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SCIENCE NEWS LETTER

Vol. 52, No. 11

THE WEEKLY SUMMARY OF CURRENT SCIENCE • SEPT. 13, 1947

Chestnut Returns

See Page 166

A SCIENCE SERVICE PUBLICATION

At Philadelphia, a testboard man answers as an electronic watchman calls attention to conditions on a coaxial system to Washington.

"Send Help to Manhole 83"

Strung out along every Bell System coaxial cable, electronic watchmen constantly mount guard over your voice. Some are in manholes under city streets; some are in little huts on the desert. Most situations they can deal with themselves; if things threaten to get out of hand, they signal the nearest testboard.

Principal care of the electronic watchman is the transmission level. Sun-warmed cables use up more energy than cold ones, so a transcontinental call may take a millionfold more energy to carry it by day than by night. Each watchman — an electronic regulator — checks the transmission level and adjusts the amplification which sends your voice along to the next point. Many hundreds of regulators may be at work on a single long distance call.

Without automatic regulation, the precise control of energy in the Bell System's long distance circuits would be a superhuman task.

So Bell Laboratories, which in 1913 developed the first high-vacuum electronic amplifier, went on to devise the means to make them self-regulating in telephone systems. This is one reason why your long distance call goes through clearly, across the state or across the nation, summer or winter.

BELL TELEPHONE LABORATORIES

Exploring and inventing, devising and perfecting for continued improvements and economies in telephone service.

MEDICINE

Blood Tests for Cancer

May be steps toward goal of a method of diagnosing cancer in its early, curable stages. One uses dyes which change color with cancer; other uses ultraviolet.

➤ TWO BLOOD TESTS for cancer being announced at the International Cancer Congress in St. Louis promise to lead to the long-sought goal of a test to diagnose cancer in its early, curable but too often unsuspected stages.

One of them even now is suggested as a "valuable screening agent," meaning that it might be used to separate cancer from non-cancer patients somewhat as X-rays are used to screen TB patients from non-tuberculous patients in a community.

This screening agent test was devised by Dr. Maurice Black of the Brooklyn Cancer Institute and New York Medical College. It is made with two dyes, brilliant cresyl blue and methylene blue. A little of the dye is added to a little blood plasma in a test tube and the tube put in boiling water. If the patient has cancer the brilliant cresyl blue, at the end of ten minutes, will have turned to lavender and the plasma and dye will form a clot. It the patient does not have cancer, this clot will be grayish-white. The methylene blue is completely decolorized in less than ten minutes if the patient does not have cancer. If he has cancer, it takes his blood plasma more than ten minutes to decolor the dye.

In 681 cases the test had an accuracy of 86%. It was 100% accurate in normal patients, 92% accurate in patients sick of other diseases than cancer, 83% accurate in harmless tumors, and 80% accurate in cancer.

The second blood test was devised by Dr. Louis Herly of Columbia University, New York. It is made with ultraviolet light. Normal blood serum seen under filtered ultraviolet is turbid and glows with fluorescence. Blood from animals and humans with cancer fails to glow and is clear. When the cancer has been removed by surgery, the blood serum is again turbid and glowing under the ultraviolet light. When the cancer has been treated by X-rays, radium or nitrogen mustard, the serum has a murky, bluish color under the ultraviolet light.

In animals, when cancer cells are injected into their bodies, the cancer that develops cannot be seen until five days later. But their blood serum shows the presence of cancer by this ultraviolet test within 20 to 43 hours.

Dr. Herly developed this test as a result of earlier work that started with using ultraviolet light to trace the course of fluorescent cancer-causing chemicals through the body of rats as cancer developed.

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MEDICINE

Cell Shell Is Cancer Clue

Hard-shelled body cells are linked with aging; soft-shell with cancer. Calcium and an unknown chemical makes the difference.

➤ HARD-SHELLED cells are linked with aging of the body. Soft-shelled body cells are linked with cancer. Calcium, the mineral that makes bones and teeth hard, and an unknown chemical in the cell that binds calcium to itself and the cell make the difference between aging, hard-shelled cells and young, vigorously growing cells of youth and cancer.

This, briefly, is the picture of cancer and the aging process evolved by Dr. Albert I. Lansing of Washington University of St. Louis and Barnard Free Skin and Cancer Hospital in St. Louis.

The theory is based on studies by himself and numerous other investigators, he points out. (*Science*, Sept. 29).

The stopping of growth is a critical turning point in the starting of age changes, Dr. Lansing found in studies of rotifers, microscopic worms that live in stagnant water.

Successive generations of these worms were traced. Lines of old parentage showed a progressive decline in mean life span. All became extinct after a limited number of generations. Lines of parental age younger than that at which growth ceases showed progressively longer life spans and are free of any age change.

The length of life of rotifers could be markedly increased by treatment with sodium citrate which removed calcium from their cells, Dr. Lansing found in other experiments.

Cancer tissue is markedly low in calcium, scientists have repeatedly shown. A calcium deficiency in cancer cells has recently been reported as the reason for a decreased stickiness of the cells. The decreased stickiness makes separation of one cancer cell from another easy and may be part of the reason for the spread of cancer through the body.

These findings on cancer are what could be expected if little calcium in the cells is a mark of young, vigorous growth.

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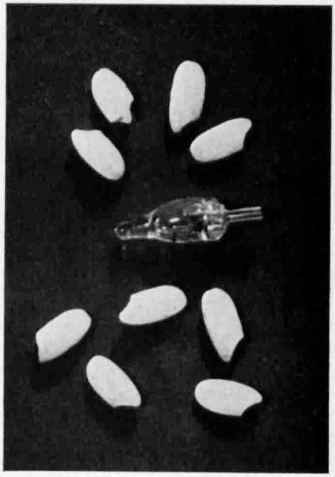
RADIO

Rice-Grain Size Tube Developed for War Uses

➤ A RICE-GRAIN size radio tube has been developed by the National Bureau of Standards, it was revealed. It is believed to be the smallest tube ever made.



RICE-GRAIN TUBE—This microtube, photographed here with grains of rice, is the world's smallest known radio tube. It was developed at the National Bureau of Standards.

This microtube, as it is called, has various military applications. Therefore no details relative to it are revealed. It grew smaller through a process of evolution. Scientists of the Bureau first made a tube about one quarter of an inch in diameter. They found that design simplifications to get that far made even further reduction in size possible. The result is the new tube, which is slightly larger than an ordinary grain of rice.

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ASTRONOMY

Sun Million Degrees Hot?

Observations with "snooperscope" and "sniperscope," show that sun produces much more energy than would be expected from lower temperatures.

➤ ASTRONOMERS have trained the eye of the wartime snooperscope upon the infra-red "heatshine" of the sun and discovered that the sun is producing much more energy than can be expected from the extent of its supposed temperature.

Probably the most important astronomical advance of the year, the American Astronomical Society meeting in Evanston, Ill. heard a group of scientists from the University of Michigan's McMath-Hulbert Observatory tell how they had penetrated a region of the sun's radiation never before adequately explored.

