluid's chemistry may point the way to reversing the metabolic process involved in schizophrenia.

This water-clear fluid which circulates in some of the spaces of the brain and the spinal cord contains excessive amounts of "protease" and "vasodilator polypeptides" in persons with diseases of the central nervous system, Drs. Loring F. Chapman and Harold G. Wolff of New York Hospital-Cornell Medical Center, New York, report in *Science* (Nov. 14).

Accumulation of these substances in excess can result in damage to tissue that may in turn interfere with the "functional capacity of the central nervous system." When there is a need for getting increased nutrients to the tissues, extra amounts of the protein-breaking-down enzyme protease are helpful. Otherwise the protease and the polypeptides it forms as a result of protein-break-down can be dangerous.

Analysis of the cerebrospinal fluid from

patients, including those with central nervous system diseases, chronic schizophrenia and vascular headache of the migraine type, showed it had properties similar to polypeptides—simple non-protein combinations of several amino-acid molecules—that cause dilation or expansion of the blood vessels. The scientists report that fluid from those persons with either inactive disease or none at all gave negative results when tested for its capacity to contract involuntary or smooth muscle.

It is of special interest, Drs. Chapman and Wolff point out, that the cerebrospinal fluid of schizophrenics contains an abnormal amount of protease.

"This observation suggests that a significant (yet perhaps reversible) alteration in metabolism occurs in the brain of patients with schizophrenia," they say.

Whether or not the accumulation of protease and polypeptides is a cause or a result of the brain's deranged metabolic function, it seems this accumulation could contribute to impairment of the brain's functions, the scientists conclude.

Science News Letter, November 29, 1958

ASTRONAUTICS

"Sweeping Satellite" Could Clear Path

► A "SWEEPING SATELLITE" that would gather the cosmic particles and clear a channel through the earth's radiation belt has been suggested.

The satellite would act as a gatherer of cosmic particles, Dr. S. F. Singer, University of Maryland, explained at the international space symposium meeting in San Antonio, Tex.

According to Dr. Singer, there are two radiation belts that must be penetrated by space vehicles. One is the "soft" belt composed of particles of solar origin. The space vehicle, and eventually man, can be shielded from these particles by a lead coating of a few millimeters in thickness.

The "hard" belt, or cosmic particles, however, could penetrate a shield, according to Dr. Singer's theory of radiation.

The shielding problems for these particles are severe. Large thicknesses of material are needed to reduce the radiation level to a tolerable level. Therefore, it might be more promising to reduce the radiation belt intensities by eliminating the particles, he suggested.

This reduction could be accomplished by operating a satellite that would "sweep" the space around the earth by absorbing the particles as they hit it.

If one satellite with a radius of about 30 meters were used, it would take one year to gather particles. If 12 satellites of the same size were used, it would take one month to reduce cosmic radiation to a safer level.

In addition, Dr. Singer's radiation theory indicates that the polar regions would be the preferred location for interplanetary launchings since these regions are believed to be free of the hard or cosmic radiation belt.

Science News Letter, November 29, 1958

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ENDOCRINOLOGY

Parathyroid Protects Against Radiation

► PARATHYROID extract can increase survival following irradiation by more than 50%.

For rats that received two milliliters of parathyroid extract either before or after irradiation, the survival percentage was significantly higher than in rats injected with a saline solution, R. H. Rixon, J. F. Whitfield and T. Youdale of the Atomic Energy of Canada, Ltd., Chalk River, report in *Nature* (Nov. 15).

When the extract was administered before irradiation, survival was 81.5% compared with 52.9% in the rats receiving saline. Survival declined when the treatment was given after irradiation, but was higher (66.7%) in rats given parathyroid extract than in the saline group (21.4%). The reason for the large survival difference between pre- and post-treatment for rats in the saline group is "not clear," the scientists report. A much greater proportion of gastrointestinal hemorrhage occurred in rats injected after irradiation, however.

