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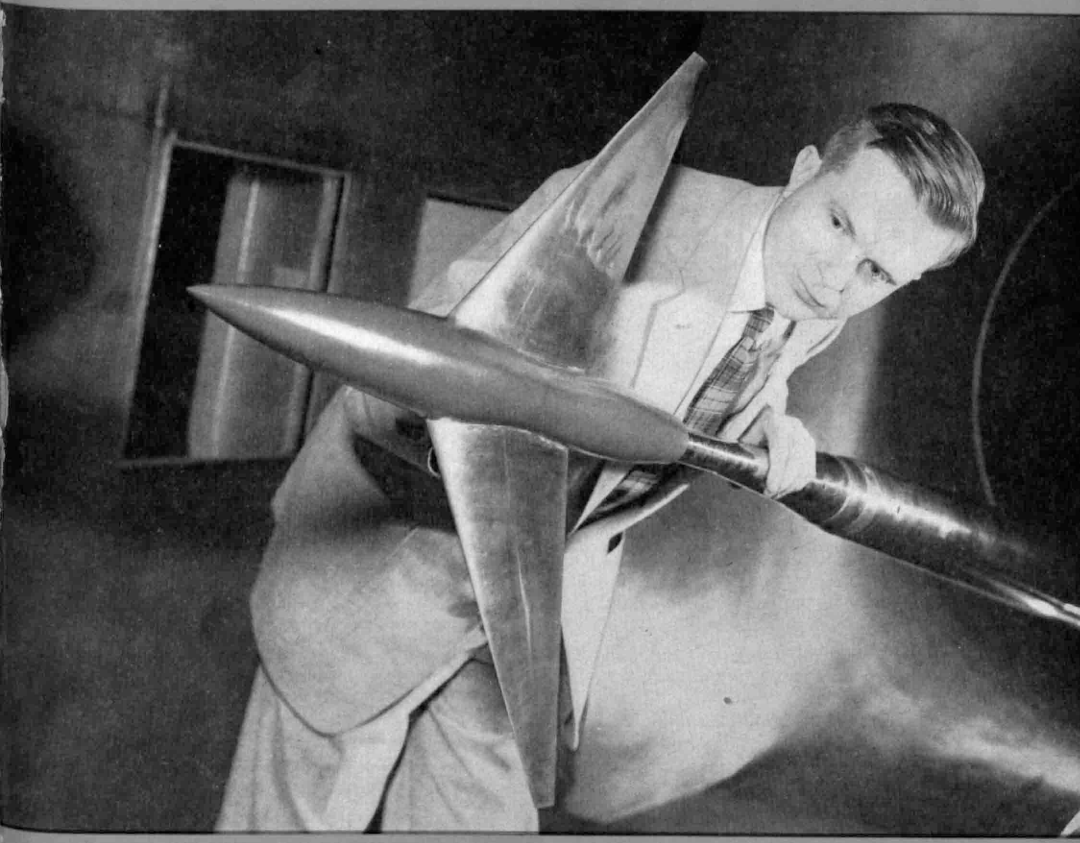
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE



Supersonic Wasp Waist

See Page 195

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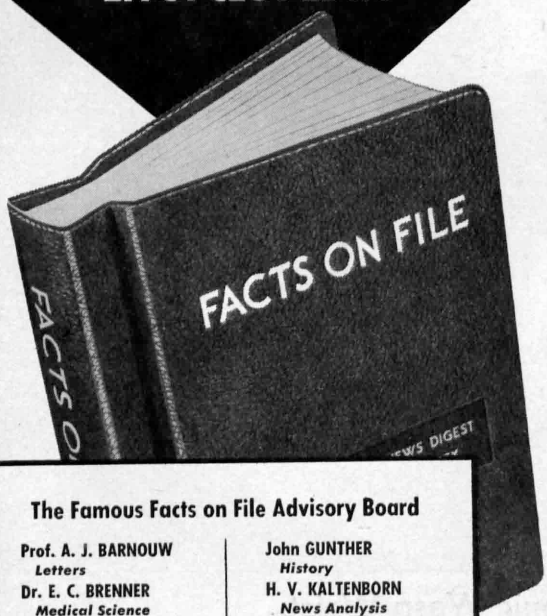

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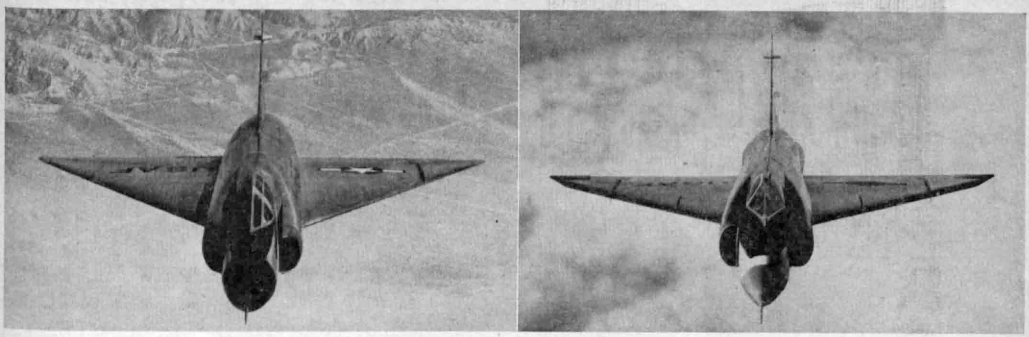

SHAPED FOR SPEED—A new idea for designing supersonic aircraft, called the "area rule," is illustrated in these comparative photographs of the prototype Convair YF-102, on the left, and the production F-102A all-weather jet interceptor, shown on the right. By giving the aircraft a "wasp waist," engineers increased the plane's speed, made it slip more smoothly through the sonic barrier, and greatly reduced the sharp drag rise that occurs at transonic speeds.

AERONAUTICS

Up Supersonic Speed 25%

Concept known as the "area rule" has been used for three years to increase supersonic speeds of airplanes as much as 25%; involves pinching fuselage where wings are attached.

See Front Cover

➤ A NEW MEANS of achieving airplane speed gains as high as 25% in the range above the speed of sound has been released from secrecy wraps, after having been used for U. S. military planes since 1952.

Called the "area rule," the new design principle was developed by Richard T. Whitcomb, 34-year-old scientist at the Langley Aeronautical Laboratory of the National Advisory Committee for Aeronautics, the Government's research arm for aviation.

The new method has been used on at least two supersonic airplanes, including the Grumman F11F-1, originally designated F9F-9 by the Navy, and the Air Force Convair F102-A, both flown in 1954.

The area rule concept results in a fuselage shape variously described as "coke-bottle," "wasp waist" and "Marilyn Monroe."

Mr. Whitcomb's work was begun in 1951 in the first of the NACA's transonic wind tunnels. When the drag-rise characteristics of wings, bodies, tail surfaces and other parts of the plane were considered as a whole, it was possible to develop an airplane design where the total drag was greatly reduced.

Mr. Whitcomb found that the drag rise was primarily a result of the combined cross-sectional area distributions.

In other words, users of the area rule pinch the fuselage where the wings are attached.

In this way, the cross-sectional area of the fuselage and the wing together become the same as the cross-sectional area would be for the streamlined fuselage only, with the optimum drag characteristics in the transonic speed range.

Mr. Whitcomb's discovery provided a powerful yet simple device for designing new aircraft with much improved performance.

Not only did it permit using information obtained from study of theoretically optimum "bodies of revolution"—streamline shapes that look like bombs without fins—in designing airplanes, but its use minimized the detailed, time-consuming analyses that previously were required whenever effects of wing geometry, such as thickness, sweep and aspect ratio, were involved.

Now that the general terms of the concept are known the significance of previously unclassified theoretical research work over the past decade is apparent, the NACA said.

Mr. Whitcomb, who joined the NACA after graduation as an engineer from Worcester Polytechnic Institute in 1943, is shown on the cover of this week's SCIENCE NEWS LETTER inspecting contours of a research model in the test section of the eight-foot transonic tunnel at Langley.

The model incorporates the new design principles for combining aircraft wings and bodies so as to provide a minimum of interference drag and a large improvement in aerodynamic efficiency in the critical transonic speed range.

CHEMISTRY

Temperature Profiles For Cigarettes Made

➤ "TEMPERATURE PROFILES" of cigarettes, cigars and pipes suggest the extremely high temperatures in cigarettes may cause "thermal cracking" of tobacco or cigarette paper chemicals into cancer-causing chemicals, in the opinion of Dr. Charles R. Greene, a chemist who lives in Berkeley, Calif.

Dr. Greene made the temperature profiles while at the Whiting Laboratories of the Standard Oil Company of Indiana, using a high-speed, high-temperature Micromax recorder.

The profiles showed the temperatures throughout the burning tobacco while it was being smoked. The "hot spots" in cigarettes were as much as 300 degrees centigrade, or 572 degrees Fahrenheit, hotter than the hot spots of pipes. Most moderately priced cigars had hot spots about as high as cigarettes.

Popular brands of cigarettes had hot spots varying between 1,130 and 1,364 degrees Fahrenheit, depending on the brand. Low-priced cigars were about as hot. Pipe tobaccos ranged from 788 degrees Fahrenheit for untreated non-aromatic tobaccos to 1,094 degrees for highly aromatic tobaccos.

The temperature of the gases entering the mouth ranged from 86 degrees at the bottom of the pipe bowl where the stem entered to as high as 158 degrees from some brands of cigarettes.

