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JANUARY 21, 1950

SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE

Man-Made Mica

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VOL. 57 NO. 3 PAGES 33-48

MEDICINE

Blood Protein 99.7% Pure

Purer blood proteins in larger quantities will soon be available for medical use. A method for preserving blood for more than three weeks may result from atomic research.

➤ BLOOD proteins that are over 99.7% pure may be available before long to doctors treating patients with kidney and liver disease and for research leading to other healing uses for human blood.

This was foretold by Dr. Ross T McIntire, director of the American Red Cross National Blood Program, speaking as guest of Watson Davis, director of Science Service, on Adventures in Science radio program over the Columbia Broadcasting System.

Proteins from blood will not only be purer but available in larger quantities, Dr. McIntire said, thanks to a new fractionation method developed by Dr. Edwin Cohn of Harvard Medical School. The new method is still being tested in Dr. Cohn's pilot laboratory in Boston.

New methods of preserving blood for more than three weeks are expected from new experiments being carried on in connection with atomic research. Through the use of radioactive zinc, the lifespan of the white cells in the blood is being determined. Use of radioactive iron to tag red blood cells in volunteers helped scientists during the war to find effective blood preservatives so that whole blood could be kept for three weeks.

In the event of atomic warfare, blood is expected to play a big part. It is so far "the only therapeutic agent to combat radiation sickness," Dr. McIntire said. If blood had been available, 20,000 of those who died at Hiroshima could have been saved, it is estimated.

Peacetime uses of blood include saving lives of mothers in childbirth, making possible such operations as the "blue baby" one and saving babies from Rh blood death through a blood-changing operation.

Results from such uses of blood have been so remarkable that demands for it have increased 60% in larger hospitals and as much as 300% in smaller ones in the Rochester, N. Y., area during the two years since the first regional Red Cross Blood Center was opened there.

The Red Cross now has 30 regional blood programs operating in 35 states, supplying blood to more than 1550 hospitals and 80 clinics in the nation. Red Cross, Dr. McIntire said, is also furnishing immune serum globulin, a blood derivative, to doctors to combat measles all over the country. It is distributed through state health departments. And there is no charge for the blood or blood derivatives supplied through Red Cross. Any charges on the patient's bill are those made by doctors and hospitals for cross-matching and administration of the blood.

"As we go into our third year of operation," he declared, "we feel that we have passed many milestones. We, in Red Cross, are fully aware of the importance of blood in saving lives. All of us look forward to the time when every doctor in the land will have the blood and blood derivatives his patients need."

Science News Letter, January 21, 1950

MEDICINE

Cortisone, ACTH Advances

➤ LATEST box score on cortisone and ACTH, the anti-arthritis hormones now being tested in many other diseases, as reported at the New York Academy of Medicine in New York City.

1. A hint that the heart condition which is the most serious feature of rheumatic fever may be helped. This was reported by Dr. Currier McEwen, Dean, College of Medicine, New York University-Bellevue Medical Center, with the caution that "this is not yet certain" and final judgment must await more experience. Effect of the hormones on the fever and toxic signs of the disease not much better than with big enough doses of salicylates, such as aspirin.

2. Patients almost dead of the fatal lupus erythematosus respond to treatment within 36 hours and the disease, which occurs mainly in young women and girls, can be arrested. Blood tests show that the disease is still present, however, and can be expected to recur, requiring treatment. Treatment accompanied by serious hazards, among them sudden congestive heart failure and pulmonary edema. Although life-saving in this disease, cortisone and ACTH should be used only on patients in a hospital with specially trained staff and facilities, warned Dr. George Baehr of Mount Sinai Hospital.

3. Improvement, lasting three to five weeks, in five previously untreated patients with acute leukemia; temporary (10 days to three months) shrinkage of enlarged lymph nodes and spleens in four patients with chronic lymphatic leukemia, one with follicular lymphosarcoma and one with Hodgkin's disease; no definite effect on eight patients with different kinds of cancer. Remissions in leukemia can be brought on with considerable regularity by ACTH but the remissions (improvement) are both incomplete and temporary, stated Drs. O. H. Pearson, L. P. Eliel and T. R. Talbot, Jr., of Sloan-Kettering Institute and Memorial Hospital.

4. How cortisone and ACTH produce their effect in connective tissue diseases suggested by discovery that they delay healing of wounds and broken bones. Since the hormones cause a failure of connective tissue to respond normally by growth to injury, such as wounds, they may reduce the reactivity of such tissue to injury of unknown origin, is the theory presented by Dr. Charles Ragan, Columbia University College of Physicians and Surgeons.

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GENERAL SCIENCE

Amateur Brings Fresh Viewpoint to Science

➤ THE scientific amateur was hailed for "his fresh viewpoint and freedom from bias which have often led to discoveries which his more inhibited professional brother had overlooked."

Although "much missionary work must be done before a rabid Dodger fan" gives up baseball for botany and sets out "to collect the flora of Flatbush," Dr. Edmund W. Sinnott, director of Yale's Sheffield Scientific School, speaking as retiring president of the American Association for the Advancement of Science, cited several organizations which are already at work bringing science and the layman closer together.

He cited the contributions of the American Association of Variable Star Observers, and the "revolution in our knowledge of bird migration" brought about by amateur bird-banding groups.

A good start in widening the participation by laymen in scientific work, he noted, is being made "by the hundreds of science clubs, organized under the auspices of Science Service," and by the nation-wide Science Talent Search which is "another important means of attracting into science some of the best of our youngsters."

Dr. Sinnott stressed that familiarizing laymen with science is very important in this highly technological age when sciences are all too frequently regarded as "primarily a sort of glorified gadgeteering."

To guard against "the twin evils of indifference and intolerance," Dr. Sinnott invoked "the spirit of science . . . . which leads both to that freedom and tolerance so necessary for the democratic way of life."

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CHEMISTRY

Better Mica Produced

Bigger and better crystals of synthetic mica have been developed. This mineral which is used in electronic equipment is listed as a strategic mineral.

See Front Cover

➤ BIGGER and better crystals of man-made mica, the mineral so critical for radio, television and other electric and electronic equipment, are now being made.

These synthetic crystals are superior to natural mica in resisting break-down at high temperatures, the National Bureau of Standards reported.

The synthetic crystals have been grown as large as four square inches. Further improvements in the growth process will relieve the United States from depending on imports to meet requirements for the vital mineral.

Great quantities of high-grade mica are required each year in the United States, and only a small fraction of that needed is produced in this country. India and Brazil are the principal suppliers of mica for the United States.

Mica is particularly valuable for condensers, and it plays a big part in radar and other electronic equipment. Mica is rated as a strategic mineral. That is, it is being stockpiled, since there is no commercial substitute available.

Dr. Herbert Insley, Alvin Van Valkenburg and Robert Pike of the Bureau of Standards are the scientists who have succeeded in crystallizing mica in such large sheets. This is part of a broad program of fundamental research on fluorine-type artificial minerals carried on by the Bureau under the sponsorship of the Office of Naval Research.

The U. S. Bureau of Mines and the Colorado School of Mines are cooperating in the work on synthetic mica. Making mica in the same way it is made by nature would require high pressures and high temperatures. Commercial production is more convenient at normal atmospheric pressure. The scientists have succeeded in doing this in a platinum-lined crucible.

The synthetic mica has four ingredients. Three of these are common materials sometimes used in making glass: quartz, magnesite and bauxite. The fourth, a fluosilicate compound, is added because it acts as a crystallizing agent. This is believed to be the compound that makes this mica superior to the natural in resisting breakdown at high temperatures.

The raw mixture is placed in the platinum-lined crucible and melted in an electric furnace at a temperature of nearly 2550 degrees Fahrenheit. As the furnace cools, mica crystals grow from tiny seeds at the bottom of the crucible.

Crystals free of impurities are clear and transparent, and thin flakes are easily split away along the planes of natural cleavage. Mica has a sheet-like structure and grows faster in a direction parallel to its cleavage plane than in any other direction. If a crucible with a cone-shaped bottom is used, the number of seed crystals required is reduced and the crystals tend to grow upwards.

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AERONAUTICS

Machine Flies Plane That Does Not Exist

➤ THEORETICAL men are now flying theoretical planes in a laboratory at the Massachusetts Institute of Technology. Three years' work by more than 50 engineers has produced a machine designed to "flight-test" planes before they are built.

On this elaborate and sensitive calculator, M. I. T. engineers will be able to set up an electrical model of any aircraft which is in an advanced stage of design. They can apply an actual autopilot to fly this non-existent craft.

The autopilot has exactly the same problem that it would have in the actual flight of a guided missile or airplane, if the projected plane were built.

The flight simulator, as it is called, was developed under the auspices of the U. S. Navy Bureau of Ordnance in the M. I. T. Dynamic Analysis and Control Laboratory, of which Dr. Albert C. Hall is director.

Once the characteristics of a plane have been given to the flight simulator and the plane is in theoretical flight, it can be determined whether the plane design is satisfactory. If it is not, changes in the wing and tail designs can be made by simple adjustments of the simulator controls until the desired behavior is obtained.