Experiments are being conducted to learn if the parathyroid hormone's ability to increase serum calcium is responsible for the extract's protective powers, or if some other factor is at work.

Science News Letter, November 29, 1958

METEOROLOGY

Doppler Radar Spots Tornadoes

► EXPERIMENTAL radar equipment is being used to spot tornadoes in time to give threatened areas sufficient warning.

Described at the Seventh Weather Radar Conference of the American Meteorological Society, Miami Beach, the equipment measures instantaneously the whirling speed of the funnel.

David W. Holmes and Robert L. Smith of the U. S. Weather Bureau, Washington, D.C., said that by making use of the Doppler effect they were able to detect what they assumed to be "tornadic activity." The Doppler effect is the shortening or stretching of the radar beam wavelength as it bounces back from the funnel. When the funnel spin is in the direction of the radar receiver, the wavelength is shortened, and vice versa. The amount of change in the wavelength indicates the speed of spin.

Mr. Holmes and Mr. Smith tested their equipment in tornado territory of Texas and Kansas. They believe that with some modifications it will "improve our ability to prevent the loss of life due to these storms."

Science News Letter, November 29, 1958

CE FIELDS

PHYSICS

H-Bomb Explosion Causes Artificial Aurora

► A HYDROGEN BOMB exploded high in the air can cause a bright artificial aurora.

The man-made auroral display was seen by J. G. Keys, observer-in-charge at Apia Observatory, New Hebrides Islands, at 10:51 Greenwich Time on Aug. 1. At the same time there was a sudden increase in magnetic activity at Apia.

A hydrogen bomb was exploded by U. S. scientists high in the upper atmosphere over Johnston Island at approximately the time the aurora appeared and the magnetic disturbance started.

Auroras are rarely seen in tropical regions, and only one other has been reported at Apia, on May 13 to 16, 1921. Those auroras that are seen in the tropics have always been associated with severe worldwide magnetic disturbances.

However, the Apia disturbance definitely was not world-wide, Dr. A. L. Cullington of New Zealand's Department of Scientific and Industrial Research reports in *Nature* (Nov. 15).

Therefore, Dr. Cullington concludes:

"There seems to be little doubt that the unusual magnetic effects recorded at Apia are related to this explosion and that the manifestation seen at Apia was a man-made or artificial aurora due to a nuclear explosion in the upper atmosphere."

Since a study of the effects due to this explosion may help understanding of the theory of magnetic storms and auroras, Dr. Cullington asked other stations in the Central Pacific to search their records for abnormal magnetic activity at the time.

Science News Letter, November 29, 1958

EDUCATION

Bent to Science Starts In Home Before School

► WHAT HAPPENS to a child while being raised in the home long before school days may determine whether he is likely to be a scientist or go into some other life work, persons at the Edison Foundation Conference in Cincinnati learned.

Dr. Anne Roe, adjunct professor of psychology, New York University, finds the differences that make most people interested in things and other people most interested in people stem from the earliest experiences in infancy. The "thing" persons can become scientists and the "people" persons develop toward non-science fields.

Parents who want to raise their children to be scientists, Dr. Roe advises, should refrain from:

Treating them as overprotected "mothers' children," giving them everything they want.

Suppressing natural curiosity by overprotection, such as stopping the handling of things around the house due to fear of breaking.

Not letting them follow the interests that develop from things attracting them naturally.

While basic orientations toward science and non-science do begin almost in the cradle, schools do have a chance to reinforce science motivation and give essential training, Dr. Roe emphasized. They can also direct the attention of those who have basic abilities to the advantages of science careers.

Science education needs to do more than discipline minds and impart facts, Dr. Roe believes. It is necessary to urge the potential scientist to give free play to fancy and also be respectful of the method and spirit of inquiry.