They used a sky-observing variation of the famous snooperscope, sniperscope and infra-red signaling devices that GIs used in spotting unsuspecting Japs. This consists of a lead sulfide photocell sensitive to heat or infra-red radiation. The cell used in solar observation has a hundred times the sensitivity of the best heat-measuring thermocouple used by astronomers heretofore. With this solar snooperscope, the astronomers are able to chart in detail the deep infra-red solar spectrum that is unreachable with ordinary photographic plates sensitive to visible light.

"There must be some way in which the sun is producing a great deal more energy than one would expect from its apparent surface temperature," Dr. Leo Goldberg of the University of Michigan told the astronomers. He concluded this from a startling discrepancy observed between the infra-red spectrum lines caused by iron atoms and the prediction from currently accepted theory. The iron atoms in the sun's lower atmosphere could not produce the snooperscope effect observed if they were at a mere temperature of 4800 degrees absolute temperature now assigned them. Estimates of million-degree temperatures in the sun's corona fit in with the new observations.

Since the sun's heat is produced by a cycle of atomic energy involving helium, hydrogen, carbon and other light elements, the new observations will probably give rise to new speculation concerning this solar conversion of mass into energy.

Oxygen and water vapor in the earth's atmosphere blanket the earth and prevent visual observation of the sun's spectrum in the infra-red region. Beginning at about 11,000 Angstroms (units in which radiation is measured) and extending to 15,000 Angstroms, the solar spectrum consists mainly of absorption bands of molecules in the earth's atmosphere.

Dr. Arthur Adel of the Michigan team and pioneer in infra-red observation, reported the identification of new atomic lines between 15,000 and 16,000 Angstroms which cannot be duplicated here on earth.

Dr. Robert R. McMath, director of the McMath-Hulbert Observatory which has two towers continuously observing the sun, and Dr. Orren C. Mohler told how new equipment, using mirrors exclusively instead of lenses, will extend the infra-red observations out to about 40,000 Angstroms this winter.

The lead sulfide cell developed by Dr. R. J. Cashman of the Northwestern Technological Institute has its range limited now to about 20,000 Angstroms by having to work with radiation that passes through glass which screens out some of the heat bands.

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From July until October, when the water is warm, *lobsters* move into Maine bays and river mouths but return to the sea when the water begins to cool.

METALLURGY

Gold and Copper Used in Solder

➤ GOLD and copper are alloyed to make a special-purpose solder by Dr. Richard B. Nelson, a General Electric Company research physicist. Preferred proportions are 37.5% gold, 62.5% copper. The solder is used on such difficult metals as copper and iron-nickel-cobalt alloys. Also, because its expansion characteristics are close to those of glass, it is well suited for making high-vacuum seals between glass and metals. Patent 2,426,467 has been granted on Mr. Nelson's solder.

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SCIENCE NEWS LETTER

Vol. 52 SEPTEMBER 13, 1947 *No. 11*

The weekly summary of Current Science, published every Saturday by SCIENCE SERVICE, Inc., 1719 N St., N. W., Washington 6, D. C., NOrth 2255. Edited by WATSON DAVIS.

Subscriptions—$5.00 a year; two years, $8.00; 15 cents a copy. Back numbers more than six months old, if still available, 25 cents.

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Entered as second class matter at the post office at Washington, D. C., under the Act of March 3, 1879. Established in mimeographed form March 18, 1922. Title registered as trademark, U. S. and Canadian Patent Offices. Indexed in Readers' Guide to Periodical Literature, Abridged Guide, and the Engineering Index.

Member Audit Bureau of Circulation. Advertising Representatives: Howland and Howland, Inc., 393 7th Ave., N.Y.C., PEnnsylvania 6-5566, and 360 N. Michigan Ave., Chicago, STate 4439.

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PHYSICS-MEDICINE

Export Atom Pile Chemicals

As contribution to international defense against cancer, the United States will send abroad radioactive chemical elements, by-product of bomb.

➤ TO AID the fight against cancer and other disease foes of mankind, the United States will export radioactive chemical elements manufactured in the uranium chain-reacting pile that produced the atom bomb.

Announcement of this "important forward step toward greater international cooperation in the field of medical and biological research" was made in a telegram from President Truman to Dr. E. V. Cowdry, president of the International Cancer Research Congress meeting in St. Louis.

Thus, while the method of making the atom bomb remains a closely guarded secret, the United States will share its greatest peacetime byproduct with the world.

In his telegram of announcement, President Truman said: "I know that the representatives of the United States attending the Cancer Research Congress share my hope that the open, impartial, and truly international character of medical research will carry over into the realm of other problems of world concern. The sharing by and among all nations of both the means and the results of cancer research will reduce the loss of life and human suffering from disease throughout the world."

The production of radioactive chemicals at the Clinton Laboratories, operated by Monsanto Chemical Company, has now reached the point where the 20 most important of these chemicals can be made available in limited amounts and at reasonable cost to qualified users outside of the United States, Atomic Energy Commission officials decided. More than 1,200 shipments of some 90 such chemicals have been made to more than 160 institutions throughout the United States in the past year.

Foreign governments whose research workers request radio-isotopes must first agree:

1. To make progress reports to the United States Atomic Energy Commission every six months on the results of the work with the isotopes and to permit publication of the reports.

2. To insure that the radioisotopes are used for the purpose stated in the requests, which must be approved by the Commission prior to shipment in the same manner as domestic requests.

3. To permit qualified scientists irrespective of nationality to visit the institutions where the materials will be used and to obtain information freely with respect to the purposes, methods and results of such use, in accordance with well established scientific tradition.

The 20 radioactive chemical elements, or isotopes as they are termed, are: antimony 122, 124, 125, argon 37, arsenic 76, 77, bromine 82, calcium 45, carbon 14, chlorine 36, cobalt 60, copper 64, gold 198, 199, iodine 131, iron 55, 59, mercury 197, 203, 205, phosphorus 32, potassium 42, silver 108, 110, 111, strontium 89, sulfur 35, sodium 24, and zinc 65, 69.

Besides cancer research, they may be used in studies ranging from venereal diseases to the action of insulin.

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AERONAUTICS-ENTOMOLOGY

American Helicopters Fight Locusts in Argentina

➤ HELICOPTERS of American make have proved their worth in combat in Argentina recently—though not against any human foe. Instead, the foe was an enemy of the whole human race—locusts, that devour grain, pastures, all edible things in the paths of their miles-wide, miles-long swarms.

Helicopters flying through or over the air-borne hordes spray them with a commercial preparation of dinitro-orthocresol. Contact is immediate and effective, it is reported; a 98% kill of the insects is claimed.

This first use of helicopters in South American insect warfare was made under the command of C. J. Tippett, technical director of Trabajos Aereos Y Representaciones (TAYR), using craft built by the Bell Aircraft Corporation. In all, 11 helicopters have been delivered for this purpose.