While cigars have hot spots in the same range as cigarettes, recent evidence, Dr. Greene says, tends to indicate cigars are not cancer-causing. Consequently he thinks that heat cracking of chemicals in cigarette paper may yield the cancer-causing chemicals.

His findings and theories are reported in *Science* (Sept. 16).

BIOCHEMISTRY

Insecticides Harm Birds

➤ ALERTED by the growing menace of potent chemical insecticides to game birds, U. S. Fish and Wildlife Service experts have been feeding them to quails and pheasants to find out how much of the poisons the birds can take without disastrous results.

Diets containing one-fiftieth of a percent of DDT did not seem to bother adult quails, but ill effects showed up later, when only 66% of their eggs hatched. At the end of 12 weeks, only about 20% of the hatched chicks, which were fed a DDT-free diet, were alive.

Stepping up the DDT dosage by only a two-hundredth of a percent resulted in death for all the adult quails in 45 days of feeding.

This same dosage killed all adult pheasants in only 18 days.

Dieldrin-feeding at only 1/1000 of a percent gave similar results as the first DDT test on quails, causing a decrease in hatching and high mortality among newly hatched chicks.

The effects of aldrin and endrin on reproduction of the game birds were not clear from the tests.

Aldrin, dieldrin and endrin were all highly toxic to both quails and pheasants. The pheasants refused to eat foods with one-fortieth of a percent of any of these poisons. With poison levels reduced to one-hundredth of a percent, however, they could be induced to eat.

All male pheasants died within ten days after the start of this diet. Female pheasants survived for a longer period, but no eggs were produced.

Earlier experiments have shown that the use of one pound of DDT per acre sprayed over forest or farm fields seems to have no immediate effect on bird population, but five pounds per acre cause a marked decrease. The U. S. Forest Service uses one pound of DDT per acre to spray forests for the destructive timber pest, spruce budworm, claiming that it does no significant harm to wildlife.

In spite of earlier findings, not enough is known about the long-range effects of insecticide-spraying on wildlife, the scientists concluded, asking for adequate control measures to protect game birds in areas to be sprayed.

Dr. James B. DeWitt reports the experiments in the *Journal of Agricultural and Food Chemistry* (Aug.).

Science News Letter, September 24, 1955

SURGERY

Safer Brain Operations

➤ BRAIN TUMORS can be removed more safely from infants and children by "meticulous attention to the mechanical details of operative methods," Dr. Rudolph Jaeger of Jefferson Medical College, Philadelphia, reported at the meeting of the U. S. and Canadian sections of the International College of Surgeons in Philadelphia.

"Benign, or cancerous, growths are commonly removed from these small patients with slight operative risk," Dr. Jaeger reported. "Cancerous growths can be exposed and their nature precisely determined with a good chance of temporary improvement."

These operations are made safer, he said, by the following:

1. Injection of sleep-inducing drugs into the blood stream, instead of giving anesthetics such as gas and ether that must be inhaled.

2. Elimination of use of tubes in the mouth, throat and windpipe commonly used in past anesthetic methods.

3. A new pumping system by which blood can be pumped into the veins as needed through the same syringe and needle that supplies the sleep-inducing medicine.

4. Reduction of abnormally high pressure inside the skull, which is very common in brain tumors, by inserting plastic tubes the size of pencil lead into the water-bearing pockets of the brain and spinal cord.

Improved diagnostic methods through injections of air and dyes opaque to radio waves into the brain vessels and cavities, proper position of the patient on the operating table, and care before and after operation are other factors Dr. Jaeger gave as contributing to reduced mortality in brain operations on babies and children.

Science News Letter, September 24, 1955

AGRICULTURE

Poison in Common Cotton Harmful to Livestock

➤ COTTON VARIETIES with the poison glands bred out are the aim of a U. S. Department of Agriculture experimental program.

Common cotton plants contain poison glands that make cottonseed meal dangerous as a livestock feed to many animals unless it is given a "de-poisoning" treatment.

The poison glands, scattered throughout the cotton plant, especially in the seeds, produce a toxic pigment called gossypol. Because of the presence of gossypol, feeding of cottonseed meal was long restricted to cattle and sheep, unaffected by the poison.

Later, methods of obtaining cottonseed oil and meal by pressing and cooking caused inactivation of gossypol, and today's commercial meal can be fed safely to chicks and broilers, but not laying hens, and to swine.

The USDA, however, wants to breed the poison glands out of cotton, and already has encouraging results in early tests. Cotton geneticists with the USDA have observed certain plants of both commercial upland cotton and primitive Hopi varieties with unusually small numbers of the glands. Some parts of these plants are completely gland-free.

The scientists are now trying to breed the glandless character existing in parts of these plants into a single variety of cotton that would be completely free of the gossypol glands.

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METEOROLOGY

Wider Use of Radar Sets

Weather Bureau plans to buy new equipment, including 40 radars, are outlined at American Meteorological Society meeting. Improved weather forecasts are expected.

➤ WIDER USE of radar sets is the key to improved weather forecasts, especially of flash floods, according to weathermen who attended the 139th national American Meteorological Society meeting in Asbury Park, N. J.

Radar and other new electronic equipment can also help spot and track more accurately such severe storms as hurricanes.

Using radar will improve precipitation forecasts in the future because the instruments can show where and how much rain or snow is falling as it falls. This information will permit warnings of the threat of flash floods much in advance of those now possible.

With present, relatively obsolete radars, weathermen now track hurricanes, tornadoes and thunderstorms with a precision never before possible.

With part of the $7,500,000 appropriated for the purpose by Congress at its last session, the Weather Bureau plans to buy 40 new radar sets, mostly for installation in the Middle West and along the East Coast, Vaughn D. Rockney of the Bureau announced at the meeting. The session was held in conjunction with the fifth weather radar conference sponsored by the U. S. Army Signal Corps Engineering Laboratories at Ft. Monmouth, N. J.

The new radars will have sufficient power to penetrate to the heart of hurricanes, as the set now operating at Cape Hatteras, N. C., proved when it went into operation for the first time this year scanning hurricane Connie. (See SNL, Aug. 27, p. 135.)

The replaced radars will be reconditioned, if required, then put to work, at inland Weather Bureau stations now radar-less, spotting thunderstorms and the squalls that sometimes cause flash floods.

Other equipment the Weather Bureau plans to purchase includes:

Three hundred telepsychrometers, instruments that measure temperature and humidity.

Fifty gust recorders.

Ceilometers and transmissmometers, instruments that tell cloud ceiling height and visibility, for the 45 airports having the highest frequency of instrument landing conditions.

Sixty-five new rawinsondes, to measure winds aloft, including the 200-mile-per-hour river of air known as the jet stream.

Eight more automatic weather stations.

Two automatic weather stations, which measure only temperature, pressure, humidity, and wind speed and direction, have been in experimental operation since 1953, Mr. Rockney said. Two others are being installed, one at Ontario, Calif., and one at Worcester, Mass.

These two, and the eight new stations, will automatically transmit at a predesignated time not only all of the above information, but also cloud heights and visibility, precipitation amounts and dew point.

Far-Away Thunderstorms

➤ WEATHERMEN are learning how to pinpoint far-away thunderstorms by tuning in on the radio static from lightning accompanying the storms.

The method is known as "sferics," contraction of the word atmospherics.

A simple system for recording nearby sferics, including those accompanying tornadoes, was described at the meeting.

Using radio direction finding methods, meteorologists listening at three or more stations to the lightning-produced static can tell where and when the flash occurred. In this way, they can get a large-scale picture of thunderstorm activity hundreds of miles away.

Dr. James W. Hunt of Copano Research Foundation and Dr. Loren F. Jones of the Weather Bureau Airport Station, Victoria, Texas, reported the new system for recording relatively nearby lightning static.

During World War II, a similar system was used to learn about stormy weather behind enemy lines.

It would take only two to four sets of sferics stations, each consisting of at least one mother and two daughter stations, to get a fairly accurate picture of thunderstorm activity over the United States, it was learned. But this would be a relatively expensive and time-consuming method to obtain only a little data, it was pointed out.

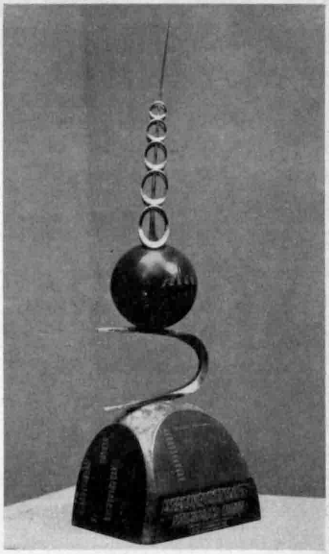
There is some evidence, meteorologists said, that invisible lightning will also cause reception of sferics. Research work to determine this is under way at several places.

Raindrops Not Round

➤ RAINDROPS ARE often not round, four Massachusetts weathermen reported at the meeting.

To measure the roundness of raindrops, they beamed radar waves polarized in various ways at rain, then noted how the reflected waves were changed.

Dr. Reginald E. Newell, Spiros G. Geotis, Melvin L. Stone and Aaron Fleisher of Massachusetts Institute of Technology, Cambridge, Mass., conducted the investigations.



ASTRONAUTICS AWARD — The American Rocket Society's award for research in astronautics, designed by Dr. Frank J. Malina, American aeronautical engineer and artist now resident in Paris, is shown in this photograph. It was endowed by Andrew G. Haley, former president of the society, to reward scientists contributing to the eventual conquest of space. It will be awarded annually through 2054.