Science News Letter, November 29, 1958

PHYSIOLOGY

Low Temperatures Lessen Kidney's Blood Flow

► PROGRESSIVE induced reduction in body temperature probably causes a parallel decrease in the kidney's blood flow and glomerular filtration rate.

This was reported by Dr. John H. Moyer of the Hahnemann Medical College in Philadelphia at a conference on hypothermia sponsored by the New York Academy of Sciences. Hypothermia refers to body temperatures less than the normal.

Despite the decrease in glomerular filtration and renal blood flow during subnormal temperatures, Dr. Moyer said, there is not a similar decrease in urine volume or sodium excretion until the body is brought to temperatures below 26 degrees centigrade (about 79 degrees Fahrenheit). Below this point urine volume and sodium excretion diminish progressively with temperature reduction.

Reduction in kidney function is probably not a result of the decrease in blood pressure concomitant with hypothermia, since raising the blood pressure with a special agent does not affect the altered kidney function.

In another report to the conference, Dr. Ralph W. Brauer of the Naval Radiological Defense Laboratory in San Francisco told how circulation in the liver is altered in hypothermia. This is due to increased blood viscosity and to a fluid shift from extracellular to intracellular resulting in increased liver volume.

Effects on the functional elements of the liver, said Dr. Brauer, include changes in secretory activity such as a sharp reduction in bile flow.

Dr. Robert M. Berne of Western Reserve University in Cleveland reported on the effect of hypothermia on the functions of the heart. Contractility or myocardial heart tissue is not impaired in hypothermia, he said. On the other hand, both the oxygen consumption of the heart and coronary resistance were found to be reduced in hypothermia. The reduction in coronary resistance may be due to a direct effect of cold on the coronary vessels.

Science News Letter, November 29, 1958

MEDICINE

Blood in the Eye Removed by Heart Drug

► A DRUG used to treat certain heart conditions can help remove damaging blood from the eye.

This is reported by Dr. Robert Sinskey, University of California at Los Angeles Medical School, who has been studying eye hemorrhages known as hyphemas.

A hyphema is a hemorrhage into the anterior chamber of the eye, which lies between the iris and cornea. Hyphemas often occur when an object, such as a ball, hits the eye, or following certain types of eye surgery. If the blood remains in the chamber for a long period of time, serious damage to the eye may result.

Dr. Sinskey was able to trace the course of the blood in the eye by tagging red blood cells with radioactive isotopes. He found the red cells can leave the chamber as whole red cells without hemolyzing or breaking up first. They leave in large numbers in the first two hours after the hemorrhage but slow down their rate of exit considerably after that.

He also found intravenous injections of Diamox, a drug used to treat certain heart conditions, increases the rate at which the blood leaves the chamber by 21% over untreated control rabbits with hyphemas. The reason Diamox works is unknown as yet.

As a result of these findings, Diamox is being used clinically to treat hyphemas. Drugs which have been used to treat hyphemas by dilating or narrowing the pupils of the eye were found not to influence the rate at which blood leaves the eye.

Science News Letter, November 29, 1958

GEOGRAPHY

Sahara-Like Desert Exists in South America

► A DESERT in South America with moving sand dunes reminiscent of the Sahara is described by Dr. Raymond E. Crist of the University of Florida in a report to the Smithsonian Institution.

There, only a little over 50 miles from bustling, modern, oil-rich Maracaibo, Venezuela, people live today very much as they did on the Old World desert of Arabia in the days of Abraham.

Although an international boundary runs through this desert of Guajira, the Venezuelan and Colombian governments that technically have jurisdiction have been forced to recognize local laws and customs and to grant a high degree of local cultural autonomy.

The people continue to be Guajiros, speaking their own language, wearing their own dress, and living their own nomadic life.

As in most arid lands, rights to water are more important than rights to land. And, as in the Sahara or in the Arabian Desert, a large part of the life of the people is carried on around wells or waterholes. People come to "casimbas," as they are known, in a constant stream from many kilometers in all directions.

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