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***KILLED BY HELICOPTER**—Victims of the helicopter, now waging war against an enemy of all mankind, these locusts lie dead on the ground near Parana, Argentina. The helicopter, of U. S. make (Bell), is used to scatter a killing dust in the clouds of locusts as they fly.*

GENETICS

Chestnuts Come Back

Trees, almost all killed by Oriental pest, may be replaced by hybrid trees now being produced that are resistant to blight fungus.

Tree was horse-chestnut

See Front Cover

➤ LONGFELLOW'S poem, "The Village Blacksmith," meant a great deal more to our grandparents than it does to children of the present generation. Not only have blacksmiths vanished, but spreading chestnut trees are no more.

Blacksmiths vanished when automobiles replaced horses and buggies; their sons set up in business as garagekeepers and repairmen. But there was no such technological replacement in the case of the chestnut tree: it simply got killed by a fungus-caused blight. Beginning about the turn of the present century with a little focus of infestation around New York, this imported Oriental pest spread by leaps, until today all that are left of America's once beautiful native chestnuts are a few scattered sick trees in western Tennessee and northern Mississippi. Over great stretches of forest land in the eastern third of our country, barkless trunks still stand, for the excellent wood of the chestnut defies decay.

America needs new chestnuts. The nuts are pleasant eating for human beings and important food for such wildlife as wild turkeys, but that is the smallest part of the story. Bark and wood are about our most important source of tannin for making leather. The wood is useful also in places where resistance to decay is important, as in posts and ties, and (of all things!) coffins. At present, much of our tannin requirement is met by "mining" the dead stands of blight-killed chestnuts; but these, of course, cannot be expected to last indefinitely. Replacements must be arranged for.

Blight-resistant chestnut species have been brought in from the Orient, where the blight itself came from. Presumably blight-susceptible trees in China and Japan died off long ago; the survivors represent the product of a natural selection. The Brooklyn Botanic Garden pioneered this work, but lately greatest activity in seeking blight-resistant trees has been on experimental plots a short distance outside Washington, D. C. There two pathologists of the U. S. Department of Agriculture, G. F. Gravatt and Russell B. Clapper, are making all kinds of hybrids between the most promising Chinese chestnuts and chinkapins and American chestnut sprouts that spring up from the roots of dead trees and survive long enough to produce a few blossoms—sometimes even a few nuts.

Male or pollen-producing and female or seed-bearing flowers are borne in clusters, separately but on the same tree. Since the two sexes mature at slightly different times there is small chance of self-pollination. To insure the desired crosses, branch-ends are bagged and "intruder" pollen thus excluded. Pollen from the chosen male parent is collected, usually by simply picking off one or more of the beautiful yellow male catkins, and the fertilizing grains transferred to the receiving surfaces of the inconspicuous green female flowers. Then the bag is tied on again until the nut-containing burrs begin to form.

The picture on the front cover of this week's SCIENCE NEWS LETTER shows how the pollen-bearing male flowers are carried to the female flower for cross-pollination as well as how the pollen grains are transferred. The cover photograph and those on this page were made by the Science Service staff photographer, Fremont Davis.

Some fairly promising resistant hybrids have already been obtained, but the researchers are not satisfied, and intend to keep on trying. When they finally succeed in getting what they want they will have also the added advantage of hybrid vigor in their trees. This is the curious property in hybrids, not at all well understood as yet, that causes many of them to be faster-growing, bigger and more prolific than their parents. It is one of the things that has made hybrid corn such a success in this country; now we are to see it in trees.

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CROSS-POLLINATION — The pollen from the male flowers is placed on the pistils of the female flowers, which are then protected against accidental pollination by paper bags. See cover for closeup.

ENGINEERING

Inspection by Supersonics

In method comparable to radar, echoes of high-frequency sound show up tight cracks in metal not likely to be found by X-ray techniques.

➤ IMPROVED methods of locating flaws in large metal forgings by means of high-frequency sound waves can be used with parts too thick to be successfully X-rayed, the American Institute of Electrical Engineers meeting in San Diego was told by Donald C. Erdman of Burbank, Calif.

Supersonic inspection, as he called the process, will detect tight cracks which are not likely to be found by X-ray methods, although X-ray has quite an advantage in being able to show defects in such a manner that the type can be more easily identified, he said.

He likened the method to the echo techniques used in radar, in which electric impulses are reflected back by obstacles to the antenna from which sent. When high-frequency sound waves

are sent through metal, waves that hit a hidden flaw within it are reflected back.

In the method described by Mr. Erdman, a small quartz crystal is used as a transducer, a device to convert electrical energy into pressure waves, or returned pressure waves into electrical energy. Extremely short blocks of radio frequency power are fed to the transducer, with intervals between the blocks to permit the receipt of returned waves if there are any.

In inspecting small metal objects, the quartz crystal and casting are separated but both placed under water. This permits the supersonic beam to be directed into fillets and curved surfaces, he said. When large objects are being inspected, their surfaces are usually flat enough to allow the quartz crystal to be placed directly against the parts.

There is no well-defined limit to the thickness of a part that can be inspected by supersonic means, Mr. Erdman stated, providing the metal is homogeneous, and the proper frequency and power are used.

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MEDICINE

Clue to How Cancer Kills

Cancer, at least in mice, picks up nitrogen from protein food and holds it trapped so that body can't use it. With nitrogen gone, the body dies.

➤ DISCOVERY of a clue to the unsolved mystery of why cancer kills was announced by Drs. G. B. Mider, H. Tesluk and J. J. Morton of the University of Rochester School of Medicine at the International Cancer Congress in St. Louis.

The clue is that in mice, and probably in humans, the cancer acts as a nitrogen trap. Nitrogen is an essential chemical for all protein tissue in the body. Muscle is the most familiar but by no means the only such protein tissue. The body gets this nitrogen from protein foods, such as meat, milk and eggs. But the cancer may take more of this than the diet provides.

It robs the body of its stores of nitrogen, and it holds this trapped, so that the rest of the body cannot use it. With its nitrogen gone, the body dies.

This theory, based on studies in mice, would explain why patients with cancer, especially in the last stages, lose weight and get very thin. Rats with cancer lose about 30% to 40% of their carcass weight, that is, of the weight of the body exclusive of the weight of the cancer.

As the cancer grows larger, the demands for nitrogen exceed the supply from the diet. The cancer gets the chemical at the expense of the body. Death comes when the body tissues cannot supply further nitrogen.

The situation is "like a motor which must supply power to machines," Dr. Mider explained. "The motor works well at its rated horsepower. It can function efficiently with some excess load. But if the load continues to increase, the motor will fail. The motor will also fail if its own source of energy is seriously impaired."

So far the findings apply only to one kind of cancer in mice under one set of experimental conditions. More studies are needed to confirm the theory and extend it to cover cancer in man. But scientists hearing the report believe it may explain many things about human cancer not now known.

For example, patients sometimes live for many years with cancer in their bodies before it finally kills them. Doctors are seeing more and more of such cases, now that surgery and X-ray have become more efficient in eradicating the primary cancer. Deaths are more frequent now from cancers that have spread from the original one.