ENTOMOLOGY

Dutch Find Pesticide To Control Mites

➤ A PESTICIDE that kills injurious plant mites, but leaves beneficial honeybees and other insects alive has been developed in Dutch laboratories.

In tests, the chemical, Tedion V 18 or 2, 4, 5, 4'-tetra-chlorodiphenylsulfone, killed all the eggs and larvae of several harmful mites, although adult mites were unaffected, H. O. Huisman, R. van der Veen and J. Meltzer reported in *Nature* (Sept. 10).

Tedion V 18 did not show any visible effects on bees, flies, beetles and other insects, when these were exposed to dried films of the chemical, they said. In addition, large concentrations of the pesticide did not seem to harm plants it was sprayed on.

Large doses of Tedion V 18 given orally to mice did not cause death or any visible symptom of intoxication.

From their tests, the scientists conclude that Tedion V 18 is a highly specific pesticide for mites that appears to be safe for the sprayer and for the consumer.

CHEMISTRY

Life Process Chemicals

Scientists attending American Chemical Society meeting hear predictions that chemicals similar to those nature uses for life processes will be made.

➤ CHEMICALS built on the pattern nature uses to keep life processes going were forecast by several research groups at the American Chemical Society meeting in Minneapolis.

Many laboratories are studying phosphorus, lately recognized as the key chemical for starting photosynthesis. Phosphorus combines with nucleic acids and ribose sugars when enzymes and certain metallic ions are present.

The source compounds and life chemicals they produce were reported by research teams from American Cyanamid Company's research laboratories, Stamford, Conn., and from the Massachusetts Institute of Technology.

Dr. Robert W. Holley of Cornell University, Ithaca, N. Y., called upon chemists to produce complex polypeptides now unknown whose formation can be foretold theoretically.

Dr. Severo Ochoa, New York University College of Medicine, New York, reported a general method for building adenosine diphosphate, or ADP, and similar growth chemicals into polymers as in life processes, using azotobacter enzyme.

Exchange of radioactive phosphorus from inorganic salt with ADP sets free half the phosphorus to continue the reaction cycle, while the growth chemical thus released is polymerized to a new complex substance in the presence of magnesium ion.

He will extend the method using other enzymes from yeast, liver and cultures of micro-organisms, also other nucleic acids, possibly creating forms of life chemicals unknown in nature.

Chemists can draw finer distinctions between organic compounds than the tissues that combine with them can recognize, Dr. Barry Commoner of Washington University, St. Louis, explained, modifying the belief that exact reduplication is the secret of growth. Hence comes the possibility of creating new life forms, whether good or bad.

Lab-Built Viruses

➤ DISEASE may result from an unfortunate marriage of a protein with the wrong nucleic acid rather than from invasion of living tissues by a specific bad virus.

This new understanding of sickness as a method of growth may throw light on many other problems of reproduction in plants and animals, Dr. Barry Commoner said at the meeting.

He reported success in putting together an infectious virus made up of a protein and a nucleic acid, neither itself infectious, in work on tobacco mosaic virus done under his direction by James A. Lippincott, a graduate student.

Dr. Commoner reported also on behalf of his associates, Drs. Eddie Basler Jr. and Tung-Yue Wang.

He reinforced the success of this new interpretation by reporting similar results obtained independently at the University of California by a research group headed by Drs. H. Fraenckel-Conrat and Robley Williams. So close were these two teams to achieving their goal that less than two months during the past summer separated their discoveries.

Test tube reactivation of virus material in Berkeley in June and St. Louis in early August opened the door to hybrids of protein and nucleic acids from tobacco mosaic mutants, which may have new effects on the plants.

"If such experiments prove fruitful," Dr. Commoner said, "the way will be open for experiments probing deeply into unknown areas of biological reproduction."

Microbes Make Drugs

➤ MICROORGANISMS are now performing steps in manufacturing chemicals and drugs that are difficult and costly by purely chemical methods.

Minute organisms produce such wonder drugs as penicillin and streptomycin, Dr. David Perlman of the Squibb Institute for Chemical Research, New Brunswick, N. J., told the American Chemical Society. Now, he said, bacteria, yeasts and molds can be harnessed to produce changes in the composition of several substances, often in a more efficient manner than by chemical methods only.

"These changes result in modification of only part of the substance and are accomplished with difficulty when chemical processes are used," Dr. Perlman said.

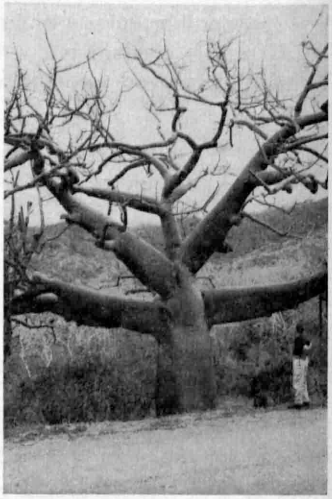
"Usually there is an integration of both microbial and chemical operations to form an efficient process. In the manufacture of vitamin C, the preparation of ephedrine, and the synthesis of cortisone, hydrocortisone and related drugs, both chemical and biological operations are used.

"Many of the bacteria, yeasts and molds which are used in these transformations are found in nature as organisms causing food spoilage, or as parasites on plants. The bacteria responsible for the souring of wine to vinegar, or the luminescence of the spoiled fish and meats, will carry out useful changes in the processes for the production of vitamin C and acids used in combatting boiler scale.

"The molds found as parasites on many ornamental plants and flowers have been useful in the production of cortisone or hydrocortisone.

"The chemical changes these microorganisms perform when grown under laboratory conditions apparently bear little relationship to those they carry out in their natural environment. It is difficult to predict the potentialities of any particular organism.

"The fermentation chemist and bacteriologist are continually studying new organisms in the hope of perfecting processes which will replace the more complicated operations devised by the manufacturing chemist."



KAPOK TREE—Ecuador has now opened to pioneers land to grow kapok trees. Not only is the vegetable wool commonly known as kapok obtained from this tree, but its bark is used in twine manufacture and from its seeds come a lightweight silky wool fiber and a stearine-rich oil. The tree is fast-growing.

Hormone Builders

➤ ACETIC ACID, which makes vinegar sour, and the fatty substance, cholesterol, are important body hormone builders, Dr. Ralph I. Dorfman of the Worcester Foundation for Experimental Biology, Shrewsbury, Mass., reported at the meeting.

Hormones are chemicals made by the

adrenal, sex, pituitary and other body glands.

The adrenals, famous as producers of adrenalin and anti-arthritis cortisone, among other hormones, have been subjected to special study by Dr. Dorfman and associates. In addition to discovering some of the materials the glands use to build their hormones, the Worcester group has been learning the precise relationships between the adrenal hormones and their metabolic products in body fluids.

"By means of these relationships and precise analytical methods developed in our laboratory, it is now possible to evaluate the functional status of the adrenal gland," Dr. Dorfman said.

Bake Atomic Debris

➤ GLAZED BRICKS were proposed to enclose and dispose of the dangerous radioactive wastes from reactors of the atomic age now dawning by Lieut. William L'a. R. Rice of Wright Air Development Center, Ohio, at the meeting.

He said the "hot" radioactive fission products from power reactors could be soaked up by clay and then baked into glazed bricks for easy handling and imperviousness to leaching when they are buried in atomic graveyards or dumped in the ocean.

Drug Checks Cancer

➤ BETTER CHEMICAL CANCER fighting is being sought through experiments such as those reported by Drs. P. Feigelson, M. S. L. Wu and J. D. Davidson of Columbia University, New York.

A compound called 8-azaguanine will completely check a specific tumor in mice, it has previously been found. But how it does this, and why this and other anti-cancer chemicals lose their effect after a time are puzzles still to be solved.

Dr. Feigelson and associates have now reported that 8-azaguanine combines irreversibly with a chemical in body cells called adenosine deaminase. Adenosine deaminase is an enzyme that helps adenine break down into other substances.

The chemical activity of 8-azaguanine depends considerably on the amount used, but the compound is active against the enzyme chemical at lower concentrations than those effective when it is used to check mouse cancers.

The order in which 8-azaguanine and the enzyme chemical are added in the test tube experiments also is important in connection with its chemical effect.

Sulfur Isotopes Tell Ages

➤ COMPARISON of heavy and light sulfur in crude oil may furnish the clue to age of the petroleum deposit and history of its formation.

Chemical studies comparing the proportions of sulfur isotopes in petroleum show that, although they are constant for each oil field, they vary widely in different parts of the world. This contrasts with the fact that the sulfur content of sea water is constant in all the oceans of the globe.

These clues to determining the relative ages of oil fields were reported by Dr. H. G. Thode of Hamilton College, Hamilton, Ontario.

Dr. Thode has studied the proportion of sulfur isotopes collected by chemical processes in different formations of the earth's crust. Native sulfur deposits, he found, have been formed by bacteria that reduce sulfate deposits. Sulfates tend to have a larger proportion of heavy sulfur 34, while sulfides are relatively poor in this isotope.

By study of the occurrence of such compounds, Dr. Thode hopes to piece together the history of sulfur-containing deposits in the crust of the earth.

Methylstyrene Plastic

➤ A NEW plastic, methylstyrene, is a low-cost, tough material with better resistance to impact and high temperature than its popular chemical plastic cousin, styrene.