The information which the simulator uses about a theoretical plane is obtained both from the designs on the drawing board and from wind tunnel tests of a model.

The flying simulator is one of several computers at M. I. T. which add, subtract, multiply and integrate at almost unbelievable speed.

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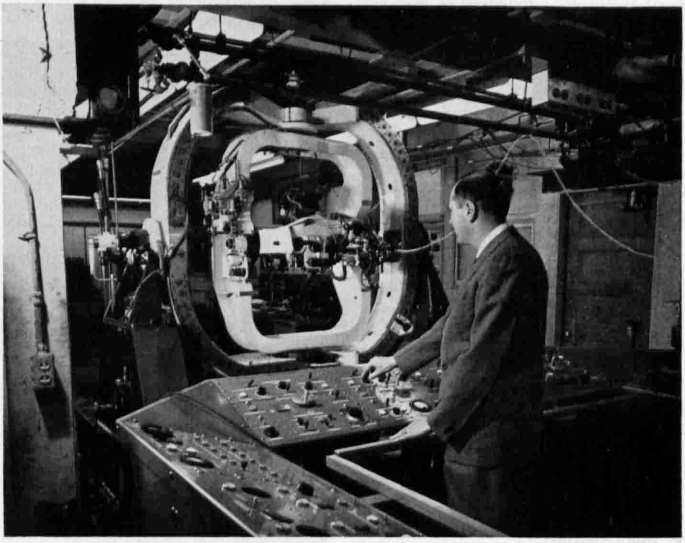

FLIGHT SIMULATOR—Dr. Albert C. Hall, Director of the M. I. T. Dynamic Analysis and Control Laboratory, stands at the control panel of the flight simulator at the Massachusetts Institute of Technology. The gimbal frame in the background responds to the various commands given from this board to the theoretical aircraft whose characteristics have been given to the machine.

FOOD-ENGINEERING

Waves Pasteurize Cheese

➤ CHEESE can now be made bacteria-free more easily.

This is done by pasteurizing the cheese with radio waves after the cheese has aged, three Cornell scientists have found. The presently used method is to pasteurize the milk from which the cheese is obtained.

It is much easier to rid 10 pounds of cheese of bacteria than to pasteurize the 100 pounds of milk from which it is made. The new method also makes possible the pasteurization of cheese after it has been wrapped, thus giving the consumer an uncontaminated product.

Since the elusive cheddar flavor has only come from aging cheese made from raw milk, the researchers had hoped to pasteurize old cheese after the raw milk flavor had developed. But the radio frequencies pasteurized only the very young raw milk cheese.

Cheese from the experiments was flavor-tested by competent cheese tasters. Although scores ranged widely, some of them were high, though not equal to an aged cheese made from raw milk.

In their system, Drs. F. V. Kosikowsky, B. L. Herrington, and A. C. Dahlberg placed the cheese between two plates or electrodes carrying a high frequency current. Friction is set up between the cheese molecules by alternating current, raising the temperature to 132 degrees Fahrenheit in a minute or two. Then the cheese is cooled by air. This pasteurizes the cheese, yet leaves enough enzymes and bacteria to develop flavor.

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BIOLOGY

Tropics Mask Battle

➤ NATURE'S lavish generosity in the tropics intensifies rather than eases the struggle between organisms for evolutionary survival. The favorable tropical environment encourages a multitude of plant and animal species which therefore must compete more fiercely than temperate zone species, said Prof. Theodosius Dobzhansky of Columbia University.

Prof. Dobzhansky gave the annual address of the Society of the Sigma Xi, which met jointly with the American Association for the Advancement of Science.

The great diversity of living things found in the tropics gives each species only a tenuous toehold on its habitat, because a host of other types are ready to displace any species that fails to hold its own even briefly.

Another consequence of tropical crowding is that no species has any area to itself, as is the case in temperate zones where a pine forest, for example, may cover a whole countryside to the exclusion of almost every other type of tree, Prof. Dobzhansky pointed out.

The result is specialization: "Presence of many competitors, in biological evolution as well as in human affairs, can be met most successfully by specialization," he said.

"The challenges of tropical environments . . . require more creative responses, somewhat analogous to invention on the human level. Such creative responses constitute progressive evolution," Prof. Dobzhansky concluded.

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Question Box

CHEMISTRY

How large has man grown mica crystals? p. 35.

CHEMISTRY-CONSERVATION

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ENDOCRINOLOGY

What vitamin and antivitamin play important roles in reproduction? p. 37.

MEDICINE

What are the latest uses for cortisone and ACTH? p. 34.

What is the latest possible technic for cancer diagnosis? p. 38.

What is the latest treatment for shingles? p. 39.

Photographs: p. 35, Massachusetts Institute of Technology; p. 37, Link Aviation, Inc.; p. 39, U. S. Fish and Wildlife Service; p. 42, 43, National Advisory Committee for Aeronautics; p. 48, Bakelite Corporation.

● RADIO

Saturday, January 28, 1950, 3:15 p. m. EST

"Adventures in Science" with Watson Davis, director of Science Service, over Columbia Broadcasting System.

Dr. Donald H. Menzel, Associate Director of Solar Research, Harvard Observatory, Harvard University, Cambridge, Mass., will talk about "Storms on the Sun".

Tongue-tie is actually a comparatively rare condition; it is a defect of a tissue which joins the tongue to the floor of the mouth in which the tissue reaches almost to the tip of the tongue.

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ENDOCRINOLOGY

Vitamin Plays New Role

The vitamin, biotin, and its antivitamin play an important role in the reproduction of the chick. Biotin and avidin have been found in eggs of all species examined.

➤ A VITAMIN and its antivitamin play "significant" parts in the process by which babies are produced. The discovery, announced in Washington, D. C., by a team of National Cancer Institute scientists, was made on chicks, but probably is true for reproduction in the human and other species.

The vitamin is biotin, once believed involved in cancer. Its antivitamin is called avidin. The largest concentration of naturally occurring biotin is found in the yolk of egg. The avidin is found in egg white and in the part of the reproductive tract where the egg albumen is formed. This is no mere coincidence, the scientists now believe from their studies.

When they gave an estrogen, or female hormone, to sexually immature chicks, the biotin activity of their blood was elevated about five-fold, the scientists found. Giving another hormone, progesterone, at the same time the estrogen was given induces formation of avidin, or antibiotin, in the oviduct, but does not change the degree of elevation of the blood biotin activity, they report. Previously they had found that giving the two hormones simultaneously checks the growth of the genital tract which is induced by giving estrogen alone.

When an egg is laid, an excess of avidin is present, the scientists have also found. As the egg is incubated, the heat destroys the avidin and the chick develops. They are trying now to see whether they can alter the process of incubation by adding either avidin or biotin. From such studies they hope to learn more about what is now a "challenging enigma," that is, just what function the vitamin and its antivitamin perform in the process of reproduction.

Both biotin and avidin have been found in the eggs of all species so far examined, such as bird, frogs and turtles. Human and other mammalian eggs probably contain them also, but because of the small size of these eggs, the scientists have so far not been able to find either biotin or avidin in them. They think they will when they develop better techniques for isolating the substances from the tiny eggs.

Latest studies on biotin, avidin and reproduction are reported by Drs. Roy Hertz, F. G. Dhyse and Wm. W. Tullner of the National Cancer Institute, U. S. Public Health Service, in the scientific journal, ENDOCRINOLOGY (Nov.). In earlier studies Dr. W. H. Sebrell of the National Institutes of Health and Dr. R. M. Fraps of the Department of Agriculture worked with Dr. Hertz.

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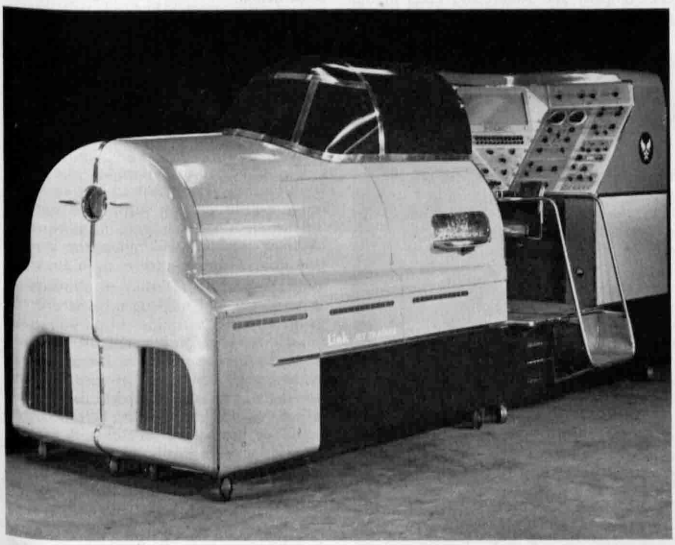

LINKTRONIC TRAINER—Looking somewhat like a diesel engine, this device is the latest work in training equipment for jet pilots. Its equipment provides for indoctrination in the use of the very newest instruments and radio navigation systems, and permits the student-pilot to gain experience in meeting all possible flight emergencies.