At first these spread cancers, called metastases, give no sign of their existence. It may be years before they grow to the point of killing the patient. If these spread cancers were ordinary scar tissue scattered widely through the body, the patients would be alive and well.

Some ways in which cancer kills are already known. It may kill by interfering with the function of a vital organ or by causing hemorrhage or ulcers which get infected and then the patient dies of the infection. But injury and other noncancerous conditions may kill by the same means. The killing effect of cancer itself is not understood unless the nitrogen trapping action explains it.

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CANKER—This is the deformity caused by the blight fungus in the trunk of a young chestnut tree. Russell B. Clapper, researcher of the U. S. Department of Agriculture, inspects the extent of the injury.

PLANT PATHOLOGY

Streptomycin Rids Seeds Of Disease Bacteria

➤ STREPTOMYCIN, the white hope against white plague in human beings, may also prove the salvation of seeds from bacterial plagues that lurk in their coats, ready to attack the young plants as soon as they emerge. In laboratory tests with a dilute streptomycin solution, Dr. Peter A. Ark of the University of California was able to rid cucumber seed of blight germs that would otherwise have proven fatal.

Other bacteria that attack plants yielded to streptomycin treatment. They included germs that cause blight in carrots, beans and pears, several leaf-spot diseases, tomato scab and tomato canker. Crown-gall bacteria and the fungi of pea blight and squash wilt resisted the drug.

Medicinal streptomycin is too costly at present for use in seed treatment, but Dr. Ark suggests the possible use of a less refined form of the drug, which could be made more cheaply.

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ASTRONOMY

Establish World Center On Minor Planets

➤ SO FAR as minor planets are concerned, Cincinnati Observatory has become the center of the solar system. The International Astronomical Union has designated it as the world's collecting and distributing center for observations on asteroids or minor planets.

Astronomers from all parts of the world will send to Cincinnati observations, ephemerides, and new discoveries, which will then be bulletined by wire, cable and mail to all observatories.

Cincinnati Observatory, headed by Dr. Paul Herget, will thus serve the same function with regard to minor planets as Harvard College Observatory, Cambridge, Mass., does in the distribution of general astronomical data by means of its famous series of announcement cards and telegrams.

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CHEMISTRY

Chemistry Helps to Locate Hidden Minerals in Ground

➤ CHEMISTRY is now playing an important part in helping locate hidden minerals in the earth. In the relatively new process, surface waters and certain parts of plants are analyzed to determine mineral compounds within them. The results indicate the chemical composition of underlying ore bodies.

The process is known as chemical or biogeochemical method. It was described in a recent issue of *Mining and Metallurgy,* a publication of the American Institute of Mining and Metallurgical Engineers, by Kalervo Rankama of the geology department of the University of Chicago. He described also the detection of mineral ores by the existence of indicator plants. This is the geobotanical method.

These methods, he stated, may provide geologists with far more information on the chemical composition of ore bodies and provide a more direct method for prospecting and locating ore bodies of specific metals than have the detailed examination of surface rocks and the results of various geophysical methods.

Principles behind the methods are simple. All minerals are soluble in water to some extent, he said. Ground water passing an ore body will dissolve the minerals in the ore. Consequently, the elements present in the ore body can be detected in the overlying soil, or in vegetation.

Copper-nickel ore in central Finland was located by Mr. Rankama by spectrographic analysis of the ashes of birch leaves growing in the vicinity. A distinct enrichment of nickel, he stated, was found present in plants growing in the immediate vicinity of the outcropping copper-nickel ore body in the northern area near Petsamo, formerly a part of Finland but now Russian territory.

Also, there are certain plants that grow best in the vicinity of certain mineral elements in the soil. Several ore deposits, discovered because of the presence of one or another of these plants, were mentioned by him.

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ENGINEERING

Sectional Buses Adapted To Wide Range of Uses

➤ SECTIONAL BUSES, introducing a new flexibility into traffic management, are offered under new U. S. patent 2,425,948, by Rene Lucien of Farnham Common, England.

According to his design, the forward section contains the operator's compartment, with steering gear and appropriate power controls. The rear section contains the engine and transmission; its wheels are the drive wheels. The middle section, normally unwheeled, is fitted with seats and baggage compartments.

The three sections are so arranged as to come apart readily, front and rear sections dropping retractable third wheels to permit their being moved away from the middle section, which is kept at proper height by hydraulic jacks fore and aft. Thus the control and power sections can be shifted from short to long passenger sections, as traffic may demand. To prevent an extra-long middle section from becoming swaybacked, extra wheels, which may be powered by a transmission shaft, can be fitted to it.

The control and power sections can be attached to mid-sections designed for other purposes, if desired. Thus the bus may become a heavy truck, a hopper truck for loads like grain, coal and gravel, a tank truck, etc. In time of war a number of them could make up a mobile battery, with open platform mid-sections mounting guns, searchlights, radar and computing apparatus. Unconverted buses could then serve as personnel carriers, and one or two might become mobile hospital units.

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IN SCIEN

ENTOMOLOGY

Mosquitoes' Flight Traced By Fluorescent Dusting

➤ THE OLD gag about crossing mosquitoes with lightning-bugs so you could tell when they were coming has been realized for practical scientific purposes. The feat was not accomplished by an impossible genetic combination but by making ordinary mosquitoes shine in the dark. The beauty of it is that the mosquitoes don't know anything about it.

A scientist from India, Dr. Rajindar Pal, working at the London School of Hygiene and Tropical Medicine, wanted to follow the flight path of night-flying mosquito species, especially the ones that carry malaria and yellow fever.

He caged his insects in old-fashioned lamp-chimneys and gave them a few puffs of a fluorescent dust, that shines when the invisible rays of ultraviolet light fall on it. After the insects were released, he could follow them easily, no matter how dark it was, simply by turning the beam of an ultraviolet lamp on them.

A short technical report of Dr. Pal's experiments is presented in *Nature* (Aug. 30).

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BOTANY

Many "Coral" Beaches Formed from Dead Seaweed

➤ THE GLEAMING, snow-white sand on thousands of tropical "coral"' beaches is not made of ground-up coral at all but of tiny flakes of limy substance formed in the flat, leaflike branches of a green seaweed or alga, declare Drs. J. van Overbeek and Raymond E. Crist of the University of Puerto Rico.

This seaweed, known to botanists as *Halimeda opuntia,* forms great green sods on the shallow bottom just off shore. Pieces of it are constantly being wrenched loose by wave and current action. Cast ashore, they die and lose their green outer coating, leaving only the limy skeletons as flat flakes. Anyone who knows the plant in life can identify a beach that it has made by the shape of the flake-like limestone sand, state the two scientists.

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CE FIELDS

CHEMISTRY

Atomic Bomb Particles May Turn into Hydrogen

➤ A PREDICTION that spontaneous disintegration of free neutrons into hydrogen atoms would be discovered was made to the British Association for the Advancement of Science by Dr. O. R. Frisch of Britain's Harwell Atomic Research Laboratory. Neutrons are the fundamental particles that set off the fission of atoms in the atomic bomb. Hydrogen in the form of the proton which is its heart is another fundamental bit of matter of the same weight.

