

CHEMISTRY

Snatch Nitrogen from Air

➤ AMERICAN agriculture will benefit from a new method of thermal fixation of nitrogen from the air for fertilizer use which Dr. Frederick G. Cottrell was working on at the time of his sudden death.

With a group of scientists at the University of Wisconsin, Dr. Cottrell, famed for his method of electrical precipitation, was perfecting a way of snatching nitrogen out of the atmosphere without the use of large electrical power needed in the usual process which enabled the Germans to make explosives for fighting the first World War.

When a heart attack ended the career of this "scientist's scientist" attending the National Academy of Sciences meeting at Berkeley, Calif., where he was long professor of chemistry, Dr. Cottrell was discussing his new researches with his colleagues.

A fortune of millions of dollars was turned over to public use through the Research Corporation which he founded. His electrostatic method of precipitating smoke, chemical fumes and other particles

has cleared the air of industrial wastes and reclaimed valuable products. Cottrell precipitation played an important role in production of high test gasoline, carbon black and dozens of other important products for peace and war. His patents were given by him to the foundation many years ago and during the present year \$1,200,000 in grants are being given to promote research from earnings of the application of the process. (See SNL, June 21, 1947). Several professors in small and large universities are carrying on research under the Cottrell grants from the Research Corporation.

Dr. Cottrell was one of the rare scientists who remained scientifically active during his whole lifetime. Aged 71 when his latest researches were interrupted by death, his work on electrical precipitation was done when he was about 30. He had been director of the U. S. Bureau of Mines, head of the Fixed Nitrogen Research Laboratory, and consultant to many governmental and research organizations.

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ASTRONOMY

Jupiter's Moon Eclipses

➤ BEGINNING this month, eclipses of Callisto, second largest moon of the planet Jupiter, again are visible. During the next three years, with the aid of a small telescope, you will be able to see this satellite and its shadow move across the planet's disk.

When a satellite comes between Jupiter and the sun, its shadow is seen as a black dot making its way across the bright disk of the planet. The moon itself is usually much harder to spot, for frequently it is equally as bright as the planet.

Callisto has a much lower reflecting power, however, than the other three large satellites, also discovered in 1610 by Galileo Galilei, Italian astronomer and physicist. Thus not only its shadow but this moon itself can be spotted.

While the other three large satellites are eclipsed every time they circle around the planet, about half the time Callisto escapes an eclipse. This occurs when the plane of Jupiter's satellites, as seen from the earth, is at the greatest angle and the satellites are thus far apart. The relatively great distance of Callisto from Jupiter—1,167,000 miles—is largely responsible for the fact that at such times the satellite is not between the planet and the earth. Until a few days ago, there had been no transits of the satellite or its shadow, and no eclipses or occultations of it since August, 1945.

On Tuesday, Nov. 23, this satellite, which is 3,350 miles in diameter and thus much larger than our own moon and even bigger than the planet Mercury, was eclipsed just after sunset. This was not visible from the United States, however, but was seen by people in Central Europe and most of Africa, according to calculations made at the Nautical Almanac Office of the U. S. Naval Observatory.

On Feb. 15, the beginning of an eclipse of Callisto will be visible just before sunrise in the eastern part of the North American continent. The sun will have risen, however, before the eclipse ends several hours later so this will not be seen. Complete eclipses of Callisto may be seen with only a small telescope, however, a number of times during the next three years.

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PLANT PATHOLOGY

Streptomycin By-Product Kills Plant-Disease Fungi

➤ THE SAME fungus that produces streptomycin, deadly to many germs that afflict man, also produces another substance even more deadly to some of the fungi that cause plant diseases. The new antibiotic has been given the name actidione by its discoverer, Dr. Alma Whiffen, re-

search worker on the staff of the Upjohn Company in Kalamazoo, Mich.

At the time of her discovery, Dr. Whiffen was actually seeking an antibiotic that could be used to treat fungus-caused diseases in man, of which athlete's foot is perhaps the commonest example. She isolated this new substance from culture fluid in which *Streptomyces griseus*, source of streptomycin, had been growing. Used against these disease-causing fungi in laboratory vessels, it at first looked promising; but later experiments on actual cases proved disappointing.

In the meantime, the new substance was being tested for its effects on plants, under the screening program of the National Research Council. In the greenhouses of Michigan State College at East Lansing, Drs. Irma M. Felber and C. L. Hamner found that too high a concentration (100 parts per million in water) would injure or kill the oat and bean seedlings used as experimental plants.

When much lower concentrations were tried, however, the effect was radically different. In concentrations from ten down to one parts per million, actidione wiped out, in as little as 48 hours, infections of powdery mildew, one of the most destructive and hard-to-fight of plant diseases, on the leaves of beans, tomato plants and rose bushes, without harming the plants themselves.

Further experiments are now in progress, to discover what other plant-disease fungi it will prevent or kill, in what concentrations it is most effective, and what "spreader" chemicals should be added to the spray or aerosol solutions in which it is used.

