

PUBLIC HEALTH

Health Hazards Noted In Rocket Propulsion

► **FUEL TOXICITY**, extreme noise and acceleration, and the difficulty in providing for passenger comfort are among the major hazards of rocket propulsion.

Louis Michelson, manager of the Rocket Engines division of the General Electric Company, Cincinnati, described these hazards at the American Public Health Association meeting in St. Louis, Mo.

Concentrated hydrogen peroxide, one of the earliest high energy fuels, was soon found to react rapidly with skin tissue, he said. Similarly, nitric acid fumes cause irritation of the nose and throat tissues, and hydrazine is highly poisonous. Both of these are common propellants on upper stages of lunar rockets. Therefore, he said rubberized, splash-proof and vapor-proof clothing must be worn in handling these fuels during their production, loading and burning.

Such fuels as the boron hydrides are rich in low-molecular-weight hydrogen and make excellent fuels but are highly toxic.

Rocket fuels are not the only poisonous rocket components. Many of the metals used in their construction are also toxic. For instance, one of the most ideal metals for rocket use because of its strength at high temperatures is beryllium. Unfortunately, the oxides of beryllium are highly toxic.

Another major hazard of high speed propulsion is the extreme noise associated with propulsion. The noise from a rocket motor at a distance of 1,000 feet and operating at a 30,000-pound thrust can reach the point where it becomes painful to the ear. Engines with 1,000,000 pounds of thrust will be so noisy that it will be impossible to approach within 3,000 feet without ear protection while the engine is being run.

Acceleration would also be a hazard to any rocket passenger. Since most rockets have a constant level of engine thrust and become lighter as fuel is consumed, the same amount of thrust produces greater and greater accelerations. It is expected that a man being sent aloft in a rocket will have to be protected sufficiently to be able to withstand accelerations as high as eight to ten times the force of gravity for up to two minutes.

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SURGERY

Heart Valve Remodeled To Overcome Leaking

► **MAKING** A two-cusped valve out of the three-cusped aortic valve may be the solution to a serious heart defect.

Normally, the valve has three leaves or cusps that come together during the "filling stage" of the heart cycle and thus block any backward flow of blood into the heart from the aorta. Sometimes, however, as in the case of some inherited defect or rheumatic heart disease, one of the cusps may become defective. This means a break in the perfect closing of the valve and blood leakage back into the heart.

Now, Dr. Charles P. Bailey, a Philadel-

phia surgeon, reported to the American Heart Association meeting in San Francisco, there are several methods being used to change the valve closing to a bicuspid, or two-leaved, one.

Among the methods are stitching two of the three cusps together, lifting flaps of tissue from the aorta lining and joining them to the free edges of the deformed cusps, and removing a cusp along with a part of the aorta lining.

"Each case must be individualized," Dr. Bailey concluded, "in order to achieve the greatest possible correction of the leak with the least possible narrowing of the passageway."

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PALEONTOLOGY

Rich Fossil Field Found In Argentine Valley

► **PURPLE BONES** promise to make a remote region of Argentina one of the world's richest fossil collecting areas.

The fossil field, about 12 miles long, contains bones of reptiles that roamed the earth some 170 million years ago, prior to the dinosaurs. The valley is mostly shale and clay, colored gray with pink, blue, green and yellow areas.

Much of the rock containing the fossils has been weathered and portions of the bones protrude. The exposed parts are covered with a purple matrix containing an iron compound. The bones are easily seen against the lighter background of rock and some lie loose on the ground.

A five-ton shipment of blocks of fossil reptiles collected at the site last spring has been received by Harvard University's Museum of Comparative Zoology. The specimens are still encased in rock and their preparation and study and display will take years to complete.

Several specimens belong to a type of reptiles, known as Cynodonts, that have features in common with mammals. These have been described as resembling crosses between lizards and dogs. Whether they nursed their young or had hair, as do mammals, is unknown. However, some anatomical characteristics lead paleontologists to believe they were warm-blooded like birds and mammals.

The uninhabited valley is near Ischigualasto in west central Argentina near the border between the provinces of San Juan and La Rioja.

Why so much fossil material occurs there is unknown. Fossils of land animals of the same general age have been found previously only in east Africa and southern Brazil, and these specimens are in much poorer condition.