Study of the way neutrons scatter from inorganic molecules will show the position of the hydrogen atoms within them, Dr. Frisch also predicted. This should be of eventual industrial importance.

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MEDICINE

Deadly Atomic Disease Has No Human Victims

➤ A NEW, deadly disease of the atomic age was reported to the International Cancer Congress in St. Louis. It is named plutonism, for the element, plutonium, discovered in atomic bomb researches.

It has never attacked a human being. It probably never will, because of the care being taken to protect atomic energy workers. But hundreds of mice and rats in the Argonne National Laboratory, Chicago, have died of it. Dr. Hermann Lisco and Miriam P. Finkel of that institution reported their studies with this radioactive chemical.

Plutonium gives off all alpha rays. Compared to beta and gamma rays, these alpha rays have not been considered very dangerous. They are big particles, but they can penetrate only through short distances or thicknesses. If they strike the body from outside, they can hardly get through the skin. But within the body, concentrated in one place, they can cause great damage in that area.

This might make plutonium good treatment for cancer by localizing its rays at the site of the cancer. But the element has a half-life of over 20,000 years, which makes it too dangerous to use. The cancer might be destroyed, but the chemical would go on emitting rays which would cause other cancers.

Time as well as the size of the dose of plutonium is important in the damage it does. It takes much longer for radioactive chemicals to cause cancer than for non-radioactive, coal tar chemicals.

A mouse has a short life compared to man. It may die before it gets cancer from radioactive material, but a man lives long enough to get the cancer, Dr. Austin M. Brues of Chicago pointed out. His studies show that it is absolute, not relative, time that is important in the development of cancer from radium or other sources of radiation. This absolute time factor may be important in connection with other causes of human cancer.

Science News Letter, September 13, 1947

METALLURGY

High Electrical Potential Warns of Beginning Rust

➤ WHEN painted metal surfaces rust in water solutions, some of their electrical properties change, F. Wormwell and D. M. Brasher, of the Chemical Research Laboratory, announced. (*Nature.*)

Describing their experiments, they explained that steel plates were abraded, degreased, and given two coats of anti-corrosion marine paint. A pair of these plates, in an upright position, was covered with artificial sea water, after an insulated wire had been attached to each.

Checking earlier workers, they first found the potential difference, or difference in electrical pressure, between the two plates. This is usually measured in volts. The potential, they pointed out, increased to a high point just before rusting began. Then it dropped slowly as rusted area increased.

Next they studied the change in the voltage needed to make current flow from one plate through the sea water to the other plate. This resistance became less as the area of rusting on the plates increased.

In a third experiment, the scientists measured the capacity, or the amount of electricity which the plates could hold. The capacity, they reported, increased as the steel plates rusted more. This change in capacity turned out to be the best method of measuring breakdown of paint films, they said.

Science News Letter, September 13, 1947

PHYSICS-PALEONTOLOGY

Atomic Energy May Locate Hidden Fossils

➤ ATOMIC energy will be tested to obtain information concerning prehistoric man from certain limestone formations in South Africa. A University of California expedition outfitted in July will try out the method, the American Society of Mechanical Engineers was told by Robert Sibley of the university staff.

In these limestones, he said, are skulls and fossil remains that will have a great bearing in tracing the ancestry of man. It is expensive to dissolve out the limestone material to obtain them. If means could be found to photograph a piece of limestone so that any fossils in it could be known before expensive excavations are made, it would greatly facilitate the speed of this study and reduce the expense.

Experiments were conducted, before the expedition left for South Africa, using radioactive materials previously bombarded by the fast moving particles in the cyclotron. Means were found that will enable the scientists to acquire information on the fossils without ever having dissolved the enclosing media.

Science News Letter, September 13, 1947

ENGINEERING

Less Sugar Loss When Beets Are Stored Cold

➤ LARGE savings in sugar result from the storage of sugar beets at near freezing temperature while awaiting processing at the sugar mills, the American Society of Mechanical Engineers was informed by R. D. Barmington of the Colorado Agricultural Experiment Station, at Fort Collins.

Sugar losses in a stored pile of beets vary from one quarter to one pound per ton per day, depending upon the temperature of the pile, he stated. When a 60,000-ton pile of beets is stored, the loss of one pound of sugar per ton means a loss of 30 tons of sugar daily.

For best storage of beets, the temperature must be reduced from about 50 degrees Fahrenheit, the average temperature of the soil at harvest time in Colorado, to as near 32 degrees as possible without freezing. One cooling means suggested is artificial ventilation using night air, which is usually 35 degrees or lower during the storage season. The statements are based on experimental work at the Colorado station.

Science News Letter, September 13, 1947

MEDICINE

X-Rays Fight White Plague

Many modern treatments have been developed for tuberculosis but the X-ray is the most valuable weapon for detecting disease in early stages.

By JANE STAFFORD

➤ FRONT-LINE weapon against tuberculosis is the X-ray machine. In the half century since the discovery of X-rays, medical scientists have developed many ways of treating the white plague, from rest cures in a sanatorium to chest operations and streptomycin, the chemical from a mold.

But before the patient can be cured, he must be found—and this is not always easy. Contrary to popular impression, the patient with tuberculosis does not always present the appearance of a gaunt, feverish person with wracking cough and bloody sputum. In fact, the cough, the hemorrhages and similar spectacular symptoms usually do not appear until the disease has gone on for some time.

Very early stages of the disease, however, can be detected by X-ray pictures of the chest.

Medical authorities now hope that with the latest technological developments and the increasing use of the chest X-ray, they will be able to wipe out a disease that is killing more than tens of thousands annually. So health agencies throughout the United States are assembling their forces for one of the greatest battles in history—a war to the death against tuberculosis.

Mobile Units Touring

Day-to-day developments in the big battle ahead are being reported in the nation's press as mobile chest X-ray units move into various localities to make available to the populace the inexpensive, simple chest X-ray. Although the X-ray itself was discovered some 52 years ago, it wasn't until recent years that the inexpensive methods were developed to a point where it was possible to bring this simple health check to every man, woman and child.

The pioneer mass chest X-ray service in this country was the rapid method of using paper film in roll form, first used by the Queensboro Tuberculosis and Health Association of Queens County, N. Y., in 1931. Advantages of this system are its high speed, allowing more than 150 persons to be X-rayed per hour, the low overall cost of the full-size 14 x 17-inch radiographs, and the high diagnostic quality and accuracy of the film.