AERONAUTICS

Device Gives Future Jet Pilots Ground Training

➤ A NEW device based on electronics to give future pilots of jet planes ground training before they go into the air was revealed at the Wright-Patterson Air Force Base where it is in use.

It is a squat and stubby affair that resembles a diesel engine more than a sleek speedy airplane but it contains all the controls and instruments of the plane and they function as they do in actual flight.

An integral part of the new trainer is a series of emergency controls with which the instructor, sitting behind the student pilot, can introduce a wide variety of operating troubles. Through the training given in the device a pilot learns how to manipulate controls to fly a plane safely in all sorts of changing conditions. A somewhat similar device is already in use in training pilots for giant airliners.

The brain of the new trainer, dubbed the Linktronic because made by Link Aviation, Inc., is an intricate arrangement of electronic computers that calculate instantly the basic equations covering the actions of the airplane simulated. The exact results are then registered on the instruments in the student's compartment. As instrument readings show the necessity, the pilot learns rapidly the control steps to take.

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PHYSICS

Generators Developed for Infra-Red Signaling

➤ POWERFUL, lightweight generators of static electricity, designed for use as a high potential power supply for electronic equipment using image tubes, were revealed at the Army Engineer Research and Development Laboratories, Fort Belvoir, Va., where they were constructed. Applications range from infra-red signaling to X-ray devices.

Two are completed. One is capable of developing 20,000 volts and the other 6,000

volts. These new influence-type generators consist of a spring motor driving a rotor made up of plastic laminated with metal plates. The stator plates, after being given an initial low charge from a manually operated friction type electrostatic generator, build up their charge as they are rotated by induction on the metallic foil.

At the proper moment the voltage is picked off the foil by means of brushes and transported to the insulated metal plates. The charges accumulated on these plates are the source of the high voltage. After the initial charge, the process of building up voltage and transporting it to the plates is continuous as long as the rotor is in motion.

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CHEMISTRY-CONSERVATION

FDR's Dream Materializes

➤ A DREAM of President Roosevelt's—a dream about how to solve water shortages—is showing signs of beginning to come true, and 43 years before he thought it might be possible.

The late president was fascinated by the little chemical bottles carried during the war on life rafts and used to turn a quart or two of sea water into something downed airmen and shipwrecked sailors could drink. He made a personal visit to Bethesda to congratulate the Naval scientists who had perfected the gadget.

In 1943, President Roosevelt said he was working on a project—"it might take 50 years"—to use this chemical process of ion exchange, which turns salt into fresh water, for irrigating small plots of desert land in Africa, the Middle East and Australia.

Now scientists at Harvard and the Weizmann Institute in Israel have perfected an inexpensive method of purifying brackish water on a large scale and the Israeli government is making plans for installing it in the recently won Negev region of that country.

As it stands now, the method to be used in Israel cannot purify anything as salty as sea water, but it can economically make the brackish water to be found underground in the Negev drinkable. And the scientists say that they are on the verge of achieving an economical method of making the same water suitable for irrigation.

The process puts the brackish water through two separate beds of resins. The resins act on the salt in the water and something called ion exchange takes place. The atoms of salt in the water are changed so that the salt becomes insoluble and precipitates out. The Israeli pilot plant now uses resins obtained from the Dow Chemical Company and Rohm and Haas in this country.

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MEDICINE

Cancer Diagnosis Technic

➤ A WAY to float cancer cells out of fluids from the lungs and abdomen has been developed by scientists at Harvard Medical School, Massachusetts Institute of Technology and Vincent Memorial Hospital in Boston, Mass.

The technic is expected to help in diagnosis of cancer and in chemical and physical studies of the cancer cell itself.

The expected aid to diagnosis comes from the fact that with this new technic the cancer cells are floated away from blood cells and other debris in the fluids being examined. They are also concentrated in one small layer of the fluid to be examined. This makes it easier and quicker to spot cancer cells under the microscope.

The method is reported by Drs. Don W. Fawcett, Bert L. Vallee and Marjorie H. Soule in the journal, SCIENCE (Jan. 13). In present methods of using fluids from various parts of the body to diagnose cancer, the fluids are spun in a centrifuge to throw the cancer cells down to the bottom. The clear fluid is drawn off the top and the sediment is examined. This sediment may contain blood and other cells besides cancer cells.

But cancer cells, Drs. Fawcett and Vallee found, are less dense than blood cells. By adding a mixture of salt solution and albumin from cow's blood to the fluid for cancer examination before spinning it in the centrifuge, the Boston scientists get the cancer cells, if present, to float up near the top of the tube. The heavier blood cells settle to the bottom. Between the blood cells at the bottom and the layer of cancer cells is a layer of albumin. Above the cancer cells is a layer of salt solution. The cancer cell layer can then be drawn off and examined under the microscope.

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PHYSICS

Radio Noises Can Be Picked Up by Receiver

➤ LARGE amounts of radio noise are being showered on us from all directions. These bursts of radio noise are coming from somewhere in the outer atmosphere of the earth. They can be picked up by the radio receiver in your home as increased background static, if your receiver is sensitive.

Definite proof that the occasional large increases over normal background noise are spread over the whole sky was disclosed in the journal SCIENCE (Jan. 13) by Herman V. Cottony of the National Bureau of Standards.

Discovery was made when a solar radiometer, an instrument to measure the amount of radiation coming from the sun, was directed towards different parts of the sky on Nov. 23. On that day the radio noise had increased to about six times the usual intensity. The solar radiometer, however, even when pointed directly at the sun, showed no unusual disturbances.

Dr. Cottony concludes that the exceptionally large amounts of radio noise are coming from somewhere in the outer atmosphere of the earth.

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AERONAUTICS

Cross-Wind Landing Gear To Be Tested

➤ CROSS-WIND landing gear for airplanes is to receive a variety of scientific tests during the next few months under direction of the U. S. Air Force, it was revealed. The objective is to further the development of this type of landing equipment to save millions of dollars in airport construction.

The plane to be used is a DC-3 which will be equipped with landing gear developed by the U. S. Civil Aeronautics Administration and fitted with instruments for measuring loads and stresses encountered in landing. Operational limitations and characteristics also will be determined during the testing.

The principal advantage of the cross-wind landing gear is that a plane so equipped can land on any runway in spite of the direction in which the wind is blowing. Its castored-wheels will follow the landing strip even when the nose is at an angle.

This means that criss-cross runways at an airport would no longer be needed. At small airports a single strip would be enough. At large ports parallel strips could be used. Airports could be located nearer to the cities to be served because less land would be required. Airports in narrow valleys would be possible. Private flying would be promoted because local country air fields may be small and inexpensive.

Cross-wind landing gears are not new. They were used in some early planes but were later replaced by fixed gears. The present returning interest is largely due to the activities of the Civil Aeronautics Administration which has encouraged a number of aircraft companies to develop types of their own. The motive behind the program of the CAA is economic. Inexpensive flying fields will greatly promote aviation.

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MEDICINE

Aureomycin For Shingles

Patients with shingles react favorably to treatment with the golden yellow drug from a mold. This treatment is based on the theory that shingles is caused by a virus.

➤ GOOD results in treatment of shingles with aureomycin, the golden yellow drug from a mold, are reported by a six-man team of doctors at Boston City Hospital and Harvard and Tufts Medical Schools in Boston, Mass.

Severe pain and itching were markedly reduced after 24 hours and usually completely relieved in four or five days.

The blisters started clearing within 24 hours and in most cases were completely healed by the seventh or eighth day, with either no trace of them or only a faintly red scar.

Among the 24 patients treated by the Boston doctors were five in which the shingles attacked the eyes. All but one recovered without permanent damage to the eye cornea or impairment of vision. The one who did not get such good results was the one who would not continue treatment.

As evidence of the striking improvement in most of the cases is the note of the skin specialist who followed one of them in the clinic and wrote on the patient's record that he had "never seen such a case clear so rapidly."

The late pain, which sometimes comes after an attack of shingles and is a very stubborn feature, was prevented in all but six patients. In three of these the treatment was started after the middle of the third week of the disease, and the fourth was the one who refused to continue treatment. The other two got aureomycin in what seemed early and large enough doses.

The 24 cases are reported by Drs. Maxwell Finland, Edmund F. Finnerty, Jr., Harvey S. Collins, John W. Baird, Thomas M. Gocke and Edward H. Kass in the NEW ENGLAND JOURNAL OF MEDICINE (Dec. 29).

Cautiously, they state that the cases "strongly suggest that aureomycin has a definite beneficial effect on the course of herpes zoster (shingles)". They point out that no parallel control series of cases was observed. But the fairly regular and characteristic response in all patients who got adequate amounts of the drug in the early or active stage of the disease leads the doctors to think it helpful, if not a specific cure for shingles.

Chloromycetin, another of the new antibiotic drugs, may also prove helpful in shingles, the doctors suggest, but they have so far tried it on only three cases.

Many other treatments have been claimed in the past to have striking and specific effects in shingles. None of these has so far gained acceptance or wide use as a cure for the disease, the doctors point out in further warning against considering these new drugs as specific cures for the disease.

Use of aureomycin in shingles is based on the claim that the drug is effective against some germs of the virus class, among which is believed to be the cause of shingles.