The improved plastic molding compound shows no distortion after half an hour in boiling water, James A. Melchore of the American Cyanamid Company's research division told the chemists.

Methylstyrene becomes an even better product when mixed with another plastic material, acrylonitrile, as styrene does also.

The new compound can likewise be made clear or in colors, and is expected to be used in electronic equipment, signs, toys, textile equipment and aircraft parts.

Lubricants for Arctic

➤ A PRACTICAL METHOD of manufacturing lubricants for extremely low-temperature service in turbojet engines, instruments and machine guns for Arctic fighting was announced at the meeting by Paul F. Pfeuffer and Donald F. Othmer of the Polytechnic Institute of Brooklyn, N. Y.

The new lucricants are made from a major constituent of turpentine. The chemists worked out a way to synthesize pinic acid from alpha pinene in turpentine. The desired cold-weather lubricants are pinate compounds made from pinic acid. Economic commercial production is foreseen.

Natural gas substitutes can be made from low-grade residual petroleum oils, H. R. Linden and associates of the Institute of Gas Technology, Chicago, Ill., reported, allowing pipelines to meet increased demands during winter months when use outruns the natural gas supply.

Direct hydrogenation converts residual petroleum oils, such as reduced crude and Bunker C fuel oil, into methane-rich gas. A similar process can be applied to coal, but is more difficult because of the low gas production rate and the problems of handling the coal and removing the ash.

Fuel gas that could substitute for natural gas can also be made from coal by a process reported by P. A. Lobo and associates at the University of Michigan. A continuous pilot plant was operated successfully for hydrogenating, at high temperature and pressure, carbon monoxide and dioxide, obtained from coal, to light hydrocarbons.

Science News Letter, September 24, 1955

Cattle weighs in growth standards of 20 years ago run well below present averages.

TURBOCHARGED DIESEL—Picking up a heaped load of 18 cubic yards of earth at high speed is a specialty of this International Harvester pay scraper. It is powered by a 262-horsepower turbodiesel built by Cummins Engine Company, Inc. Turbocharging harnesses exhaust gases normally wasted.

BIOPHYSICS

Radioactive Phosphorus Aids Cancer Diagnosis

➤ RADIOACTIVE PHOSPHORUS can help tell whether a stomach disorder is cancerous or non-cancerous, Dr. Komei Nakayama of the University of Chiba, Japan, reported at the meeting of the U.S. and Canadian sections of the International College of Surgery in Philadelphia.

The radioactive phosphorus, injected under the skin, tends to accumulate in cancer tissue. The location is then disclosed by especially-devised Geiger-Muller counters that are inserted into the gullet, or esophagus, or into the stomach through the mouth. A higher radioactive count is found where cancer exists, Dr. Nakayama said.

"Intelligent execution of this method in combination with conventional methods, such as X-ray study, endoscopic study, smear test and others, permits us to obtain a more accurate diagnosis of cancer in the alimentary tract," he said.

The diagnosis was 100% correct, he reported, in 53 cases with malignancy in the esophagus or in the opening to the stomach. Seventeen cases with non-cancers were ruled out.

In 58 cases of cancer of the stomach, 56 or 96%. were diagnosed correctly before operation. There was a 100% diagnosis of 48 cases with nonmalignant lesions.

Cancer of the rectum is another good subject for this diagnostic method, Dr. Nakayama said.

Science News Letter, September 24, 1955

GENERAL SCIENCE

Critical Skills Shortage Faces a Bleak Future

➤ THE SCIENTIFIC MANPOWER shortage in the United States will be a serious problem for many years "unless drastic action is taken," according to a Government official reporting in *Chemical News* (Aug.-Sept.).

Dr. Henry H. Armsby, chief of engineering education for the Department of Health, Education and Welfare, says "the nation's serious shortage of engineers, scientists and technicians promises to remain acute for many years."

The Government manpower expert also warns that, as the country becomes more and more dependent on these skilled persons for its technological civilization, the situation can become increasingly worse.

Even the "drastic action" is a long-term proposition, Dr. Armsby told SCIENCE SERVICE. Basically, it would be to get more youth interested in these areas, he said.

Dr. Armsby said what is needed is a large scholarship program by both the federal and state governments; an increased emphasis on mathematics and science in the high schools; a campaign by government agencies, engineering societies and scientific organizations, and by the schools themselves; better guidance in the high schools and colleges, and active participation in science youth movements, such as science fairs and science clubs.

He pointed out that more than half the high schools in the United States do not have a physics course. Even if a youngster has the potential to become a physicist, if he is not exposed to physics, his desire to become a physicist will not be aroused.

One of the key problems, he said, is the shortage of the science teachers. More good teachers are needed to inspire and help develop the nation's future scientists.

In his report, Dr. Armsby estimated that there will be a shortage of 65,000 engineers alone in this country by 1960. A comparison of the number of skilled personnel in this country and Russia "is not encouraging," he said.

"Unless present trends are changed," he concluded, "the Russians bid fair to overcome our present advantages."

Science News Letter, September 24, 1955

PUBLIC HEALTH

Ready 'Flu Vaccine For Winter Outbreak

➤ U.S. SOLDIERS at home and abroad will soon be rolling up their sleeves for shots of anti-influenza vaccine.

The vaccine has been ordered and will be given as soon as received, probably early in October. Army medical authorities hope to have all vaccinating finished by the end of November.

Dependents will probably also be able to get anti-'flu vaccine this year. The Army hopes to have enough vaccine left to give it to those dependents who ask for it.

An outbreak of influenza A causing mild sickness and not many deaths except among the elderly is likely this fall and winter, according to the "educated guess" of a Public Health Service influenza watcher.

There were a few outbreaks of influenza A in Europe and one in New York State last spring. Since April, no 'flu has been reported anywhere.

Influenza A generally strikes every two years. Its last appearance in the United States was in 1953, and before that in 1951. So this is the year to expect another outbreak.

The diseace, however, is fairly unpredictable. That is one reason why the Army, having decided that vaccination is worthwhile, is now vaccinating regularly every year in the early fall. Waiting to see where and when the first cases start does not give enough time for effective vaccination, experience in 1953 showed.

Protection from the vaccine starts a week or more after vaccination and lasts about a year. Since 'flu spreads rapidly, vaccination must be given early to be effective.

Vaccinating an entire population is not yet considered practical, partly because to be effective the vaccine should correspond to the type and strain of influenza virus causing an epidemic. Viruses A, A′ and B are included in most vaccines at present.

Science News Letter, September 24, 1955

IN SCIEN

AERONAUTICS

Refuel Secret Planes In Simulated Flight

➤ SOME OF America's newest supersonic fighter planes are flying inside a room with a ceiling only 20 feet high at Farmingdale, N. Y.

Within that limited space, however, scientists of Republic Aviation Corporation make the secret planes climb, bank and dive under conditions that duplicate actual flight through the stratosphere at altitudes above 50,000 feet.

In the air refueling laboratory, part of a new $2,500,000 aeronautical research installation, skeletonized versions of the planes, with tails sticking up through a special notch in the rafters, are tested.

Researchers "fly" this "mock-up," equipped with the plane's fuel system, and record temperatures and pressures at 25 key locations as fuel is taken aboard at several hundred gallons a minute. By rolling and pitching the mock-up, and varying the temperature and pressure in the system, engineers can set up mid-air refueling conditions existing at altitudes up to 50,000 feet.

The lab is used to improve mid-air refueling equipment for fighter-bombers. Intricate plumbing enables these planes to take aboard several hundred gallons of fuel a minute and distribute it from one intake connection to a great many tanks of various sizes all over the airplane, at such rates that all the tanks become filled at about the same time.

Science News Letter, September 24, 1955

PHYSIOLOGY

Flat Feet, Pigeon Toes From Belly-Sleeping

➤ FLAT FEET and pigeon toes can be blamed on belly-sleeping in infancy, Dr. Joseph H. Kite of Emory University School of Medicine, Georgia, said at the meeting of the U. S. and Canadian sections, International College of Surgeons, in Philadelphia.

During the first months of life when the baby cannot turn over by himself, he should be encouraged to sleep on his side, Dr. Kite said.

A pillow or rolled blanket against shoulder and hip will support the infant in the side position. The baby should be turned to the other side after each feeding.

When the baby is placed on his belly, he either draws his knees up under him with hips high in the air and weight on the feet which are turned in or he spread-eagles. The first position leads to pigeon toes, the second to flat feet.

Science News Letter, September 24, 1955

E FIELDS

PUBLIC SAFETY

Stormy Weather Raises Gas Danger in Mines

➤ A STORM WARNING above ground should be a danger signal to coal miners thousands of feet under the earth's surface. The U. S. Bureau of Mines has found that the explosive gas, methane, builds up in mines following a barometer drop.

Tests carried out in an Illinois mine showed methane content in mine air rose from 0.5% to 1.5% with a falling barometer, as gas seeped in from both sealed and unsealed abandoned tunnels.

In view of the findings, the Bureau of Mines has recommended that additional precautions against the dangerous gas be taken in periods of low barometric pressure.

Science News Letter, September 24, 1955

ENTOMOLOGY

International Body Fights South Pacific Insects

➤ DESTRUCTIVE INSECTS, spawned in the aftermath of war, are plaguing the coconut groves of many South Pacific islands, threatening the chief means of livelihood for thousands of natives.