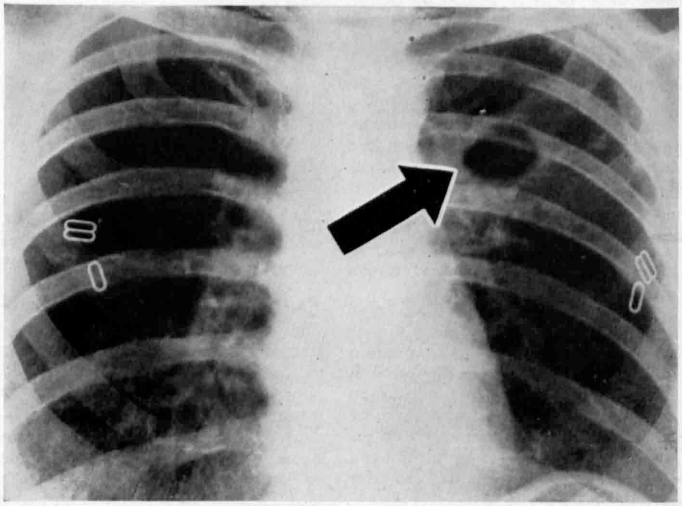
In recent years further developments in chest X-ray equipment have produced mobile units—using 14x17 paper, and 35-mm. and 70-mm. films—that can be moved into any place, any time, for the purpose of providing a person with a chest X-ray that takes only a matter of seconds.

For the person to be X-rayed by this "case-finding" process the entire operation is as simple as the taking of a snapshot with an ordinary box camera. The person to be X-rayed steps in front of the X-ray unit where he is shown the proper stance and position by a trained technician and in less than two seconds his X-ray has been "shot." These X-rays are then processed and interpreted by a physician.

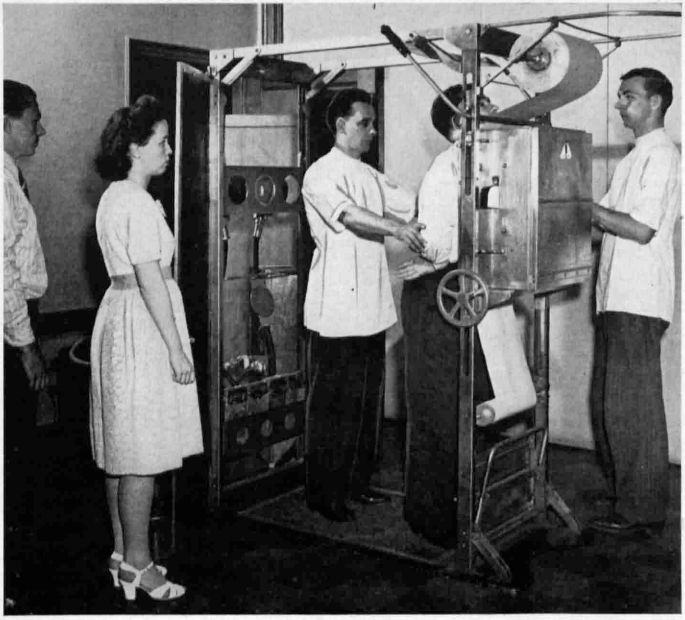
Tubercle bacilli, germs which measure only 1/500 of an inch in length, are the cause of tuberculosis. In many cases of early tuberculosis the tubercle bacilli are not present in the sputum but the X-ray will show their "suspected" existence in the chest. Early diagnosis is especially important because the treatment of this disease consists in developing the forces of resistance and the sooner the doctor and the patient know of the presence of this germ the better able they are to fight the disease.

Aids During Treatment

After serving its important part in diagnosis, X-ray continues to be of major aid to the doctor as he treats the disease. Before X-ray was put to use, knowledge of what happened in the lungs during tuberculosis infection had to be based mostly on what could be seen in post-mortem examinations. The X-ray makes it easier for the physician to understand the disease in its early stages,



ADVANCED TB—The arrow is pointing to a shadow that shows advanced disease in the left lung. The right lung has no such cavity. It requires the trained eye of a physician to interpret properly the shadows and highlights of the X-ray picture.



SNAP SHOOTING—It takes only a fraction of a second to make a picture. A trained technician shows the proper stance.

watch its progression or regression, and adjust treatment accordingly.

Chest X-rays are being offered with the latest scientifically developed equipment by the U. S. Public Health Service, by various state and municipal health departments and by Christmas seal sale organizations. In addition, there are private services, such as Powers X-Ray Service of Glen Cove, L. I., which handle mass surveys for civic, educational, industrial, labor and other groups. A letter or phone call to your local Tuberculosis and Health Association, or Public Health Center, will bring information as to where these X-rays are available in your locality.

When the X-ray picture of the chest shows a shadow over the lung, the doctor will want to make further tests before a final diagnosis. If the X-ray was taken with small size film, a second X-ray with the large 14x17 diagnostic film will be taken. The small films are used for screening, that is to distinguish between those with no shadow on the lungs and those with shadows that might mean tuberculosis.

A shadow on the lungs might be due, for example, to cancer of the lungs. On the large film the X-ray specialist, called a radiologist, can usually distinguish between these two diseases. Histoplasmosis, a fungus infection of the lungs, can also cause shadows in the X-ray picture.

After the large film has been studied, the doctor will make further tests to corroborate the diagnosis. Sputum, fluid washed out of the stomach and urine will be examined to see whether tuberculosis germs are present in any of these fluids. A blood sedimentation test will also be made. The rate at which the red blood cells settle when the blood stands in a tube will show a toxic condition, if such is present.

Once the doctor is convinced that the patient has tuberculosis, he will undoubtedly advise that the patient go to a sanatorium for a rest cure, as it is called. Treatment of tuberculosis, until the discovery of streptomycin, was based on rest. The patient stays in bed, cutting down bodily and mental activities and exertion to an absolute minimum.

This resting is best done in a sanatorium because few homes can provide the necessary quiet and freedom from minor and major domestic incidents which worry a sick person. Protecting others from getting tuberculosis, when the patient is discharging germs in his sputum, is also more easily done in a sanatorium than in the patient's home.

The object of the rest is to give the body a chance to concentrate all its forces on fighting the tuberculosis germs. Even now that streptomycin's anti-TB germ action has been discovered, many doctors will still order absolute rest for the patient.

May Put Lung to Rest

Besides rest in bed for the body, doctors may advise procedure to put the infected lung at rest.

The commonest way of doing this is by pneumothorax. This consists in injecting air into the pleural cavity, that is, the space between the lungs and the chest wall. The injection is made painless by a small amount of local anesthetic.

Normally the lungs, contracting and expanding 25,000 times daily throughout life, fill the space between them and the chest wall. But when air is put into this space, the rather elastic lung collapses and remains in a collapsed resting position. Both lungs may be

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Do You Know?

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A synthetic *drug,* called synhexyl, is successfully used to "cheer-up" patients in the fight against mental sickness.

A broad 4,250-acre swampy plain near the Rhone river in France has been planted during the past dozen years with some 350,000 poplars.

A state *lobster hatchery* in Maine raises some 600,000 baby lobsters each year; they are distributed to more than a hundred coastal areas along the rocky shore of the state.

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partially collapsed. Refills are necessary at intervals to replace the air which is absorbed.

In some cases of tuberculosis, the doctor may decide to cut the phrenic nerve so as to paralyze one side of the diaphragm. The diaphragm is then pushed up by the organs beneath it, and compresses the diseased lung.