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WILDLIFE

Snowy Alaskan Owls Visit Nation's Capital

➤ THE nation's capital which has been enjoying one of the balmiest winters on record awoke recently to learn that a snow flurry had checked in. Not the white fluffy stuff that has to be shoveled off sidewalks, but an unusual visitation of snowy owls from up Alaska way.

The Arctic flurry is actually more of a statistical thing than a large-scale invasion of the large white birds, but even so several of them have been seen in downtown Washington. The latest one was sighted recently, perched on a ledge of Constitution Hall.

The U. S. Fish and Wildlife Service, which keeps records on the comings and goings of these and other birds, says that snowy owls have been observed in greater abundance this year than any winter since 1926. The birds only penetrate south when their natural prey, the lemmings, enter their cyclical periods of scarcity, about once every four years.

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AGRICULTURE

Using Scythes for Sickles Would Advance Food Output

➤ IF millions of farmers throughout the world who still use the sickle would change over to the scythe, "nearly half the world could be moved ahead a hundred years," Norris E. Dodd, Director-General of the United Nations Food and Agriculture Organization, said.

This is one of the "simple, practical, comparatively cheap advancements" by which the world's food output could be increased. Another such measure mentioned by Mr. Dodd is the use of the best known rice varieties in place of inferior local types. If rice farmers, "who feed half the world", could use these superior varieties, total world production would be boosted by 10%.

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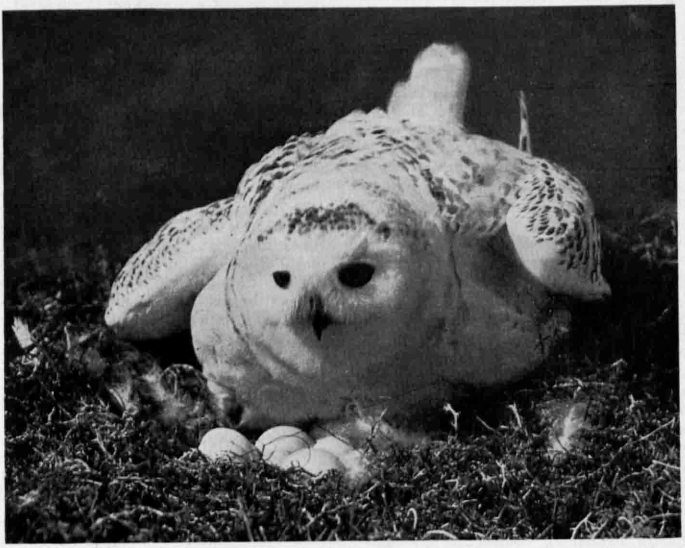


CAPITAL VISITORS—Snowy owls from Alaska have been recent visitors in Washington, D. C. These birds only penetrate this far south when the lemmings, their natural prey, enter a period of scarcity.

GENERAL SCIENCE

Truman Requests Salt Water Research Funds

➤ RESEARCH on ways of making salt water usable for drinking and other purposes, including irrigation, is one of the scientific projects for which President Truman requested funds from Congress.

The money, $1,000,000 requested for the fiscal year 1951, would also be used to build and install pilot plants for testing any satisfactory methods found in the laboratory. This project for finding ways to meet current and future water shortages would be under the control of the Bureau of Reclamation, Department of the Interior.

The President's budget message also included $500,000 for the proposed National Science Foundation, with the expectation that legislation establishing the Foundation will be passed. The money would be used to develop a national policy for basic research and education in the sciences and to promote basic research and evaluate existing research programs of both government and private industry.

Science News Letter, January 21, 1950

WILDLIFE-INDUSTRY

Two Mink Coats a Year— If You Are a Mink

➤ THE secret of how to get two new mink coats every year has just been discovered in Saratoga Springs, N. Y., famous racing and gaming center. A close study of the sleek and slinky creature with which the sumptuous fur is most closely associated shows that the whole thing is childishly simple. Don't be a man, be a mink.

Seems that minks can't help themselves, they just roll with the weather and molt. Twice a year they go through the routine of shedding last season's tired old model and growing themselves a new coat.

But as any one who has ever owned a mink coat can understand, it takes time. To make sure that the new coat is ready by Thanksgiving, a mink starts working on it early in August. The summer coat starts to look dusty, and the hair starts to loosen at various points.

From then on deterioration of the old model takes place in 10 stages, the fur loosening here and there according to a definite schedule. While this is going on, and about a month after molting began, new fur starts growing in toward the end of the tail, which by the end of September is fully furred.

Somewhere between Nov. 12 and 25 the new coat is completed, just in time for the chilly winter. The mink then has the pelt which is prime for the fur trade. The second coat, grown by a similar molting process between April and July, is lighter in color and less dense than the winter coat, and therefore less desirable commercially.

The details of the ten-step molting process were observed by two scientists of the U. S. Fur Animal Experiment Station, Saratoga Springs, N. Y., Drs. Charles F. Bassett and Leonard M. Llewellyn. They have just published a report of their findings in the AMERICAN MIDLAND NATURALIST (Nov.) Dr. Llewellyn is now with the U. S. Fish and Wildlife Service.

Science News Letter, January 21, 1950

METEOROLOGY

Predictions of Bikini Wind Speeds Inaccurate

➤ PREDICTIONS of wind speed for aircraft flying high over the tropics are often as much as 35 to 40 miles an hour off from the actual speed of the winds.

This is the conclusion of Maj. Delmar L. Crowson, U. S. Air Force, BULLETIN AMERICAN METEOROLOGICAL SOCIETY (Dec., 1949), from tests made high in the sky over Bikini at the time of the first and second atom bomb tests there and last spring.

The winds change both their speed and direction much more often than had previously been thought possible, he found. Maj. Crowson suggests that one reason for the great changes may be large-scale eddies.

His data contradict the theories for air flow around the earth that require easterly winds in the latitude of Bikini. Maj. Crowson found that easterly winds occur only a small percent of the time in that area.

Science News Letter, January 21, 1950

METEOROLOGY

East to Be Colder, West To Be Warmer This Winter

➤ THE EAST will get generally colder and the West warmer during the next two or three months, according to Jerome Namias, chief of the Extended Forecast Section of the U. S. Weather Bureau.

Mr. Namias pointed out that, during the month of December, weather in the United States followed a pattern similar to that of last winter. There seemed to be a dividing line down the middle of the country and to the east of that line temperatures were above normal, while to the west they were below normal.

The pattern has occurred only twice before since weather records have been kept, once during January, 1937, and again throughout the whole winter of 1889-90.

However, Mr. Naimas pointed out, the global pattern has been different this year than last. And the difference in the global pattern is one of the reasons he believes the weather will change in the United States. He said that last year Europe had warmer winter temperatures while this year there have been some extremely low temperatures there.

Science News Letter, January 21, 1950

IN SCIEN

AGRICULTURE

Foot-and-Mouth Hazard Is New Group's First Job

➤ CLEARING the Mexican border of the heavy brush that is impeding horse and jeep patrols on quarantine duty against foot-and-mouth disease is one of the first jobs assigned to the Department of Agriculture's newly created Weed Division.

The patrols have been having trouble working close to the border because of the very thick reedlike cane that grows along the Rio Grande.

At least 100 million acres are overrun with heavy shrubbery, said Dr. R. M. Salter, chief of the Bureau of Plant Industry. In addition to interfering with the quarantine patrols, the brush would impede a hasty roundup of cattle in the event of a foot-and-mouth disease outbreak.

Both mechanical and chemical methods are being studied to fight the hazard.

Science News Letter, January 21, 1950

ENGINEERING

Ship Stabilizer Device To Relieve Seasickness

➤ RELIEF from the roll of the sea, and from seasickness, is promised with a ship stabilizer which Stanford engineers are helping develop. It is a 10-year-old idea, but development begun in 1938 was halted during the war and until recently.

The theory of the stabilizer was developed by Dr. Nicholas Minorsky, who was at Stanford University from 1947 to early 1949. A model, named the U. S. S. Minorsky, was built at the New York Naval Shipyard in 1938. Experiments with it in the shipyard's laboratory led Navy engineers to build a device which was tested aboard the U. S. S. Peregrine off the coast of Virginia.

The stabilizer consists of two large tanks, installed on opposite sides of the vessel, with their bottoms connected across the ship by a duct. The tanks are partly filled with water. The instant the ship starts to roll, a sensitive instrument, called an angular accelerometer, automatically puts a pump in operation. This forces water through the duct to the tank on the side where the roll started, thus leveling the ship.

The device was briefly sea-tested by the Navy in 1940 on the destroyer, U. S. S. Hamilton, but was removed when the vessel entered active war service. In 1947 it was brought to Stanford, reassembled and put into operation by Dr. Minorsky. He was assisted by Albert J. Morris and Joseph H. Chadwick, Jr.

Science News Letter, January 21, 1950

E FIELDS

GENETICS

Tumor-like Growths of Fruit Fly Are Inherited

➤ NEW evidence showing that tumor-like growths in the fruit fly drosophila are inherited has just been advanced.