Economic losses from the huge, horned rhinoceros beetle have become so serious that an international body representing Australia, France, the Netherlands, New Zealand, the United Kingdom and the United States is searching for methods to check the beetle's ravages.

A grant of $47,000 has been made to the group, the South Pacific Commission, by the Rockefeller Foundation for a three-year hunt for diseases of the beetle, in hopes of waging bacteriological warfare against it.

Occurring naturally in Africa, India and southeast Asia, the rhinoceros beetle infiltrated into many South Pacific islands as stowaways among imported goods. As they had left their natural enemies behind, they fared well in the islands.

It took the war that swept through the islands to make the beetle into a major pest, however. During the fighting, thousands of coconut trees were blasted to the earth. Their rotting trunks furnished perfect breeding grounds for the beetles, which soon were found in great numbers, flying to the tops of live coconut trees to devour the crowns and eventually kill them.

In the search for diseases of the beetle, Dr. Paul Surany of the Illinois State Natural History Survey will go to India, Madagascar, Java and other exotic spots where the pest is held in check by its natural enemies. When he locates diseased beetles, the germs will be isolated and shipped to the islands, where other scientists will attempt to spread the infection.

In the American-held Palau islands, a "sanitation" program has been underway for four years now to control the rhinoceros beetle. This work involves the destruction of fallen coconut trees by burning or by hauling them off to sea.

This program has given some results, but authorities believe that real control will come only with the establishment of the beetle's natural enemies on the islands.

Science News Letter, September 24, 1955

BIOLOGY

Gulls Probably Innocent Of Salmon Predation

➤ GULLS may not be as serious predators on downstream migrant salmon in the Columbia River as had been suspected, a study of the birds' food habits, conducted recently near McNary dam, showed.

Young lampreys, and not salmon, were the main item of food found in 40 gull stomachs collected by biologists Ted Merrell, Mel Collins and Bob Gunsolus of the Oregon Fish Commission during the study. Only five identifiable salmon were found in the stomachs.

This single study does not necessarily prove that all gulls are free of the salmon predator label. George Y. Harry Jr., director of research of the Commission, cautioned that the food-habit study was too small in scope to apply to gulls under all conditions.

The study was started because of the large numbers of gulls that have congregated below McNary dam during May for the past several years. Biologists feared the gulls were gorging themselves on the young salmon that move down the Columbia in the spring.

Other items detected in the stomachs were scrap fishes, insects, grass, small rocks, a crawfish claw, a melon seed, a small chip of green glass and several chunks of cauliflower.

Science News Letter, September 24, 1955

CHEMISTRY

Chemists Synthesize Ancients' Poison

➤ A DEADLY POISON that probably figured in many an assassination in the ancient world has been made synthetically for the first time by two University of Wisconsin chemists.

Found naturally in plants bearing the ominous sounding names of gorse, broom and laburnum, the alkaloid chemical cytisine has been made in the laboratory of Prof. E. E. Van Tamelen and graduate student John Baran in Madison, Wis.

Cytisine itself is of little practical value, but its synthesis opens the way to creating similar alkaloids in the laboratory, many of which may prove important in the chemical industry.

Science News Letter, September 24, 1955

HOROLOGY

Device Tells Day For Any Date

➤ A CALENDAR DEVICE invented in Britain and a few twists of the wrist will tell you instantly on what day of the week you were born or on what day your birth date will fall in the year 2107.

The desk-sized perpetual calendar can give the day of the week for any date from 1800 to 2199 A.D. The presently used Gregorian calendar contains so many irregularities and inconsistencies that the problem becomes a maze of calculations.

The device, called a "Calendar Determinant," measures only ten inches by seven and a half inches. By means of slides, it can display the calendar for any Gregorian months in a span of 400 years. Its range could be extended indefinitely.

It also gives the dates of Easter and Whitsuntide, a matter of great importance in England for solving legal and business problems.

Development of the device by Osmond Robin of Croydon is described in the *Journal of the Horological Institute of America* (Aug.), which called it a "remarkable commentary on the inconsistencies of the Gregorian calendar, which requires so ingenious a device to enable one to determine a past or future date."

Science News Letter, September 24, 1955

MARINE BIOLOGY

Soupless Days for New Zealanders

➤ NEW ZEALAND EPICURES are having to do without one of their favorite bills of fare, the succulent soup of a large ocean clam, the toheroa.

The great beds of toheroas on the north island of New Zealand have been in steady decline due to an unidentified malady, and authorities have closed the beaches to all toheroa hunters except the native Maoris.

The toheroa, *Amphidesma ventricosum*, is a fleshy clam some six inches across found only in New Zealand, but its fame as a seafood is international.

The clams live mainly along open beaches where breaking surf insures a good oxygen supply. If they escape becoming food for fish, gulls and man, toheroas may live as long as 10 years.

Toheroas escape their enemies by burrowing deep into the sand, digging with a strong two- to three-inch "tongue." According to Miss Joyce Allan, curator of mollusks at the Australian Museum, they can dig 12 inches into the sand in an amazingly short time.

They also use the "tongue" as a foot and, by extending it into the sand, then pulling their bodies up to it, can move along the ocean floor. Entire beds of toheroas have been known to migrate from one part of the beach to another overnight by this method, Miss Allan said.

Science News Letter, September 24, 1955

ASTRONOMY

Milky Way Shines Above

October is the best time to see this arch of stellar light in the evening, although its splendor can be appreciated only when viewed far from the flare of city lights.

By JAMES STOKLEY

➤ IN ADDITION to all the stars that shine in the evening sky, October brings us about the best chance of the year to view a fainter feature of the heavens—the Milky Way, which modern city-dwellers can hardly appreciate.

It is usually hidden in the glare of city lights. but out in the country where the sky is really dark, on a night when the moon is not bright enough to interfere, it can now be seen arching overhead.

Actually, the Milky Way is made up of a vast swarm of stars, each so distant that it cannot be seen separately, but the stellar light combines into a continuous glowing pathway extending from Cassiopeia, the queen, high in the north, through Cygnus, the swan, nearly overhead in the western sky, then southward to Sagittarius, the archer, low in the southwest.

These constellations are shown, along with others of the October evening, on the accompanying maps, in which the heavens are depicted as they appear about 10:00 p.m., your own kind of standard time, at the beginning of the month, or an hour earlier on Oct. 15.

Vega Brightest Star

Brightest of the stars now visible is Vega, in Lyra, the lyre, about halfway from the western horizon to the zenith. Cygnus is just above, and in it can be seen another first-magnitude star, Deneb. A third is visible to the left of Vega. This is Altair, in Aquila, the eagle.

Low in the south is a fourth, Fomalhaut, in Piscis Austrinus, the southern fish, but because it is so near the horizon its brilliance is somewhat dimmed.

Toward the east and northeast, also at low altitudes, are two bright stars that will be prominent in the southern evening skies of next winter.

One is Capella, in Auriga, the charioteer. The other is Aldebaran, in Taurus, the bull. When these appear in the evening sky, we know that the year is approaching its close.

Although its stars are not of the first magnitude, a prominent group, which may be used as a guide to others, is the "great square of Pegasus," high in the south.

Three of the stars are in Pegasus, the winged horse, which extends over toward Cygnus. The fourth, in the upper left corner of the square, is Alpheratz, in the next-door constellation of Andromeda, the chained princess of mythology. This extends over toward the northeastern sky, where Perseus, the champion, can be seen, above Auriga.

In Perseus is indicated the star Algol, which varies in brightness by becoming considerably fainter than normal every two days and 21 hours.

Below the left-hand side of the great square are the fishes, Pisces, one of the constellations of the zodiac, through which the sun, moon and planets seem to pass.

Aquarius, the water-carrier, another member of the zodiac, is to the right, just below the easternmost parts of Pegasus.

No planets can be seen easily in October evening skies, although several appear after midnight. About two a.m. brilliant Jupiter, which is in Leo, the lion, close to the star Regulus, is seen low in the east.

A few hours later, about two hours ahead of the sun, Mars makes his appearance.

On Oct. 29 Mercury will be farthest west of the sun, so for the last few days of the month will be seen near the eastern horizon as dawn is breaking. Mercury is many times brighter than Mars, but not as bright as Jupiter.

Ideas of Milky Way

Among ancient peoples there were many fanciful ideas as to the nature of the Milky Way. The Norsemen, for example, called it the path of the ghosts going to Valhalla, and some of the American Indians seem to have had a similar notion.

Longfellow referred to this in "Hiawatha," where he tells how Nokomis, teaching him,

"Showed the broad white road in heaven,
Pathway of the ghosts, the shadows,
Running straight across the heavens . . .
To the land of the hereafter."

To the Anglo-Saxons it was the path of the Waetlings, the giant sons of King Waetla. Even much later in Britain it was known as Watling Street, and identified with the ancient road of the same name, which is still in use, that goes from Dover to Chester by way of London.

About 1610 the Italian astronomer Galileo, with his first little telescope, looked at the Milky Way and found it consisted of swarms of stars, thus confirming some older speculations as to its nature.

Milton, who once paid a visit to Galileo, refers to this notion in "Paradise Lost," when he speaks of

"This broad and ample road whose dust
is gold
And pavement stars, as stars to thee appear
Seen in the galaxy, that milky way
Which nightly as a circling zone thou seest
Powder'd with stars."