The lung collapse from pneumothorax is temporary. If the doctor thinks the lung should be permanently collapsed the operation called thoracoplasty may be performed. This consists in removing the ribs so as to allow the chest wall over the diseased area of the lung to fall in and collapse the lung permanently.

Streptomycin, penicillin's ally in the fight against germ diseases, is being used more and more in treatment of tuberculosis. This chemical from a mold in the earth has saved lives and shortened the course of the disease. It is not a cure-all. Its action is to check the tuberculosis germs, thus giving the body's natural defensive forces a chance to overcome the germs completely. Rest in bed and other forms of treatment may be needed along with streptomycin.

Science News Letter, September 13, 1947

ASTRONOMY

Stars Have Prominences

Observations on eclipsing binary star show that our sun is not only body with great flares of hot gas extending from it.

➤ STARS, as well as our sun, have great flaming prominences and flares of hot gas extending from them that make any earthly storms or volcanoes feeble by comparison.

This discovery was reported to the American Astronomical Society meeting in Evanston, Ill., by Dr. Otto Struve, president of the society and honorary director of Yerkes and McDonald Observatories.

Dr. Struve's observations were made on the unusual eclipsing binary star UX Monocerotis. His work throws new light upon the origin of gaseous streams, rings and shells which exist in many close double-star systems and in some peculiar single stars.

UX Monocerotis consists of a large, fairly massive star of the same type as the sun, although much larger, and a hotter star of less mass. These stars revolve around each other at speeds of 37 and 87 miles per second, respectively. There is a total eclipse when the solar-type star hides the smaller, hotter one. During this eclipse clouds of calcium gas are observed spectroscopically expanding outward from the solar-type star at a velocity of 155 miles per second.

But the hotter star also gives out prominence clouds, principally of observable hydrogen gas. The sun's own prominences, which are visible during a total eclipse of the sun as bright red tongues of "flame", are composed principally of hydrogen, but also contain large amounts of the same calcium gas observed in the case of UX Monocerotis.

Frequently observed gaseous streams and rings in other eclipsing variable stars owe their origin to a similar process, Dr. Struve said, explaining it is probable that all of these tenuous formations are being replenished by prominences from one or both stars. He expects that prominence action is also responsible for the formation of rings in rapidly rotating single stars.

Dr. Struve suggested that the enormously extended atmospheres of supergiants, such as Deneb (alpha Cygni), may also be caused by a vast field of prominences. He credited Dr. Donald H. Menzel, of Harvard, with arriving at substantially the same conclusion by an entirely different process of reasoning.

Science News Letter, September 13, 1947

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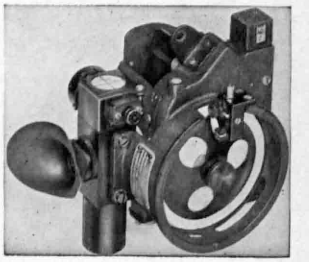

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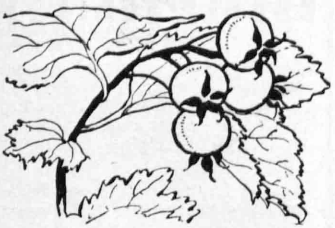

Bright Invitations

➤ AUTUMN sees a steady, finally a rapid, diminution in the bright show of flowers that has delighted our eyes and noses ever since spring. The brightness has not all departed, however; it remains with us in the tawny gold of hawthorn and persimmon and false bittersweet, in the reds of coralberry and honeysuckle fruit, in the purples of wild grapes and woodbine berry and viburnum, in the gleaming white of the snowberry. Many of these persist after the last brilliant leaves have fallen from trees and shrubs, holding fast all winter, or until some hungry bird or squirrel nips them off.

That of course is the secret of their brightness. As the fair color and sweet scent of the flowers tempted bees, moths and other insects to sip nectar and thereby made possible the necessary function of pollination and fertilization, so the bright hues of the berries and fruits are invitations to animals, especially birds and mammals, to come and eat their fill and thereby disseminate and plant the seed. And that is what gives an advantage to those shrubs and trees that keep at least a part of their fruit until deep into the winter: their offerings may be passed up in the abundance of autumn, but will be taken gladly when glazed snow covers the ground and food is harder to find.

Most of the bright fruits, no matter how diverse their botanical kinships, are alike in having a more or less pulpy flesh surrounding one or more hard-coated, indigestible seeds. The pulp is the reward for swallowing; the tough seed is constructed for survival through the vicissitudes of digestion, emerging finally undamaged and ready for germination when warmth and moisture give leave. Indeed, it is quite probable that some seeds are even prepared for germination by the chemical action of their animal carriers' digestive juices on the resistant, impervious coats.

What the fruits may taste like to human tongues is no criterion of their acceptability to birds and other animals that may act as agents of distribution. Birds seem to have either no sense of taste or else a very strange one, for they will swallow without hesitation berries and small fruits that are bitter or nauseous to us, or at best insipid and tasteless. If there is a little sugar or starch in the pulp that is all the bird or beast cares about. Niceties of flavor are luxuries that man can afford, but they are not for the hungry beaks and teeth of the snowy woods.

Science News Letter, September 13, 1947

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CHEMICAL ENGINEERING

Certain Greases Produced By Continuous-Process

➤ ALUMINUM-BASED greases for industrial and agricultural machinery, and lithium-based greases for aviation and other uses, are now produced in a continuous-process machine into which the ingredients are dumped at one end and come out as finished products at the other.

The result is a saving of time over the old so-called batch method and a finer quality of grease is produced. In the generally used batch-process, the ingredients are heated in big kettles and mixed by paddles until they reach proper consistency. In the new process, which is suitable for greases other than those mentioned, mixing, heating and flow through the machine are all automatic. In it there is no handling of the grease during manufacture, and there is no chance for contamination.

The continuous-process method is a development of Shell Oil Company. It has just been put into production in the company's refinery at Martinez, Calif.

Science News Letter, September 13, 1947

CHEMISTRY

Chemistry Research Prize To Dr. George C. Supplee

➤ DOCTOR George C. Supplee, president of the G. C. Supplee Research Corporation, Bainbridge, N. Y., will receive the 1947 Borden Company prize for research in the chemistry of milk.

The award of $1,000 and a gold medal will be presented to Dr. Supplee at the national meeting of the American Chemical Society this month.

Dr. Supplee, who was formerly associate director of research at the Borden Company, received the Billings Medal of the American Medical Association in 1936 for isolating pure vitamin B-2 from whey and from the wastes of milk sugar production.

Science News Letter, September 13, 1947

YOUR HAIR AND ITS CARE

By O.L. Levin, M.D. and H.T.Behrman, M.D.

Two medical specialists tell you what to do to save and beautify your hair, stimulate healthier hair growth, and deal with many problems, as:

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COATING AND INK RESINS: A Technological Study—Dr. William Krumbhaar—*Reinhold,* 318 p., illus., $7.00. Presents a clear understanding of the principles governing the formation, reactivity and the technical properties of coating and ink resins, based upon laboratory and factory experiments, and written for those who come into contact with resins in production, testing, or research.