Although the experimental strain of flies inherited tumors as a simple genetic recessive character, Dr. Ernest W. Hartung of Rhode Island State College said that heredity "cannot be regarded as the cause," because not all the flies became tumorous.

Since the discovery in 1916 of the presence of tumors in fruit flies, many workers have tried to demonstrate their exact hereditary nature, Dr. Hartung said. But only one previous investigator has had any success in this up till now.

Since inheritance does not tell the whole story, Dr. Hartung sought other influences which might also be contributory. Both diet and temperature seem to produce some variation in the expected proportions of tumorous flies, he said.

However further investigation is still necessary, he added, before the influence of diet and temperature can be accurately appraised.

Science News Letter, January 21, 1950

METALLURGY

Magnesium Is Resistant At Very Low Temperatures

➤ MAGNESIUM now joins gold as the second metal with a queer electrical behavior at extremely low temperatures. It has an increased instead of a decreased electrical resistance when its temperature is lowered below six degrees on the absolute scale, or below minus 449 degrees Fahrenheit.

New insight into the structure of matter is promised from this discovery and other similar studies being made in low temperature laboratories throughout the country.

Dr. Frank G. Dunnington, chairman of the physics department of Rutgers University, New Brunswick, N. J., is collaborating with Dr. Bernard Serin and Dr. Charles A. Reynolds on the behavior of metals at very low temperatures.

Working independently, Dr. K. Mendelssohn of Oxford University, England, announced that discovery of the queer behavior of magnesium had been made in his laboratory.

Finding another metal that has increased resistance near absolute zero brings up the question of how its behavior can be explained. As yet no generally accepted theory has been suggested.

Other types of materials, semiconductors, also have an increase in electrical conductivity when the temperature is lowered below a certain point. The basic mechanism for the change in these materials, however, is known to be different than that for pure metals such as gold or magnesium.

The phenomenon of superconductivity is not new to the scientist, but so far there is no satisfactory explanation of why many metals do have a sudden drop in their electrical conductivity at very low temperatures.

Science News Letter, January 21, 1950

PHYSICS

Atom Smashers Are Analyzing Deadly Smog

➤ ATOM-SMASHING techniques are helping to determine exactly how much or how little makes up deadly smog.

The new method of analyzing extremely small amounts of matter—as little as one-billionth of an ounce—has been developed by Dr. Sylvan Rubin and Volney K. Rasmussen, physicists at Stanford Research Institute. Dr. C. C. Lauritsen, professor of physics at California Institute of Technology, collaborated in developing the technique.

Samples of smog were bombarded with charged particles in the half-million volt electrostatic generator at the Kellogg Radiation Laboratory. This causes a scattering of the particles in a way that is peculiar for each element in the sample.

Layers of material no more than one molecule in thickness can thus be analyzed. Oil spread in a very thin film on water so that it reflects rainbow colors is often only one or two molecules thick.

Science News Letter, January 21, 1950

CHEMISTRY-ARCHAEOLOGY

Chemicals in Fossils Reveal Ancient Secrets

➤ THE presence of microscopic amounts of an element called strontium in the fossils of very old ocean creatures makes it possible to tell how ancient seas were constituted, whether the creatures lived in fresh or salt water and many other things, Dr. Howard T. Odum, zoologist at Yale University has discovered.

Strontium is a relatively stable element. The zoologist explained that it always goes along with calcium in bones and shells and that the amount of strontium in relation to the amount of calcium in a fossil reflects the amount in the medium in which the animal lived.

It is known how much strontium is present in creatures which live in fresh water and that this amount differs from that in salt water creatures. Thus, scientists are able to learn much about the environment in which the creatures lived.

Science News Letter, January 21, 1950

AERONAUTICS

Jet Certified for U. S. Commercial Transport

➤ AMERICA now has a jet engine certified for commercial jet transport use. This marks an important step looking forward to jet-propulsion of civil planes. The U. S. Civil Aeronautics Administration has certified for commercial transports the General Electric powerful J-47 engine.

It is the first jet engine so certified. Many of this type are in use in military fighters and bombers. To determine its fitness for commercial passenger uses, the engine was tested in the wind tunnel of the National Advisory Committee for Aeronautics at its Lewis Laboratory, Cleveland, and at various Air Force development centers. In the tests the engine has logged up several thousands of hours of flight time.

America now has many types of military planes from speedy fighters to giant bomber that are jet-powered. It has no commercial airliner, however, using this type of propulsion. Both England and Canada have. An American jet-propelled airliner may now be expected within a year or two.

Science News Letter, January 21, 1950

ASTRONOMY

Heavy Metals Discovered In Cool Red Stars

➤ STARS may both be red and yet differ in basic chemical composition, the American Astronomical Society was told by Dr. Philip C. Keenan, of Perkins Observatory of the Ohio State and Ohio Wesleyan Universities.

Dr. Keenan has studied the spectra of some of the reddest of the red stars, those classified by astronomers as class S. These stars have very low surface temperatures that permit the existence of many compounds in their atmospheres. During last year's decline to minimum of the long-period variable star R. Cygni, spectra were taken at the Perkins Observatory with the 69-inch reflecting telescope there. A remarkable new set of bands from unidentified molecules was found in the infra-red region of the spectrum (7,500 to 9,000 Angstroms).

The new evidence extends an earlier suggestion that in the atmospheres of the S-type stars the heavier metals are more abundant than in the M-type stars. Most red stars are of the M-type. In type S the elements of the fourth and fifth rows of the periodic table of the elements: rubidium, zirconium, lanthanum, etc., are more conspicuous than in type M, where the elements of the third row: potassium, titanium, iron, etc., are most prominent. Dr. Keenan pointed out that if this fundamental difference in chemical composition extends into the interiors of the stars, it raises the possibility that the two groups of stars may differ in their past histories.

Science News Letter, January 21, 1950

AERONAUTICS

Fuels for Faster Planes

Jet and rocket engines need their own particular kinds of fuels. Kerosene, the usual fuel, is not plentiful and is quickly decreasing in importance.

By A. C. MONAHAN

➤ THE 100-octane gasoline, famous fighter fuel for planes of the recent war, may be of only minor importance in another emergency. Jet and rocket engines, and power for guided missiles, need their own kinds of fuel and some of them are far removed from petroleum products.

Jets, however, will probably continue to use products from crude oil, but not the kerosene which is now the usual fuel.

Lack of Kerosene

One reason is that there is not enough kerosene to meet the needs of an active combat force. Only about 6% of crude oil is kerosene. Jet engines can operate on gasoline, but better still is a new fuel that includes both gasoline and kerosene and also the diesel oil from the petroleum.

Proper fuels for the speedy planes of the future, both civilian and military, and fuels for ram-jets, rockets and guided missiles, constitute one of the principal problems of today in the aviation field. Progress can be reported, but there is still much to be done. Results achieved are still held partly secret for very obvious reasons.

High Altitudes Are Problem

The problems encountered in meeting the fuel needs of the jet engine, the ram-jet and the rocket are all different. Both ram-jet and rockets have applications of their own, but both are coming more widely into use to provide "spurt" power to fighters and bombers for use in combat emergencies. Ignition at high altitudes and speed presents a special problem.

The ram-jet, or "stovepipe engine," is a relatively simple device which gives extraordinary power in comparison with its weight. However, it will not operate until it has an initial speed of some 300 miles an hour, a speed that permits it to pick up enough air to support combustion. It provides valuable supplementary power to ordinary jet propulsion high in the sky because it gets its initial speed from its carrier.

Fuels of the past for the ram-jet have often failed in two respects. They refused to ignite at high altitudes, and after igniting the flame of combustion is often subject to "blow-out" from the very speed of the air rushing through it that enables combustion to take place. The essential problem is to develop a fuel that will ignite easily both at high and low altitudes, and one whose flame is proof against "blow-outs."

Rocket Engine Problem Different

With the rocket engine, the problem is entirely different. Present rockets operate only for a few minutes because they can not carry enough fuel for a longer flight period. One problem is to obtain a fuel light enough so that greater quantities can be carried, but this is complicated by the fact that the rocket has to carry oxygen for combustion as well as fuel. The rocket is the only present type of engine that can operate above the atmosphere. All other engines rely upon air for their supply of oxygen.

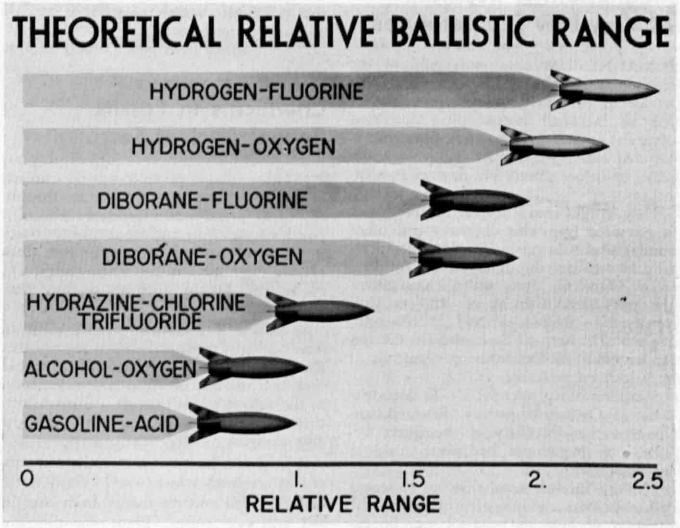
The oxygen for the rocket comes from an oxygen-yielding chemical mixed with the fuel, or compressed oxygen in its own tank, perhaps in liquid form, to mix with the atomized liquid fuel in the combustion chamber. However, oxygen is not always needed; a hydrogen-fluorine combination will provide the speedy jet discharge to drive the plane.