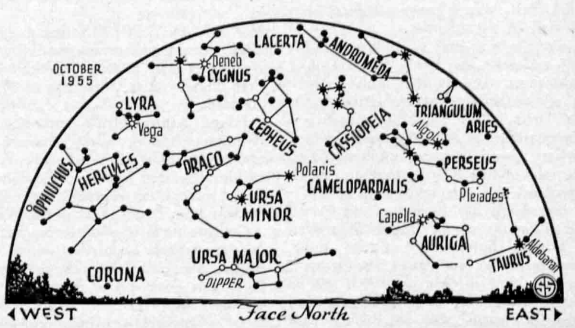
In more recent years astronomers have found an explanation as to why there should be a Milky Way. Actually, our sun, and in fact all the stars that we can see with the naked eye, as well as most that are visible with a telescope, are part of the Milky Way system, or galaxy.

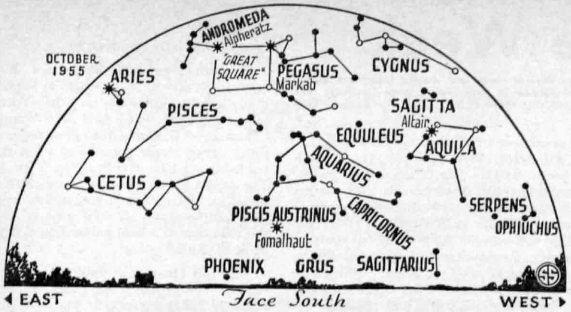
Sun Not at Center

This contains something like a hundred thousand million stars, arranged to form a huge disk, its diameter so great that light, traveling at a speed of 186,000 miles a second, would take more than a 100,000 years to cross it. We are about 30,000 light years from the center.

When we look toward the edge of the disk, we look into a much greater depth of stars than when we look off toward the sides. It is this concentration around the edge that give the effect of the Milky Way.

If, with a dark clear sky, you look toward the constellation of Andromeda, in the position just above the letter M in its name, on the accompanying maps, you may be able to see a hazy spot of light, which is actually another such galaxy, outside our own, but one of its nearest neighbors.





☼ ✱ ○ • SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS

Light from this one takes over two million years to reach us.

Photographed through great telescopes, the Andromeda galaxy shows a spiral structure, a characteristic of these objects, of which millions are known.

It has been conjectured that our own galaxy has a similar spiral structure, but only recently have astronomers gone very far toward identifying the arms. Of course, it is far more difficult to determine the structure from our position inside, just as it would be to tell the layout of a city by observations made from a single building in the outskirts. A single aerial photograph would do far better.

However, the new science of radio astronomy has begun to show how our spiral is arranged. Scientists are now able to detect radio waves emitted from clouds of hydrogen gas between the stars. Where there are more stars, there is more interstellar gas and so determination of the location of the densest gas clouds shows the position of the spiral arms.

Astronomers in many countries are working on such problems and, in a few years, it is likely that we shall have a pretty good map of our stellar city.

Celestial Time Table for October

Oct.	EST	
1	2:17 p.m.	Full moon.
5	6:00 a.m.	Moon nearest, distance 228,200 miles.
8	9:04 a.m.	Moon in last quarter.
10	2:25 a.m.	Algol at minimum.
11	10:50 a.m.	Moon passes Jupiter.
12	11:13 p.m.	Algol at minimum.
13	4:00 p.m.	Mercury between earth and sun.
14	4:03 a.m.	Moon passes Mars.
15	2:32 p.m.	New moon.
	8:02 p.m.	Algol at minimum.
16	6:39 p.m.	Moon passes Venus.
18	12:16 a.m.	Moon passes Saturn.
	4:51 p.m.	Algol at minimum.
21	1:00 a.m.	Moon farthest, distance 251,600 miles.
23	6:04 p.m.	Moon in first quarter.
29	6:00 a.m.	Mercury farthest west of sun.
31	1:04 a.m.	Full moon.

Subtract one hour for CST, two hours for MST, and three for PST.

Science News Letter, September 24, 1955

PHOTOGRAMMETRY

Clearer Aerial Photos

➤ IF THE RUSSIANS accept President Eisenhower's plan to allow aerial photographing of military installations in the United States and Russia, the U. S. has a new focusing device that can provide more revealing pictures than is possible with conventional techniques.

Focusing accurately on the site below and maintaining a sharp focus over mountainous terrain and through altitude shifts are major problemse in aerial photography. Of the potential information available on such long focus equipment, 80% is lost under operating conditions due to inaccurate focusing, optical experts say.

Tiny details, such as evidence of new underground piping or the tracks of a parked bulldozer, are often the sort of clues intelligence officers need to judge the activities at a base. With bad focusing, these details can be obscured.

Focusing is so delicate on aerial cameras that moving a 48-inch lens only 35/1000 of an inch will change the point of focus from 5,000 feet to 50,000 feet away.

The new automatic focuser, developed by the Perkin-Elmer Corporation, Norwalk, Conn., sets the focus on the K-22 aerial camera three times more accurately than is possible visually.

It uses a spinning wedge of glass to notify light sensitive cells in the device that the camera has gone out of focus. To prevent the device from compensating for transient factors, such as clouds or smoke passing beneath the plane, there is a 30-second lag before the proper setting is made automatically.

The device was developed under terms of a contract with Wright-Patterson Air Force Base in Ohio.

Science News Letter, September 24, 1955

ENTOMOLOGY

Machine Age Continues: Butterfly Net on Way Out

➤ THE MACHINE AGE finally comes to everything. A team of British scientists has announced the use of vacuum cleaner-like machines for making insect collections, displacing the time-honored butterfly net.

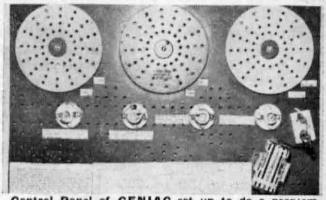
To sample insect populations in rough grassland, scientists generally make several sweeps with a standard-sized net and from the number of bugs they catch, figure out their abundance. C. G. Johnson, T. R. E. Southwood and H. Entwistle of the Rothamsted Experimental Station, Harpenden, Eng., found they missed too many insects that way.

So they devised a system using the intake end of a portable electric blower to scoop up insects in vacuum-cleaner fashion from measured areas of grass.

From approximately 23 square feet, the suction apparatus recovered 2,945 insects, 1,606 mites, spiders and other arthropods, and 189 snails and slugs. Hand-picking the area later showed that the suction method had taken about 90% or more of the insects present, they report in *Nature* (Sept. 17).

Science News Letter, September 24, 1955

Can you think faster than this Machine?



Control Panel of GENIAC set up to do a problem in check valve research.

Be careful before you answer. GENIAC the first electrical brain construction kit is equipped to play tic-tac-toe, cipher and encipher codes, convert from binary to decimal, reason in syllogisms) as well as add, subtract, multiply and divide. Specific problems in a variety of fields — actuarial, policy claim settlement, physics, etc., can be set up and solved with the components. Connections are solderless and are completely explained with templates in the manual. This covers 23 circuits and shows how new ones can be designed.

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Books of the Week

For the editorial information of our readers, books received for review since last week's issue are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N.W., Washington 6, D. C. Request free publications direct from publisher, not from Science Service.

ANIMAL CLOTHING—George F. Mason—*Morrow*, 94 p., illus., $2.00. Describing the different protective coverings given by nature to animals and pointing out how animals use their clothing to defend themselves.

ATOMIC ENERGY RESEARCH AT HARWELL—K. E. B. Jay—*Butterworths Scientific Publications*, 144 p., illus., paper, 70 cents. Carrying forward the story of the atomic research from the report of 1952 up to the formation of the United Kingdom Atomic Energy Authority in August, 1954.

THE BOMB: Challenge and Answer—Gilbert McAllister, Ed.—*Batsford*, 160 p., $3.49. Hard-cover follow-up of the Bertrand Russell-Albert Einstein peace appeal, whose timing a few weeks before the Geneva "Summit" conference made it more significant. The medical, scientific, social and political implications of the A-bomb, "the greatest issue facing humanity today," are set forth by participants in the conference of optimistic world parliamentarians and scientists held in London in August, 1955.

THE BROMELIACEAE OF BRAZIL—Lyman B. Smith—*Smithsonian*, Smithsonian Miscellaneous Collections, Vol. 126, No. 1, 290 p., illus., paper, $3.50. Based on 25 years of study in the United States, Europe and Brazil. Much of the material has been derived from an unpublished manuscript prepared for the "Flora Brasilica" of the Instituto de Botânica of São Paulo. Bibliography has been limited to that strictly essential in Brazil.

THE CARE OF WATER PETS—Gertrude Pels—*Crowell*, 119 p., illus., $2.50. Telling in detail, in simple language for children, how to set up and care for an aquarium.

THE CRUST OF THE EARTH: An Introduction to Geology—Samuel Rapport and Helen Wright, Eds.—*New American Library*, 224 p., illus., paper, 35 cents. A compilation of articles about different basic elements of geology.

DICTIONARY OF TERMS USED IN THE THEORY AND PRACTICE OF MECHANICAL ENGINEERING—J. G. Horner, revised by Staton Abbey—*Philosophical Library*, 7th ed., 417 p., $6.50. This volume is divided into two parts, the first containing modern terms, the second includes general and traditional terms.

EDUCATION FOR THE PROFESSIONS—Lloyd E. Blauch, Ed.—*Govt. Printing Office*, 317 p., cloth $2.75, paper $1.75. Describing many professions, reporting the developments and current status of education for them, indicating some of the major problems in professional education, and listing schools offering professional study.