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PSYCHOLOGY

Thought Waves Show Up On Brain Wave Record

➤ A BRAIN WAVE that seems to be really a thought wave has been discovered by four psychologists at Tufts College in Medford, Mass. The four are John L. Kennedy, Robert M. Gottsdanker, John C. Armington and Florence E. Gray.

The thought waves, called "kappa waves" by the psychologists, show up on the brain wave record when a person is doing mental arithmetic, trying to tell which of two tones is longer, learning nonsense syllables, naming the 48 states from memory and solving problems.

They even show up occasionally when a person is trying not to think, probably corresponding to the thoughts that come when trying to keep the mind a blank. Talking, aloud or to oneself, is not associated with the new thought waves. Nor are they produced by such non-thinking brain activity as merely hearing a sound or making the response of pressing a key at a signal.

The new thought waves are recorded in the same way as other brain waves but the

electrodes for picking up thought waves are placed just back of the outer edge of the slits between the eyelids. This position suggests, the scientists point out in their report in the journal, *SCIENCE* (Nov. 12), that the source of the thought waves may be the temporal lobes of the brain.

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ORDNANCE

Soviet Tanks Lack Finish But Are Termed Efficient

► **RUSSIAN TANKS** are rough-looking, but first class fighting machines, declares Col. Robert J. Icks, an Ordnance Reserve officer, in the technical journal, *ORDNANCE* (Nov.-Dec.). They have thick armor and good guns, and can dish it out as well as take it.

Commenting on their apparent lack of finish, a Russian once remarked to Col. Icks, "To us a tank is built to last for only three shots. One you may get off and may miss, the second the enemy gets off and may miss, and third either one of you hits. It had better be you that hits him because he isn't going to miss the next time."

Tank designers of the USSR, Col. Icks points out, are able to take advantage of information contributed by lend-lease and captured enemy materiel, as well as by their espionage service. In addition, they have many captured and conscripted German tank experts working for them.

In the meantime, the Army has announced the unveiling of the new Patton tank, which took place at the Detroit Arsenal on Armistice Day, with the widow of the famous tank commander of World War II doing the christening.

The Patton tank resembles the present medium M26, but has a speed of 30 miles an hour instead of 20 and it carries as principal weapon a 90-millimeter gun. A waterproof electric system will enable it to ford deep streams, and it can be "winterized" to operate at temperatures as low as 65 degrees below zero Fahrenheit.

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MEDICINE

Chloromycetin May Conquer Cholera and Dysentery

► **DYSENTERY**, cholera, and two relatively new diseases, Q fever and rickettsialpox, are the next diseases expected to fall before the healing power of chloromycetin, streptomycin-like remedy dug out of a sample of earth from Venezuela. These prospects were disclosed by Army scientists at the meeting of the American Public Health Association in Boston. The recently crystallized drug has already shown rapidly curative effects in five other plagues, epidemic typhus, scrub typhus, murine typhus, typhoid fever and Rocky Mountain spotted fever.

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MR. N. Y. SCIENTIST'S DREAM HOUSE—The architect's conception of building in which the New York Academy of Sciences hopes to house its numerous activities is shown here. A \$1,000,000 drive is underway to purchase and maintain new quarters. Fourth oldest scientific society in America, the Academy was founded in New York City in 1817. It now lists more than 4,000 members.

AERONAUTICS

Foresee Automatic Flying

In 15 years airplanes will be equipped with all-weather flying aids, radar, television and other devices which will permit automatic flight, expert predicts.

► **COMPLETELY** automatic, weather-proof flying will be possible through use of present flying aids, plus radar, television, electronic computing machines and un-built devices for the future—and we'll have it in 15 years.

That's what Howard K. Morgan, vice-chairman of the Radio Technical Commission of Aeronautics, foresaw in connection with the demonstrations of the best there is today in aviation traffic control and navigation.

Devices for greater automatic flight safety recommended by the RTCA were shown at the Wier Cook Airport, Indianapolis, Ind., where the Civil Aeronautics Administration all-weather flying aids are installed.

Already the big airlines are expected to be equipped with the new all-weather devices in the near future. Mr. Morgan, who is assistant research director for Bendix Aviation Corporation Radio Division, pointed out that by 1963 the longer range "ultimate common system" outlined by RTCA is expected to be completed.

The list of devices that will bring aviation closer to automatic flight will include: very high frequency omni-directional range

stations, operating on static-free radio waves which will provide very many flying courses radiating like the spokes of a wheel; and stations and measuring equipment linked with an automatic computer which will enable a plane to take a straight course past several ranges. Distance-measuring equipment, a link in the omnirange system, provides aircraft continuously with measurement of distance to stations.

Very important is an instrument landing system to make an electronic pathway to the runway. This will enable a pilot to make a safe landing when ceiling and visibility are below present minimums. The devices include beam radar to watch the fixed beam approach, giving a double check on the electronic pathway down to the runway.

Additional devices are improved runway- and approach-lighting to guide the final approach, also radar instruments to spot planes in the air, and to let them know by radio how many other planes are aloft and where they are. This automatic system will use devices already in existence and many which are now known to be possible but are not yet developed.

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