Unending Research Needed

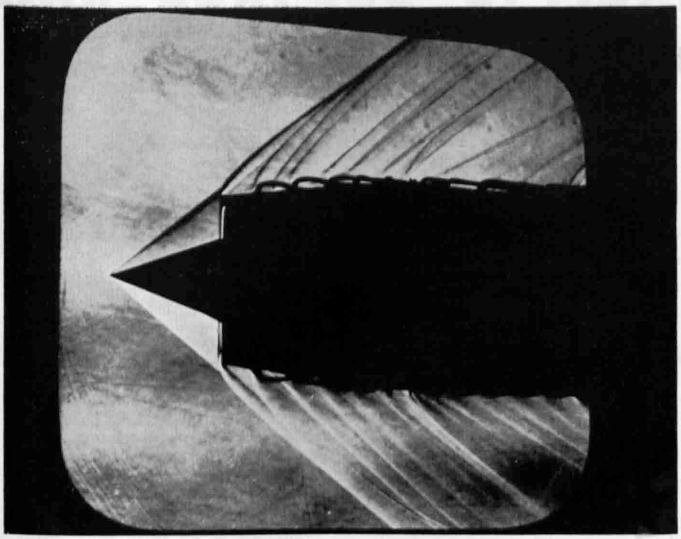
Research for better fuels for all types of aircraft is spear-headed in the United States at Cleveland, Ohio, in the Lewis Flight Propulsion Laboratory of the National Advisory Committee for Aeronautics. Valuable work, however, is also being carried out by university and other laboratories and by the engine and fuel industries themselves.

This NACA laboratory is one of three maintained by the National Advisory Committee for Aeronautics, and its particular work is concerned with fuels and the engines in which the fuels will be used. Great progress has been made, but much remains to be done. Unending research is essential to keep America ahead in the aviation field. The first objective is to satisfy military needs. The second is to adapt the new developments for civilian utilization.

From its earliest days, NACA has studied propulsion problems. In 1923, an NACA report by Edgar Buckingham of the National Bureau of Standards considered the future of jet propulsion. This was 26 years ago, and it is only eight years since America's first jet-powered airplane took off at Muroc, Calif., on its maiden flight.



FUEL THRUST—The chart prepared by the National Advisory Committee for Aeornautics shows the relative thrust of various rocket fuels.



SHOCK WAVES—Design studies in supersonic wind tunnels will determine the best shape for air inlets and compressors for air breathing engines. Rough-appearing surface and light shock waves pictured are due to pressure measuring tubes which would not be present on finished model.

Early interest on the part of the NACA was largely in the reciprocating engine. Military requirements during the war demanded immediate extension of the power potential of this type of engine which industry was equipped to build in the needed number. However, it contained some research in jet propulsion, and now virtually all research effort is concentrated on jet and rocket engines.

Rocket Uses Increasing

With the greatly increasing uses of rocket power to supplement other power in planes, and the development of rockets for other purposes, an intensive study of more powerful rocket fuels has become necessary. Already fuels have been studied that are 2.5 times as powerful as the ordinary gasoline-nitric acid combination fuel-oxidizer propellant widely employed. Studies are being continued to include propellants with still higher energy potentials.

Hydrogen-Fluorine Propellant

From a theoretical standpoint, the Lewis laboratory has determined that a hydrogen-fluorine propellant will give 2.5 times the ballastic range of the gasoline-nitric acid or alcohol-oxygen combinations of common use. Hydrogen-oxygen propellant is nearly as good as the hydrogen-fluorine. Diborane-fluorine and diborane-oxygen propellants are about twice as powerful as gasoline-acid, and hydrazine-chlorine trifluoride is 40% better.

Great hopes are held by scientists who have worked with a hydrogen-oxygen propellant, particularly by those at Ohio State University who have the equipment to condense these and other gases into liquid form. In a rocket both the hydrogen fuel and the oxygen oxidizer would be carried preferably in liquid form. To liquefy them, very high pressure is used and in combination with it, a process in which part of the compressed gas is released to create the extreme cold needed for the conversion into liquid.

Hydrogen-Oxygen Motor

A rocket motor utilizing liquid hydrogen and liquid oxygen has been in experimental use at the Ohio State University for nearly two years where it was developed by Prof. H. L. Johnston and Marvin L. Stary. It is no larger than the human hand but it will produce a thrust higher than that developed by the engine of the average small airplane, they claim. Its exhaust jet nozzle emits gases at a speed of around 15,000 miles an hour.

One advantage of the use of hydrogen and oxygen is that both are plentiful. Only traces of hydrogen are found in a free state but abundant quantities occur in water, plants, animals, petroleum, asphalt and natural gas. About one-fifth of the atmosphere is free oxygen. Recent developments made its separation from air easy. Expensive equipment, however, is required to reduce either to a liquid form.

The rocket is unsurpassed as a "heat engine" wherever high thrust is required for short periods of time, NACA scientists state. It develops the greatest thrust per unit of engine weight with the smallest frontal area per pound of thrust of all engines used in aircraft propulsion. It is the only power plant whose performance does not decrease with higher altitudes because it carries its own oxygen supply and does not rely on air.

Science News Letter, January 21, 1950

ENGINEERING

Natural Rubber Is Better In Roads than Synthetic

➤ NATURAL rubber, in the new-type roads under testing in the United States which utilize a rubber-asphalt mix, seems to have a definite edge over the synthetic product, the American Society of Mechanical Engineers was told by Lois W. Brock, G. H. Swart and E. V. Osberg of the General Tire and Rubber Company of Akron, Ohio.

Tests of these so-called rubber roads are being made in at least five states. England is also making tests. In the Netherlands and in Java, rubber roads were built some 12 years ago. The Netherlands roads withstood well heavy German traffic during the war.

In this type of road surface, rubber in powder form is mixed with ordinary asphalt. A layer only one millimeter thick of rubber-asphalt mixture is said to be all that is necessary.

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MEDICINE

Iron Lung Centers Planned

➤ HOPE for improving the lot of the nation's 450 infantile paralysis patients who can live only in iron lungs appears in a plan to establish at least five iron lung centers in various parts of the country.

Patients who have to live alone in an iron lung, either at home or in a hospital, do not get along as well as when they live in a group with other iron lung patients. This was learned from a pilot respirator (iron lung) center at Children's Hospital, Baltimore. For over three years 24 chronic respirator patients have been treated there as a group.

Many patients at this pilot center found they could stay out of their iron lungs for longer periods when they were encouraged by seeing other respirator patients trying to do the same thing. Some were finally able to stay out of the respirators entirely, others for all the time except when sleeping.

Besides these good results from the psychological effects of living in the respirator center, the patients were helped by the concentration of special care, skills and equipment. Costs were greatly reduced, since the 24-hour nursing service needed by all iron lung patients could be shared.

The five new respirator centers, which will be devoted to research as well as patient care, will be financed by contributions to the Mary MacArthur Memorial Fund for the National Foundation for Infantile Paralysis. Half the money contributed in the name of the 19-year-old daughter of Helen Hayes and Charles MacArthur, who died last September of respiratory polio, will be used for this purpose, the other half remaining in the community where it was raised to provide funds for local patient care.

Science News Letter, January 21, 1950

ENTOMOLOGY

Insect Fight Advances

➤ IT was a banner year for us bipeds in the endless cold war against the insects. Man used some of his heaviest scientific guns, like chemistry and air power, to kill the bugs on a dozen fronts while the insects could only claim an occasional local gain.

Some of man's achievements in 1949, outlined by Dr. P. N. Annand, chief of the Bureau of Entomology and Plant Quarantine, in his annual report, include the following:

1. Development of synthetic chemicals that act like the fly-killer pyrethrum, some of which are even deadlier.

2. Use of planes to spray large areas, with particular success against mosquitoes and black flies.

3. New insecticides: methoxychlor and lindane which can be used safely for fly control of dairy cattle; new organic phosphorus compounds against mites and aphids; and new baits against grasshoppers.

4. A chemical treatment which keeps insects out of flour and other food bags; and the use of DDT to prevent insect damage to clothes better and more cheaply than naphthalene.

Among the gains chalked up by the insects, the most impressive was the development of resistance to DDT. However, this is somewhat offset by new and effective fly-killers like methoxychlor, chlordane and lindane.

One of the few insects that came through the year in an improved state, is one that is working on our side. This traitor is called the Chrysolina beetle. Bureau scientists, with the cooperation of the University of California, imported some and nourished them until they were half a million strong. Then they were turned loose in large numbers in California, Oregon, Washington, Idaho, and Montana to destroy Klamath weed, a plant pest.