EFFECTIVE READING AND LEARNING—Phillip B. Shaw—*Crowell*, 447 p., $2.95. Written to provide a basic textbook on the development of reading and learning ability, and intended not only to capture the interest of the reluctant reader and of the student of low motivation, but also to meet the needs of the industrious student determined to perform most effectively in college.

FEDERAL CIVIL DEFENSE ADMINISTRATION ANNUAL REPORT FOR 1954—Val Peterson, Administrator—*Govt. Printing Office*, 268 p., illus., paper, 75 cents. Report of the past year's activities, together with pertinent recommendations for civil defense in our future national security structure.

GEOLOGY OF SOUTHERN CALIFORNIA—Richard H. Jahns, Ed.—*California Division of Mines*, Bulletin 170, 1319 p. and maps, illus., paper, $12.00. This bulletin comes in a cardboard box with separately bound chapters, five road logs and 34 map sheets. Essentially a symposium on the geology of southern California.

HARVEST OF THE SEA—Walter Buehr—*Morrow*, 96 p., illus., $2.50. Presenting for young people an account of commercial fishing in the United States.

HELICOPTERS: How They Work—John Lewellen—*Crowell*, 136 p., illus., $2.00. Telling in simple language the principles and the performance of the "whirly-bird."

LAPLACE TRANSFORMS FOR ELECTRICAL ENGINEERS—B. J. Starkey—*Philosophical Library*, 279 p., illus., $10.00. Using a physical rather than a purely mathematical vocabulary.

MARINE TROPICALS—Ed L. Fisher—*All-Pets*, 2 ed., 71 p., illus., paper, $1.50. The author, a professional diver, gives practical information for raising small salt water fish in an aquarium.

MARS—Franklyn M. Branley—*Crowell*, 148 p., illus., $2.50. Facts to fascinate and inform the layman about the red planet and the entire solar system, and presenting the possibilities of reaching Mars by rockets.

MICROBIOLOGY: An Introduction—Ernest Gray—*Philosophical Library*, 175 p., illus., $3.75. Stressing the ecology of organisms and the historical background of a science that has been studied under another name for three centuries.

A MILLION YEARS OF HUMAN PROGRESS—Ira D. Cardiff—*Pageant*, 2d ed., 146 p., $2.50. A revised edition presenting an outline of some highlights, scientific and social, in the history of man leading to the advancement of civilization.

PROCEEDINGS VOLUME OF THE GEOLOGICAL SOCIETY OF AMERICA FOR 1954—Ernst Cloos, President—*Geological Society of America*, 204 p., illus., paper, $1.50. Proceedings of the 67th Annual Meeting held in Los Angeles, Calif., November, 1954.

THE ROBOTS ARE AMONG US—Rolf Strehl—*Arco*, 316 p., illus., $4.00. Tracing the picture of the perfected machine automaton of our highly developed civilization and its future prospects. The author poses the question, "What will become of Man?"

SPIDERS—Dorothy Childs Hogner—*Crowell*, 56 p., illus., $2.00. For the young naturalist interested in learning about the world of spiders.

WENNER-GREN FOUNDATION FOR ANTHROPOLOGICAL RESEARCH INCORPORATED: Report on the Foundation's Activities for the Year Ended January 31, 1955—Axel L. Wenner-Gren, Chairman—*Wenner-Gren Foundation*, 84 p., illus., paper, single copies free upon request to publisher, 14 East 71st St., New York 21, N. Y. The report of the director of research includes the aims, objectives and accomplishments of the long-term program on early man in Africa, and the initiation of a new publication series, "Yearbook of Anthropology."

WILLIAM HERSCHEL: Explorer of the Heavens—J. B. Sidgwick—*Faber and Faber (Macmillan)*, 228 p., illus., $2.50. The biography of the man who did much to make 18th century astronomers more aware of the universe beyond our solar system.

Science News Letter, September 24, 1955

How Life Is Handed On

By CYRIL BIBBY

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PHYSIOLOGY

Hearing With One Ear First, Improves Sound

➤ HEARING with both ears at the same time is poorer than hearing the same sound with one ear and then the other, experiments by Ohio State University scientists who are "splitting hears" show.

Splitting sounds so that one ear hears it first is known as "monaural delay." Its use by the Air Force and airlines promises better and clearer communications in the air.

Tests at the University's Speech and Hearing Clinic in Columbus, Ohio, show that reception of radio messages under noisy conditions is 22% better when the message is sent to one ear before the other.

The signal received sounds "louder, fuller and farther away," Dr. Henry M. Moser, clinic director, and Dr. John J. Dreher, chief project investigator, reported.

The delay time in transmitting the sound so that one ear gets it first is only six-hundredths of a second. In the laboratory, the delay was produced with a tape recording device that splits the signal in a headset. Variations of this device could be used in aircraft, Dr. Dreher said.

The tests also showed that by feeding the one-ear signal to the dominant or "telephone" ear, which is the left ear for most persons, the first signal is received twice as well as with the other ear.

Why monaural delay produces better hearing is not clearly understood. The scientists pointed out that the six-hundredths of a second, which gives the best results, corresponds with estimates of the time required for the discharge of a signal from the auditory nerve.

"What may be happening," they reported, "is that in effect the listener is getting two complete and distinct presentations of the signal, one through each ear, with no interference."

Science News Letter, September 24, 1955

Most men's *beards* are about three times as thick as the hair on their heads.

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The Annual National Science Fair (started in 1950) is held each spring in a different city. The NSF has been to Philadelphia, St. Louis, Washington, D. C., Oak Ridge, Tenn., Lafayette, Ind., and Cleveland, Ohio. The boys and girls who show the best science exhibits in cooperating local science fairs get three-day all-expenses-paid trips to the National Science Fair and a chance to compete there for honors and awards. Only sophomores, juniors and seniors in high school are eligible to go to the NSF but in most local science fairs boys and girls of all ages can compete for local honors. The host city for the NSF in 1956 is Oklahoma City, Okla. In 1957 it is scheduled for Los Angeles, Calif.

The Annual National Science Talent Search (started in 1942) is held each year for seniors in high school who want to compete for $11,000 in Westinghouse Science Scholarships for their college education. Annually 300 are honored. Of these, 40 boys and girls, chosen as winners, also receive a five-day all-expenses-paid trip to Washington, D. C., to attend the Science Talent Institute; the 15th will be held in 1956. Experience in science clubs and participation in science fairs is great practice for those who are planning to compete in the STS when they are old enough.

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MAMMALOGY

NATURE RAMBLINGS

by Horace Loftin

Little Big Eaters

➤ AS AUTUMN rushes in, the tree squirrels are working even harder at the perpetual job of stuffing cavities with food —cavities in the ground, in hollow trees, and in their own plump bodies.

High-priority item on the schedule now is the cutting and burying in damp earth of green pine cones. The squirrels must work rapidly, for if the pine seeds are allowed to ripen on the tree, the wind will soon scatter them far and wide, and the cones will be lost to the animals.

Squirrels have far from a monotonous diet. Rather than the usually pictured meals of acorns, acorns, acorns, these bushy-tailed rodents also eat tree buds and flowers, nuts and berries, the seeds of forest evergreens and a variety of other fare, including an occasional young bird or a clutch of eggs.

Among the most relished foods of the tiny red squirrel, *Tamiasciurus hudsonicus,* are mushrooms and other fungi.

These items he gathers and carries to his tree, placing them in a forked branch to cure, eating them later at his leisure. Some naturalists believe that the mushroom species stored by squirrels are all safe for human food. This is not true, for squirrels store and eat without harm the amanita mushrooms. which are deadly poison to man.

All the tree squirrels are lavish in their feeding habits, throwing away more than they eat and hoarding more than they will need over a long winter.

But Nature has a design in making the squirrel such a greedy feeder. Whatever the chief food squirrels find at a given time —acorns, pine seeds, elm buds—it is far more abundant than they can use then. It is to the squirrels' advantage in the struggle for survival not so much to conserve that food as to learn to eat a wide variety of foods and to know where to find the various items.

Then, if a particular source of food fails one year, the squirrels will know where to turn for another kind of meal.

The common belief that tree squirrels will perish in large numbers if the local nut crop fails is not supported by fact. The varied diet of squirrels acts as good insurance that they will manage to keep fat and frisky, acorns or no acorns.

Science News Letter, September 24, 1955

GEOPHYSICS

Hawaii Was North Pole

➤ WARM, SUNNY HAWAII used to be the North Pole of the world, the bleak, frigid polar area of the earth 600,000,000 years ago, experiments on "fossil" magnetic rocks of two continents by Dr. S. K. Runcorn of Cambridge University and the Museum of Northern Arizona at Flagstaff have shown.

His evidence that the earth's axis has been constantly changing throughout the earth's history is backed by fossil remains of tropical life in Greenland and Alaska.

To learn the location of the constantly shifting magnetic pole in the geological past, Dr. Runcorn plotted the directions of the "north" poles of magnetic rocks buried in the earth through the ages, using samples from Britain and the southwestern United States.

He found that some 600,000,000 years ago, in the late pre-Cambrian era, the probable position of the magnetic north pole lay in the vicinity of the present-day Hawaiian Islands. By the Paleozoic era, 200,000,000 to 300,000,000 years ago, the magnetic pole had shifted toward the Pacific coast of Asia.

