

BIOCHEMISTRY

Nerve and Mental Cures Seen in New Compound

➤ A NEW SERIES of chemical compounds that can check spasms and internal disorders, guard against mental depression and act as local anesthetics was described to chemists.

The therapeutic compounds are based on a previously unknown molecular structure and were made by well known methods, Dr. W. R. Hardie, organic research chemist at Cutter Laboratories in Berkeley, Calif., told the American Chemical Society meeting in Washington, D.C.

The three new compounds were recognized as the first substances that block parasympathetic nervous impulses (which belong to the autonomic or involuntary nervous system), Dr. Hardie explained. This blockage retards hypertension that causes spasms and other disorders.

High doses in animals caused effects similar to anesthetics without muscle paralysis or loss of awareness. Lower doses of two of the substances decreased the reaction time from a nervous stimulus such as pain.

The scientist said that clinical application is expected in the near future for the three substances. One of them could, he said, be used in cases of nervousness to counteract such symptoms as nasal stuffiness, diarrhea, the development of ulcers and mental depression, or other disturbances which accompany tension.

Mental disturbances and disorders of the stomach and intestine are included in the list of ailments that may be aided.

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PUBLIC HEALTH

Impartial Control Urged Over Food Additives

➤ IMPARTIAL scientific control over food additives is needed to parallel drug control, a former director of the National Institutes of Health believes.

Additives such as chemicals that color or preserve food are useful and desirable under proper control, Dr. W. H. Sebrell Jr., presently director of Columbia University's Institute of Nutrition Sciences, said.

The "poisons" or toxicity in natural foods and additives to foods were described at the American Chemical Society meeting in Washington, D.C.

Man needs to cook most of his foods to avoid toxicity, Dr. Sebrell said. Natural poisons are present in small quantities in many of the foods eaten by man and animals and taken up by plants.

Although American foods are generally safe, some areas produce toxic plants and animals because of adverse soil conditions or overuses of pesticides and herbicides.

Dr. Sebrell emphasized that an impartial scientific group, such as that advocated by President Kennedy to control harmful additives to drugs, should be formed to control or guide the addition of chemicals to food.

Natural poisons found in plants can be

controlled by cooking in most cases, the scientist said. But coupled with toxic additives, these harmful substances could be great enough to kill or cripple.

In the United States, alkali poisoning of livestock in South Dakota and Wyoming was caused by selenium taken up by plants from soil.

Beans or peas grown in the Near East have caused diseases such as lathyrism and favism. These diseases are common during food shortages, he said, because natives do not prepare the food properly or ignore their effects.

With proper scientific inspection and control, Dr. Sebrell said, these foods, prepared properly, would be no problem.

Many industries aim for the zero tolerance provided by law of harmful substances in food and drinks. This, however, is impossible, Dr. Sebrell pointed out. If scientists thoroughly test the product, some trace of the substance can be found.

The Government, therefore, should aim at a specific level, as close to zero as possible, he said. An impartial scientific group could recommend, on scientific judgment and not on emotion, the desired maximum level harmful to man.

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PUBLIC SAFETY

Air-Filled Plastic Dome Protects Researchers

See Front Cover

➤ AN AIR-FILLED plastic dome, of a type used for radar installations in the Arctic, protects research crews against winter weather while they study radiation effects.

Fallout protection of building complexes and how buildings can be changed to increase this protection are some of the problems studied under the dome, seen on the front cover, by Technical Operations, Incorporated, Burlington, Mass., for the Office of Civil Defense.

Fields of radiation are simulated by pumping a small capsule of radioactive cobalt 60 through polyethylene tubing arranged in a spiral pattern around or adjacent to scale model buildings.

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CHEMISTRY

"Picture" of Chemicals For Computer Use

➤ A DEVICE has been built that can type a drawing of a three-dimensional chemical structure for computer identification, the American Chemical Society learned in Washington, D. C.

The "typewriter," built at the Walter Reed Army Institute of Research in the nation's capital, reproduces a chemical structure many times faster than drawing the structure by hand, and presents it on tape for computer use.