Science News Letter, January 21, 1950

AGRICULTURE

Crop-Destroying Wireworm Tracked Radioactively

➤ ONE of the worst crop destroyers, the soil-dwelling wireworm, is being shadowed in his underground travels by a team of scientific sleuths armed with Geiger counters.

By tagging larvae of the prairie grain wireworm with radioactive cobalt, three Canadian scientists are able to track the path of the tiny insect. From their study of the worm's turnings, they hope to devise more effective control methods.

There are many varieties of wireworms, they are widely distributed, they attack a wide range of crops, and they are highly destructive. In the United States they kill or weaken a long list of crops, a few of which are: wheat, corn, potatoes, onions, beans, cotton, pasture grass, and tobacco.

Drs. A. P. Arnason and R. A. Fuller of the Dominion Entomological Laboratory, Saskatoon, and Dr. J. W. T. Spinks, chemistry head at the University of Saskatchewan, have just finished mapping the zigzag progress of one such tagged worm.

They attached a tiny piece of radioactive cobalt to the half-inch long larva, using vinylite plastic so that the metal would stay put. They put the larva in one end of a shallow soil-filled container. At the other end, eight inches away, they buried a piece of potato. Twelve hours and 40 minutes later the larva found the potato and climbed in.

They took Geiger tube readings every ten minutes at the surface, and pinpointed the path the worm followed. Their map shows that the worm wandered all over the place, actually covering many times the eight-inch distance that separated it from the potato.

This method of tagging wireworms can be applied to other underground insects. The three investigators predict that from knowledge obtained in this way, better control will be gained over these destructive pests. A report on this work has just been published in the journal SCIENCE (Jan. 7).

Science News Letter, January 21, 1950

ENGINEERING

Concrete Gives Better Radiation Protection

➤ BETTER protection from radiation is given by a new kind of high-water content concrete developed in Pittsburgh, Pa.

The cost of the new concrete is less than ordinary concrete, and it is easy to make. Secret of the improved variety is that it has iron in it. This gives it more shielding ability per cubic foot. Less space is therefore required to give the same protection from radiation.

To find the best possible shield for the 400 million-electron-volt proton synchrocyclotron at Carnegie Institute of Technology, Dr. Edward Creutz and K. Downes tested many types of concrete, including magnetite concrete. Their report appeared in JOURNAL OF APPLIED PHYSICS (Dec.).

They found that the material made with magnetite ore, cement and water gave better protection than ordinary concrete. This concrete is also easy to handle and is quite strong. It is not as strong, however, as ordinary concrete.

Although the new concrete is more expensive by the cubic foot, using it results in a saving because it takes less space to give adequate protection.

Science News Letter, January 21, 1950

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Stock #1061-Q—6½" dia. 9" F.L. **$2.50 ea. Pstpd.**
Stock #1080-Q—5½" dia. 7" F.L. **$1.00 ea. Pstpd.**
Stock #1084-Q—2½" dia. 4"F.L. **$1.00 ea. Pstpd.**
Stock #1077-Q—2⅜"dia. 3"F.L. **$1.00 ea. Pstpd.**
Stock #1019-Q—6" dia. 16" F.L. **$2.00 ea. Pstpd.**
Stock #1062-Q—6"dia. 9"F.L. **$2.00 ea. Pstpd.**
Stock #1086-Q—1-11/16" dia. 3" F.L. **$ .25 ea. Pstpd.**
Stock #1103-Q—29/32" dia. ½" F.L. **$ .50 ea. Pstpd.**

MOUNTED PROJECTION LENS—Speed F/1.9 . . . F.L. 15 mm. $22.00 value for $7.50. Low Reflection Coated. Used on 8 or 16 mm. Movie Projectors . . . or to make a Desk Viewer or Editor . . . for 16 mm. Micro-film Reader . . . for Contour Projector for very small items.
Stock #4045-Q ..... **$7.50 Postpaid**

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These Army Air Forces Bubble Sextants costs the Govt. about $125.00 each. A real bargain at our price at $12.50! Wooden carrying case included. Also auxiliary items. Wartime used. **BUT COMPLETELY REPAIRED COLLIMATED AND PUT IN GOOD WORKING ORDER.** If not satisfied that Sextant is exactly as represented, return within 10 days for refund. Full directions for use accompany each shipment.

Stock No. 924-Q ..... **$12.50 Postpaid**

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Stock #946-Q ..... **$32.50 Postpaid**

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Stock #692-Q Pr. of 2" dia. Circles 35c Pstpd.

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Stock #2-Q—10 lenses ..... **$ 1.00 Postpaid**
Stock #5-Q—45 lenses ..... **$ 5.00 Postpaid**
Stock #10-Q—80 lenses ..... **$10.00 Postpaid**

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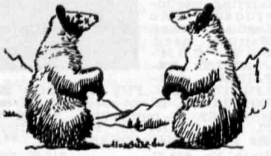

Hibernation

➤ THE bear who was cranky in the spring because he had tossed and turned all winter is probably less of a rarity than is commonly supposed. The winter sleep of bears varies from sound slumber to intermittent dozing, and compared to the hibernation of some other creatures, bears are wide awake.

Take such cold-blooded animals as snakes and turtles, or toads and salamanders. Because they are cold-blooded, instead of warm-blooded like birds and mammals (including humans), their temperature is only a degree or so above their surroundings. In winter ordinary outdoors surroundings get too cold even for snakes to survive.

So they head for a hole underground below the frost line or in the mud below the waterline, and go into a trance that lasts until warm weather comes again.

Compared to such thorough-going seasonal self-effacement, bear hibernation is mild. Strictly speaking, some experts do not even classify it as hibernation. For one thing bears do not undergo the extreme lowering of body temperature that other creatures, such as ground squirrels, woodchucks, and bats, do.

In these deep-slumbering, true hibernators, body temperatures go down very low, and the circulation slows down greatly. When in the typical deep torpor of hibernation, these creatures will scarcely bleed, even if a limb is amputated.

Moreover when attempts are made to rouse them, they respond very sluggishly and it takes a considerable time in warm surroundings for them to snap out of it.

Bears by comparison can get into action relatively quickly, although they too go into a deep torpor, especially if it is very cold. The bears that sleep deepest are pregnant bears, or mothers with cubs. Others, and especially the males, sleep off and on, frequently interrupting their nap to wander around the woods.

The length of time an animal hibernates varies a good deal from one species to another, and even between individuals of the same species. While some bears scarcely hibernate at all, but merely take it easy during the colder spells, others tick off whole months without interruption. One observer has reported seeing a mother bear and her three cubs in the same den for three and a half months.

Skunks have been known to hibernate four months, badgers six months, and bats seven months, which seems to be carrying a good thing to extremes, like the little boy who slept the whole day through in order to miss his one-hour music lesson.

But what is possibly the all-time record was chalked up by a young female ground squirrel which slumbered in the arms of Morpheus for 33 weeks. Only 19 more weeks before she had to start all over again!

Science News Letter, January 21, 1950

ENGINEERING

More Sugar from Sugar Beet with New Process

➤ MORE sugar from the sugar beet will be possible with a process of treating former wastes, developed at the Massachusetts Institute of Technology and revealed in Cambridge.

The new waste treatment increases the yield of sugar from every ton of beets by about four pounds while reducing water consumption by at least 320 gallons. If adopted by all the nation's sugar beet mills to which it is applicable, the new process could save more than 20,000 tons of sugar a year. It would also eliminate a source of stream pollution which annually involves about 3,000,000,000 gallons of waste water.

Under this new method, a very small amount of chlorine is dissolved in the mill's process waste water. This chlorine destroys bacteria and acts chemically to make rapid separation of the non-sugar impurities. The small concentration of valuable sugar that remains in the water can then be recovered, since the chlorine-treated water may be re-used for sugar extraction instead of being discharged as waste.

Under direction of Dr. Clair N. Sawyer of the MIT staff, the process was developed by Dr. E. A. Pearson, now of the University of California.

Science News Letter, January 21, 1950

ENGINEERING

Brick and Tile Improved By Soda Ash Addition

➤ THE addition of a controlled amount of soda ash to clay results in better brick and tile, it was revealed at the University of Wisconsin. The discovery was made by Prof. George J. Barker and Prof. Emil Truog of the university staff, and its application will be known as the B-T process.

The amount of soda ash to be used varies with different clays. Clays contain a number of ingredients, such as calcium, sodium and hydrogen. They are not present in all clays in equal amounts. If calcium predominates, the clay is alkaline. If hydrogen predominates, it is acid.

The workability of clay depends upon the nature and balance of these ingredients. The B-T process involves an analysis of the clay, and the "juggling" of the ingredients by the proper amount of soda ash.

The addition of soda ash, technically known as sodium carbonate, improves the workability of the clay to a marked degree. Less water is required in processing, green ware is tougher and dry strength is increased.

The B-T process has now been granted a federal patent which has been assigned to the Wisconsin Alumni Research Foundation. Brick and tile manufacturers can obtain licenses to use the process from the foundation. When manufacturers contract for the right to use the process, their clay will be analyzed at the university and a prescription furnished them indicating the proper amount of soda ash to use.