The pole was in a high latitude in Triassic times, 150,000,000 years ago, and reached substantially the present position 80,000,000 years ago, in Cretaceous times.

The migration of the earth was not smooth, Dr. Runcorn reports in *Nature* (Sept. 10), but was "rather like a random walk."

Science News Letter, September 24, 1955

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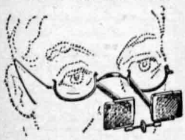

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BIOCHEMISTRY

Seaweed Wool Traps Allergy-Causing Molds

➤ A SEAWEED wool filter to trap and count mold spores in the air that might cause allergy troubles in somewhat the same way that pollen grains do has been developed.

The wool is made of sodium alginate but, since this seaweed chemical is not available as a wool, it has to be prepared from calcium alginate yarn.

The seaweed wool filter traps the mold spores for counting purposes and also allows them to be grown on culture media for identification.

Details for making and using the filter are reported by Dr. Merfyn Richards of the Canadian National Research Council's Prairie Regional Laboratory in Saskatoon, Sask., in *Nature* (Sept. 17).

Science News Letter, September 24, 1955

PHYSIOLOGY

Fear Reaction Shown By Magnet in Stomach

➤ WHAT YOUR STOMACH does when you are frightened can be detected by a magnetometer.

The magnet part of this device is a plastic coated magnetic rod measuring about one-quarter inch by one-tenth inch. This is swallowed. Its weight is slight, but enough to keep it in the stomach for about two hours before it continues through the digestive tract.

The movements of the magnet, showing what the stomach is doing, are "remotely detected" by a device measuring magnetism known as a magnetometer.

Its use in studying stomach movements in various situations was reported at the American Psychological Association meeting in San Francisco by Drs. M. A. Wenger, B. T. Engel and T. L. Clemens of the University of California at Los Angeles.

Some reactions found for various situations were:

When a person is startled or afraid, the stomach has a brief spasm, then irregularity.

Smoking causes a partial or total "blocking," that is, a spasm or inhibition, followed by depression.

An electric shock causes some blocking, then an increase in the contraction rate.

A noise causes some blocking, then decrease in the contraction rate.

Previously, scientists have studied stomach movements by balloons. The balloons were inflated after being swallowed. They were connected with recording devices, instead of being under "remote detection" recording.

The new method is more sensitive than the balloon technique, recording even slight movement caused by the beating of the heart and the motion of the lungs in breathing.

Science News Letter, September 24, 1955

PUBLIC HEALTH

Smog-Caused Deaths

Los Angeles residents are threatened with a major catastrophe from smog at some future date. When is not predictable, but chances of its occurrence increase each week.

➤ HUNDREDS of Los Angeles residents are facing unnecessary death from smog poisoning.

This may not happen soon, even though Los Angeles was recently blanketed by the worst smog in its history, but it will come.

When the deadly attack will occur cannot be predicted, but that it will happen is a "mathematical probability" increasing as each week passes without positive action to eliminate smog-forming sources.

This is the opinion of informed scientists in Washington.

What can be predicted, one of them said, is the daily smog pattern whenever the weather conditions keep the city under a temperature inversion. Such inversions occur when temperature increases with height, rather than decreasing at higher altitudes as is the usual case.

Each day in Pasadena, the previous day's high of smog concentration will be smashed by a new high between twelve and one o'clock, local time. The smog will decrease somewhat in the evening, then build up again the next day to another new maximum at noon.

This pattern will repeat, day after day with new highs, until the weather conditions causing the temperature inversion change. If it repeats over many days, hundreds may die.

Temperature inversions are common throughout the year in Los Angeles, occuring about two-thirds of the time, but the worst season is in September and October.

The know-how to deal with Los Angeles smog is already available, the scientists stress. To prevent another disaster such as struck London in 1952 or Donora, Pa., in 1948, officials and residents should stop talking and setting up new committees—they should start acting.

The first action should be to pinpoint the sources of smog-causing particles, and determine which is the worst offender. The three most serious smog sources are fumes spewed forth by the oil refineries and other industries, smoke and particles from back yard incinerators, and exhausts from automobiles.

Halting one or more of these sources now would probably clean the air temporarily, but this might result only in wrong conclusions concerning responsibility for the smog. Scientific methods of pinning the blame are now available.

Another action that can be taken immediately is to make plans for industries to be built in the Los Angeles area in the future. New industries should be so located and designed that they do not contribute to air pollution.

Science News Letter, September 24, 1955

OPTICS

Expert Color Testers Found Not So Expert

➤ EXPERT COLOR TESTERS are not as expert as they may think, the National Bureau of Standards has found.

They disagree widely among themselves in judging color differences.

When 19 experts put their heads together to rate colored tiles—noting if one was redder, lighter or weaker than another—their average judgement was only a little better than that of 15 non-experts. The experts, however, agreed among themselves more closely than the laymen.

Scientists at the National Bureau of Standards are now trying to develop a simple machine that will tell how much and in what ways two colors differ. It would be faster and more accurate than the expert samplers that today do about 90% of the industrial color testing.

Developing the machine is a difficult assignment. The objective readings on a machine often tell very little about how a color would appear to the average observer or the housewife.

To make the spectrophotometer's curves meaningful in a housewife's terms requires an expensive computer. Other common machines, with electric eyes, pose other problems, primarily how to keep them from wandering off standard.

A machine that can appraise color differences and interpret them in accordance with the average judgement of the American buyer "ought to be ready by 1965," Dr. Deane Judd, who is coordinating the NBS project, said.

Science News Letter, September 24, 1955

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Questions

ASTRONOMY—What is the distance from the sun to the Milky Way's center? p. 202.

□ □ □

BIOCHEMISTRY—How do insecticides harm game birds? p. 196.

□ □ □

METEOROLOGY—Why are radar sets particularly useful in forecasting precipitation? p. 197.

□ □ □

PUBLIC HEALTH—When should 'flu vaccinations be made? p. 200.

□ □ □

SURGERY—How can brain operations on children be made safer? p. 196.

□ □ □

Photographs: Cover, National Advisory Committee for Aeronautics; p. 195, Convair; p. 197, Andrew G. Haley; p. 198, Hamilton Wright; p. 199, Cummins Engine Company, Inc.; p. 208, Eastman Chemical Products, Inc.

Do You Know?

Studies of the effect of 14 hydrocarbon *insecticides* on insects show that a large proportion of the materials would be of little use in controlling insects that have developed resistance to any one of them.

A grain of ragweed *pollen* is 800-millionths of an inch in diameter, is spherical and contains dozens of tiny spikes that stick outward in every direction.

Not a single case of *lung cancer* has been reported among Yemenite Jews in Israel in the past 15 years; these people do not smoke cigarettes, but an oriental pipe in which tobacco smoke is drawn through water.

Evidence indicates the tragic effects of *hypothyroidism* in babies, such as dwarfing and mental retardation, may be prevented by early diagnosis and adequate treatment.

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AERIAL URANIUM DETECTOR is designed for one-man pilot prospectors. The 17-pound scintillation counter has an automatic alarm that signals the pilot whenever an anomaly is passed. The counter can also be provided with a strip chart pen recorder and two indicating meters.

Science News Letter, September 24, 1955

SALMON EGG DISPENSER for the fisherman automatically baits a hook with one egg, eliminating fumbling and saving bait. The plastic dispenser measures two by two by one and a half inches, takes all brands of single eggs, and can be pinned to fishing garb.

Science News Letter, September 24, 1955

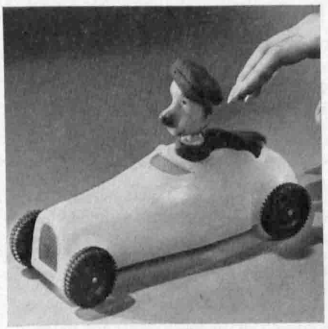
DRAWER LUBRICANT makes it easy to open doors, windows and drawers. The product shrinks the wood and impregnates it with a dry, non-oily lubricant. The product is new, but its basic ingredient was used by ancient Romans to lubricate their chariot axles.

Science News Letter, September 24, 1955

PORTABLE GREENHOUSE, made of reinforced plastic over an aluminum frame, will not shatter, corrode or be affected by the weather. The plastic panels allow 65% of the outside light to enter, but reflect much of the heat. The 11- by-10-foot greenhouse, shipped in a flat carton, takes only a few hours to assemble.

Science News Letter, September 24, 1955

RACING-CAR TOY is a crazy little gadget that rolls back to you after you push



it away. No winding needed; the initial push activates its "memory motor." The race car's driver, smartly clad in French beret and scarf, turns his head from side to side as he motors in his plastic auto, shown in the photograph.

Science News Letter, September 24, 1955

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Science News Letter, September 24, 1955

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Science News Letter, September 24, 1955

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Science News Letter, September 24, 1955

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MUSSORGSKY Night on Bald Mountain — Netherlands Philharmonic Orch., Walter Goehr, Conducting

VIVALDI Concerto in C for Two Trumpets and Orchestra — H. Sevenstern and F. Hausdorfer, Trumpeters, Netherlands Philharmonic Orch. Otto Ackermann, Cond.

BERLIOZ The Roman Carnival — Netherlands Philharmonic, Walter Goehr, Cond

WAGNER Die Meistersinger, Prelude, Act 1 — Zurich Tonhalle Orch., Ackermann, Cond.

DUKAS Sorcerer's Apprentice — Utrecht Symphony, Hupperts, Cond.

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