Members of the expedition, including Profs. Alfred S. Romer and Bryan Patterson of the Museum, were unaware of the fossil richness at Ischigualasto before leaving Cambridge. They had been working in the Mendoza region along the eastern edge of the Andes, and went to the valley because small finds had been reported there years before.

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IN SCIENCE

SURGERY

"Walking" May Prevent Clots During Surgery

► **ELECTRICAL** stimulation that will keep patients "walking" during surgery may prevent blood clot formation.

When movement of the leg muscles is reduced, as during surgery, the blood pools in the legs and conditions are set for the formation of blood clots.

When the patient is "walking" through the use of electrical stimulation of the leg calf muscles, this pooling is reduced. The stimulation causes the muscles to contract as they do in walking and to act as a pump, forcing the blood back to the heart, Drs. John and Angus D. McLachlin of the department of surgery at the University of Western Ontario Faculty of Medicine, London, Ont., report in the *Archives of Surgery* (Oct.)

The doctors applied skin electrodes, similar to those used to study the heart's electrical activity, on the legs of patients. The closed electrical circuit produces regular contractions of the calf muscles during the operation and until the patient is able to move about.

Blood pooling in the legs may be a prime factor in pulmonary embolism, the doctors suggested. Therefore, prevention of pooling may lessen the possibility of clot formation.

When blood clots form, parts of them may break off and move through the vessels. They can block the artery between the heart and lungs, forcing the blood back to the heart. This condition, known as pulmonary embolism, is now the commonest single cause of death following major surgery.

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VITAL STATISTICS

Children Taller, Heavier In U. S. and Other Nations

► **A WORLD WAR** and economic depression have not kept children today from being taller and heavier than their parents were.

Among boys nine years and older the increase in height is an inch or more, the Metropolitan Life Insurance Company, New York, reports. Increases in weight range from two pounds at age seven to 13 pounds at age 14.

There is evidence that these figures, taken from a study of Michigan school children in 1937-39 and in 1954, are also representative of the United States as a whole. Other nations are reporting similar increases.

Improved nutrition, rising living standards and the decreased number of debilitating diseases among children are among the factors that are responsible for the children's improved physical status, the insurance company researchers said.

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CE FIELDS

FISHERIES

Shellfish, Baby Herring Attracted by Lights

► CRABS AND lobsters not only "like" bright lights, they apparently prefer blue or green light to any other color.

This discovery may help the U. S. fishing industry bring in one of its biggest shellfish catches. By using lights mounted on the base of a fish net and directed to its mouth, Japanese fishermen have already more than doubled their catch, J. Pileggi of the Bureau of Commercial Fisheries reported.

While the Japanese have been testing the effects of lights in attracting shellfish, scientists along the Scottish coast have been experimenting with light's effects on herring and whiting.

They found that whiting, young herring and sprats, a kind of small herring, were most susceptible to the use of lights. Adult herring, however, exhibited a negative reaction to the lights at all times and, the scientists report, there is no evidence that lights made the mature fish collect in one place.

Since the lights attracted both marketable and unmarketable sizes of whiting, special fishing equipment would have to be used with the lights in order to sort out the "good" from the "bad" fish. This means that lights as an aid for commercial fisheries would be useful only where juvenile herring and sprats were desired, the scientists explained.

Fish attracted by lights seemed to dislike light coming from below them. They collected below the lights except in one instance when two lights were used at different depths.

The lights indirectly attracted predator fish, also, the scientists said. These fish—mackerel, dogfish, cod and some whiting—were attracted by the easily available prey. In one case, the scientists reported, an entire shoal of sprats attracted by lights was virtually destroyed in 15 minutes by mackerel.

J. H. S. Blaxter and B. B. Parrish reported their research in the Scottish Home Department's marine research series.

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MINERALOGY

New Compounds Formed 60 Miles Deep in Earth

► MINERALS CONTAINED in the earth's abundant granite and basalt deposits are changed into new compounds at depths of less than 60 miles beneath the surface.

The transformations occur in much the same way that graphite is changed to diamond under great pressure, Dr. George C. Kennedy of the University of California at Los Angeles reported in a Sigm Xi national lecture at the University of Miami Sigma Xi Club, Coral Gables, Fla.