EDUCATION IN ECUADOR—Cameron D. Ebaugh—U. S. Office of Education, Bulletin 1947, No. 2—*Govt. Printing,* 92 p., paper, 25c. Basic study on education in Ecuador which is one of a series prepared as a part of the program of cultural cooperation under the auspices of the U. S. Dept. of State.

HANDBOOK OF URANIUM MINERALS—Jack De Ment and H. C. Dake—*Mineralogist,* 80 p., illus., paper, $1.50. For use of students, prospectors, collectors and non-specialists, an excellent work on uranium and thorium minerals, including world occurrences and methods for their detection and location.

THE HAVE-MORE PLAN—Ed and Carolyn Robinson—*Macmillan,* 326 p., illus., $3.49. A practical tried plan for country living, including chapters on poultry, rabbits, goats, cows, sheep, bees, berries, fruit, vegetables, etc. A little land provides most of the food for a family of four as a part-time enterprise.

HEALTH FACTS FOR COLLEGE STUDENTS—Maude Lee Etheredge—*Saunders,* 5th ed., 439 p., illus., $2.50. An authoritative and interesting presentation of information in the field of individual and community health, including such important topics as communicable diseases and their control, new antibiotic treatments, nutrition and proper diet, mental health. allergy, and even first aid.

HOSPITAL CARE IN THE UNITED STATES—Commission on Hospital Care—*Commonwealth Fund,* 631 p., illus., $4.50. A detailed reference book summarizing a two-year survey of general hospitals in the U.S. and analyzing all major hospital problems so that adequate preventive and curative health services for all people may be planned for a better tomorrow.

INDUSTRIAL CATALYSIS—B. B. Corson—11 p., illus., paper. Free from: *Mellon Institute,* University of Pittsburgh, Pittsburgh, Pa. Scientific advances in catalysis and part it plays in modern industry.

INVENTORS BEHIND THE INVENTOR—Roger Burlingame—*Harcourt,* 211 p., illus., $2.75. Interesting facts regarding the inventive geniuses of America and their forgotten helpers. Research laboratories and the complications of the sciences today make individual heroes a thing of the past.

MANAGING YOUR MIND: You Can Change Human Nature—S. H. Kraines and E. S. Thetford—*Macmillan,* 374 p., $2.75. A guide intended to aid in gaining insight into effects emotional states have upon determining bodily well-being.

SCIENCE AND PUBLIC POLICY: Vol. 1—A Program for the Nation—John R. Steelman—*Govt. Printing,* 73 p., illus., 20c. A comprehensive survey of U. S. position in field of science, together with broad outline of program for the next ten years to advance the position of this country in scientific research and development through establishment of a National Science Foundation.

SCIENCE IN PROGRESS—George A. Baitsell, ed.—*Yale Univ. Press,* 350 p., illus.. $5. The Fifth Series of this work, it contains ten essays by specialists in widely varied fields: seismology, physics, catalysis, respiration studies, blood immunity factor, genes, cancer, plant diseases, living cells in action, and anterior pituitary hormones.

SEMIMICRO QUALITATIVE ORGANIC ANALYSIS—Nicholas D. Cheronis and John B. Entrikin—*Crowell,* 498 p., illus., $3.75. Utilizing the time and material saving new techniques, this text is designed for college students studying qualitative organic analysis, those taking first-year organic chemistry and industrial chemists and laboratory workers in related fields.

WASTE PICKLE LIQUOR—Richard D. Hoak —5 p., illus., paper. Free from: *Mellon Institute,* University of Pittsburgh, Pittsburgh 13, Pa. Important processes outlined for treatment of waste product in steel industry. Good bibliography.

WELDING ENCYCLOPEDIA—T. B. Jefferson, ed.—*Welding Engr.,* 12th ed. rev., 1024 p., illus., $6.50. Very useful and handy up-to-date compilation of principles, data, and most effective methods of welding in industrial and allied fields. Subjects alphabetically arranged and cross indexed so that they are readily found.

Science News Letter, September 13, 1947

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BIOLOGY

Germ-Killer from Cinnamon Discovered by Accident

➤ A GERM-KILLER from cinnamon oil has been discovered. It was one of those lucky accidental discoveries, like that of penicillin itself. And it is a by-product of the huge scientific search during the war for chemicals to replace quinine as a malaria remedy.

The discovery was made by Sister M. Petronella Schroeder, C.PP.S., bacteriologist at the Institutum Divi Thomae in Cincinnati.

Searching for a remedy related to penicillin in another mold, she used ether reclaimed after its war use in extracting a chemical from a plant that yields cinnamon oil. She got a germ-killer, but it was from the cinnamon oil, not the mold.

Science News Letter, September 13, 1947

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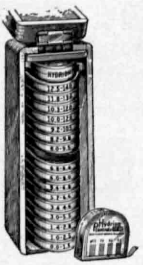
Hydrion pH Papers In One Compact Case



This new variety of sensitive pH papers offers a sharp color change within 0.25 pH unit of almost any point of interest from pH *0* to *14*.

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• New Machines And Gadgets •

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PHOTOGRAPHER'S LIGHT, for use particularly when photographing posing persons, is inserted in the tube connection between bulb and camera and throws a brilliant light only when the bulb is squeezed. Light and shutter are perfectly timed. The electric lamp itself will last indefinitely.

Science News Letter, September 13, 1947

SOLID BRONZE vise for attachment to a craftman's bench holds work from .001 to 2.5 inches thick with equal ease and without marring. Three holes in each jaw behind the ordinary grasping surfaces permit the use of round rods to hold objects of irregular shape.

Science News Letter, September 13, 1947

CONSTRUCTION panels, of the sandwich type in which a light material, sometimes in honeycomb formation, is resin-bonded between metal or other sheeting, have now been developed with aluminum foil for the honeycomb core. The metal-faced, metal-core panels have great strength and will float on water.

Science News Letter, September 13, 1947

VOLTAGE REGULATOR, a portable instrument for alternating currents adaptable to a wide range of equipment, is suited for laboratory and other uses where good regulation at low cost is needed. It has an input voltage range of 95 to 125 volts AC with an output of 115 volts.

Science News Letter, September 13, 1947

LUGGAGE CANOPY, made of heavy water-repellent olive-drab duck, fits into a luggage rack on the roof of an automobile to which it is fastened by elastic straps with swivel snaps. Its four laps, as shown in the picture, completely cover the luggage to protect it from rain, sun and dust.

Science News Letter, September 13, 1947

SILICA, applied on front surface mirrors by low-temperature, low-pressure evaporation, does not increase reflection properties but gives the surface some 1,600 times better protection from abrasion. A special silica preparation prepared for this particular use is now available.

Science News Letter, September 13, 1947

FLEXIBLE SHAFT machine, cabinet-enclosed and mounted on casters, can be easily moved about the shop to where its metal or wood grinding, polishing and other attachments may be needed. The flexible shaft provides rotary power to the tool as in the familiar grinder used by the dentist.

Science News Letter, September 13, 1947

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