Science News Letter, January 21, 1950

Words in Science—CYGNET-FAWN

➤ HUNTERS, especially, will be interested in the words which apply to the young of wild animals.

Among the young of wild game birds, cygnet refers to the young of the swan, the young of the pheasant or quail is a chick, the young of ducks are ducklings and the young of geese are goslings.

Fawn is commonly used to refer to the young of the Red Deer, but it also applies to the young of the rabbit, caribou and antelope.

Young wolves are whelps, pups, or cubs. Young fox are kits or whelps. Young trout are fry. And young shark are cubs.

Science News Letter, January 21, 1950

• Books of the Week •

TO SERVE YOU: To get books, send us a check or money order to cover retail price. Address Book Dept., SCIENCE NEWS LETTER, 1719 N St., N. W., Washington 6, D. C. Ask for free publications direct from issuing organizations.

ALBERT EINSTEIN: His Work and Its Influence On Our World—Leopold Infeld—*Scribners,* 132 p., $2.00. Einstein's theories explained by the man who has worked for many years by Dr. Einstein's side on special problems of relativity theory. In non-technical terms.

ANNUAL REPORT OF THE SMITHSONIAN INSTITUTION 1948—Smithsonian Institution—*Gov't. Printing Office,* 466 p., illus., $2.50. The usual appendix contains authoritative summary articles for which this report has long been famous. Such articles as Atomic Energy in Industry by H. A. Winne, V-2 Rockets by E. H. Krause, Sense Organs of Birds by R. J. Pumphrey and Japanese Art by Robert T. Paine, Jr. are included.

CHARLES DARWIN: The Naturalist as a Cultural Force—Paul B. Sears—*Scribners,* 124 p., $2.00. The life and times of this great scientist and how he influenced them.

COME TO THE ZOO—Ruth M. Tensen—*Reilly and Lee,* 23 p., illus., $1.75. A beginning reader to acquaint children with 21 different animals of the zoo. Full page black and white illustrations.

THE COMPLETE BOOK OF HOME PET CARE—Leon F. Whitney—*Doubleday,* 552 p., illus., $4.95. All the necessary facts to keep your pet in the best of health.

ENGINEERING USE OF AGRICULTURAL SOIL MAPS—Highway Research Board—*National Research Council,* Bull. No. 22, 128 p., illus., paper, $1.80. Papers presented at the 28th annual meeting of the Highway Research Board, 1948.

FRACTIONAL HORSEPOWER MOTOR MAINTENANCE—T. E. M. Carville—*International,* 3rd ed., 282 p., illus., $3.75. For those interested in the operation, care, or repair of small motors.

GROUP GUIDANCE: Principles, Techniques, and Evaluation—Robert Hoppock—*McGraw-Hill,* 393 p., illus., $3.75. An introductory group guidance text.

GUIDANCE POLICY AND PRACTICE—Robert Hendry Mathewson—*Harper,* 294 p., illus., $3.00. A framework of fundamental theory which may aid in evaluating current psychological guidance practice.

HELPFUL HINTS TO THE DIABETIC—William S. Collens and Louis C. Boas—*Thomas,* 135 p., illus., $3.00. The diabetic is aided by this book to a better understanding of how he can work successfully with his doctor.

INDUSTRIAL PSYCHOLOGY AND ITS SOCIAL FOUNDATIONS—Milton L. Blum—*Harper,* 518 p., illus., $4.50. A college text.

INTRODUCTION TO ATOMIC PHYSICS—Otto Oldenberg—*McGraw-Hill,* 373 p., illus., $3.00 Intended for those who already have a general knowledge of physics.

ISOTOPIC TRACERS AND NUCLEAR RADIATIONS WITH APPLICATIONS TO BIOLOGY AND MEDICINE—William E. Siri, and others—*McGraw-Hill,* 653 p., illus., $12.50. A handbook of theory and practice in nuclear physics and tracer methodology.

MATERIALS ENGINEERING OF METAL PRODUCTS—Norman E. Woldman—*Reinhold,* 583 p., illus., $10.00. A reference to aid the materials engineer select the type of metal or alloy which is best able to meet a given set of conditions.

MEASURING OUR UNIVERSE: From the Inner Atom to Outer Space—Oliver Justin Lee—*Ronald,* 170 p., illus., $3.00. For those who wonder how infinitely small and great distances are measured. For the layman.

POINT FOUR: Cooperative Program for Aid in the Development of Economically Underdeveloped Areas—*Department of State,* 145 p., illus., paper, free upon request to publisher, Washington 25, D. C. An explanation of the nature, purpose, scope and operating arrangements for the proposed Point IV Program and its relation to the United Nations program.

PREHISTORIC SOUTHWESTERNERS FROM BASKETMAKERS TO PUEBLO—Charles Avery Amsden—*Los Angeles Southwest Museum,* 163 p., illus., paper, $3.50 (Cloth $4.25). A monograph on what corn did for the ancient people who inhabited the Colorado basin.

PROGRESS IN THE TREATMENT OF PULP AND PAPER MILL WASTES—W. W. Hodge—*Water Conference of Engineers' Society of Western Pennsylvania,* 32 p., illus., paper, free upon request to Mellon Institute of Industrial Research, University of Pittsburgh, Pittsburgh 13, Pa.

RAILROADS OF NEW YORK—G. W. O'Connor—*Simmons-Boardman,* 144 p., illus., $4.00. A pictorial history of railroading in and around New York City. Includes full-color maps of metropolitan rail and rapid transit facilities.

THE USSR: BASIC FACTS—Bernard L. Koten—*American Russian Institute,* 6 p., illus., paper, 10 cents. Economic, political, and social statistics.

WARD MANAGEMENT AND TEACHING—Jean Barrett—*Appleton-Century-Crofts,* 399 p., illus., $4.00. For graduate nurses who are preparing themselves for positions as hospital head nurses.

WHO KNOWS—AND WHAT: Among Authorities, Experts and the Specially Informed—*Marquis,* 796 p., $15.00. A reference book listing specialists and their fields and subjects.

Science News Letter, January 21, 1950

• New Machines and Gadgets •

For addresses where you can get more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St., Washington 6, D. C. and ask for Gadget Bulletin 500. To receive this Gadget Bulletin without special request each week, remit $1.50 for one year's subscription.

BETA GAUGE, an industrial measuring and control instrument, utilizes a source of beta radiation from strontium-90 and a radiation detector. Sheet material to be measured is put between source and detector. A part of the radiation is absorbed by the sheet in proportion to its weight per unit area.

Science News Letter, January 21, 1950

ENGINE HOOD HEATER, for use in the automobile garage in cold weather, consists of three standard infrared lamps in a specially designed channel suspended a foot above the hood. The device, inexpensive to operate, will keep everything under the hood warm in sub-freezing temperatures.

Science News Letter, January 21, 1950

SAVINGS BANK for the youngster will hold as much as $50 in coin but will pop open automatically when the total is $10 or a multiple of ten. As each coin is inserted a register dial adds it correctly to the amount already in the bank.

Science News Letter, January 21, 1950

FEEDING BIB for baby, shown in the picture, is made of a plastic film electrically sealed instead of stitched and with wide pockets to catch the inevitable spills.

It is a well-fitting garment large enough to give full protection, and it fastens at neck and arms with metal grippers instead of with strings.

Science News Letter, January 21, 1950

AIR PISTOL operates without pumping and has hair-trigger action. When the pistol is cocked, a powerful spring is compressed which moves a piston to one end of the air chamber. When the trigger releases the spring, air compressed by the piston powers the shot.

Science News Letter, January 21, 1950

ALL-PURPOSE HANDSAW for the wood worker has a plastic handle in which are inserted a level vial, a plumb vial, a wide-range protractor and an outside and inside layout square. The straight-edge back of the saw blade is graduated both in inches and in metric units.

Science News Letter, January 21, 1950

BREAST POCKET BINOCULARS, which "bring objects six times closer," utilize a single prism, said to transmit more light than the conventional two-prism system. This four-ounce sportsman's aid with a magnesium body is claimed to do everything that a standard six-power binocular does.

Science News Letter, January 21, 1950

GARDEN HOSE SPRAY GUN consists of an aluminum and stainless steel container for a concentrated insecticide solution which is attached to the delivery end of the hose. As the water passes through, a controlled, measured amount of the chemical solution is delivered into the stream.

Science News Letter, January 21, 1950

Do You Know?

Missouri claims to lead the nation in the production of *black walnut*, highly prized wood, particularly for furniture.

The first four patients to get penicillin treatment for *syphilis* have now passed a six-year period without a return of the disease.

Crows are said to kill more wild ducks each year than are killed by sportsmen; crows are able to kill a live duck but the greater damage to the duck population is due to the crow's liking for duck eggs.

Chemically, the *ruby* and the *sapphire* are similar, both being corundum, an aluminum oxide; the difference is in the coloring, the ruby containing chromic oxide and the sapphire containing oxides of iron and titanium.

Several different chemical preparations are used to *defoliate cotton*, that is to remove the leaves so that mechanical pickers may be used; they include calcium cyanamide, ammonium thiocyanate, monosodium cyanamid and potassium cyanate.