Quartz, albite feldspar and orthoclase feldspar, which are the common minerals of granite, are transformed at different pressures. Quartz, for instance, changes into coesite at 500 degrees centigrade and 19,000 atmospheres of pressure. (One atmosphere is approximately equal to 14.7 pounds per square inch.) This pressure is equivalent to a depth in the earth of about 40 miles. Albite feldspar breaks down into both jade and quartz at a pressure of about 13,000 atmospheres at 500 degrees centigrade.

The common minerals of basalt—pyroxenes, amphiboles and calcium-sodium feldspar—are transformed in a similar way but at even lower pressures.

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ENGINEERING

Teletypewriter Prints 3,000 Words a Minute

► A TELETYPEWRITER can print 3,000 words a minute, 20 times faster than most people can talk. It prints 45 times faster than an average typist.

Operating at 750 words a minute for U. S. Army Signal Corps needs, it will do the work of eight military printers now in use and get completed messages to their destinations eight times faster.

Instead of using ordinary keys, as do conventional teletypewriters, the machine shoots letters at the paper with a series of electrode "guns." Each gun aims a beam at a corresponding spot on the paper and can fire any letter or number.

After the letters have been fired, each line of text passes rapidly over powdered ink and a heated roller and appears a split second later as clear, readable text. The device operates from standard code tape, or can be plugged into long-distance radio or telephone circuits.

The machine is expected to be the basic unit in what the Army believes will be the fastest known military teletypewriter network.

It will also have broad civilian applications by providing greatly increased message speed for weather forecasting networks, stock exchanges, telegraph offices and news gathering agencies.

Another use will be typing out calculations of new military electronic computers, which handle data so fast that none of today's standard page printers can keep up with them.

Even at speeds printing four lines of text a second the new device is said to be operating in low gear. With further development, its theoretical top speed is expected to be 500,000 words a minute, or the equivalent of three full-length novels.

In mass production, the printer will probably cost half as much as the eight standard printers it can replace.

The device, a joint development by the U. S. Army Signal Research and Development Laboratory, Fort Monmouth, N. J., and the Burroughs Corporation, Paoli, Pa., was displayed at the Overseas Press Club in New York.

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NEUROLOGY

Microscopic Damage Causes Several Ills

► WHEN MICROSCOPIC areas in the brains of experimental animals are damaged, sex deviation, obesity and epilepsy occur.

This has been demonstrated in research by Dr. John D. Green and associates at the University of California at Los Angeles Medical School.

While all the brain damage occurred in a region of the cerebrum known as the rhinencephalon, each type of abnormal behavior was associated with damage to a particular subdivision of the rhinencephalon.

Sex deviation was observed in male cats which had damage in the piriform cortex area of the rhinencephalon. The deviation took the form of an abnormal sex drive which was directed not only toward female cats but other animals and inanimate objects.

Animals having damage in the basal and lateral part of the brain region known as the amygdala demonstrated voracious appetites and become abnormally fat. Epileptic seizures occurred in cats with damage to the hippocampus.

Dr. Green said it was not known whether the relationship of brain damage to abnormal behavior in experimental animals applied to human beings or not, but that similar effects have been observed after brain surgery in the same areas. Brain damage leading to epileptic seizures in the animals is similar to that observed in some human epileptics, and it is possible that certain types of sex deviation and obesity in humans may be related to brain damage.

The research, which has been reported in the *Journal of Comparative Neurology*, has been supported by the U. S. Public Health Service.

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BOTANY

Short Days Cause Legumes' Iron Deficiency

► "IRON DEFICIENCY" may be the reason why some legumes, a family of important food plants such as peas and alfalfa, fail to grow well.

A general hematin deficiency was found in several leguminous plants when they were grown under short-day conditions, C. Sironval of the department of biochemistry, Cambridge University, reports.

He notes that soya beans and lupin grown under eight hours of daylight had 20% to 30% less hematin in the leaves. With lupin, some root nodules had 50% less hematin. There was also a reduction in the chlorophyll content, the scientist reports in *Nature* (Oct. 25).

However, in hemp, which needs a short day to flower, the hematin content increases in short day-length while chlorophyll content decreases.

Hematin is a complex pigment made up of iron plus porphyrin, a nitrogen compound. Together with the protein globin, hematin makes up hemoglobin.

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