The three-dimensional structure is automatically assigned to the conventional two-dimensional form. The machine then records the atom or bond as a drawing, easily recognizable by the eye.

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IN SCIEN

ENTOMOLOGY

Mosquitoes Offer Clue To Polynesian Migrations

➤ A STUDY of the Pacific's mosquitoes may provide clues to Polynesian migrations.

This is suggested by Dr. John N. Belkin, professor of entomology at the University of California, Los Angeles, and one of the foremost authorities on mosquitoes of the South Pacific. He believes that Polynesians are very likely responsible for the wide distribution of certain types of the insects throughout the vast ocean area.

These mosquitoes could not disperse naturally over existing ocean barriers between the islands, he said. Very likely they were transported in Polynesian canoes.

The insects normally breed in tree holes or dead plants on the ground such as coconut fronds, shells and husks. But a little rain water in a canoe also serves the purpose. Thus a breeding mosquito colony could be transported in the canoes wherever the Polynesians took them.

By studying the distribution of various varieties of mosquitoes throughout the islands and atolls of the South Pacific, one might trace the migrations of these people.

Whether or not the insects could furnish a clue to the original mainland home of the Polynesians is questionable, Dr. Belkin said. Very likely these particular varieties of mosquitoes first became associated with the Polynesians in a particular island area where the insects originally lived.

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CHEMISTRY

Chemicals Increase Crops, Make Tougher Plants

➤ A NEW, CHEAP METHOD for producing chemical compounds that increase crop yield, stimulate root formation and decrease frost damage was explained to chemists.

With the new method, compounds of 3-indolealkanoic acids can be made that would be highly important for gardening and agriculture, Dr. H. E. Fritz, Union Carbide Olefins Company, South Charleston, W. Va., told the American Chemical Society in Washington, D. C.

The new, one-step method of combining commercially available chemicals or reagents makes the once-tedious method of putting the compounds together a simple task.

The acids, he explained, give many varied responses in plants, such as the production of fruit without pollination (parthenocarpic development), enlargement of cells, increased fruit production and control of flowering, as well as the stimulation of bigger and better root structures.

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CE FIELDS

EDUCATION

School Drop-Outs Called Great American Tragedy

► UNITED STATES SCHOOLS need the support of the public in solving the problem of school drop-outs—"the great American tragedy of our times."

Robert C. Taber, of the division of pupil personnel and counseling, School District of Philadelphia, told the meeting of the American Orthopsychiatric Association in Los Angeles that 7,500,000 boys and girls will drop out of school during the next decade. Thirty percent of these (2,300,000) will have completed less than eight grades.

"We are in error if we think the schools can solve this problem alone," Mr. Taber said.

Many school systems offer technical-vocational training for students who are not interested in going on to college, Mr. Taber pointed out, but such courses generally require a minimum of eight or nine completed grades. In the meantime jobs are being upgraded to levels requiring higher skills.

A program for the rehabilitation of such school drop-outs and helping them find jobs and keep them out of the growing ranks of juvenile delinquents was described to the meeting by Livingston E. Beane of Richmond, Calif. The program has included 52 boys.

The boys were sought out at their homes, on the street and at pool halls. They were followed into and out of jail. Psychological tests were used to help evaluate and counsel the boys. A training course was worked out which included learning how to fill out applications, how to read want ads and street maps and how to study for Civil Service examinations.

After two years, 23 of the 52 boys in the program have held permanent jobs and 20 have gone back to school. Not all 20 stayed.

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PUBLIC HEALTH

Spring Rains Will Bring Fallout About Like 1959

► THE SPRING RAINS, contrary to some predictions, will bring down only about the same levels of radioactive fallout from Russian bomb tests of last fall as measured in the spring of 1959.

This is the best estimate of Government officials concerned with the problem at this time. The exact measurements will not be available until a month or two after the highest amounts of fallout have reached earth's surface.

However, the most recent measurements, for January, 1962, are very similar to those made for January, 1959, following the Russian, United States and British tests of 1958. Radioactive debris thrown into the

earth's high atmosphere, or stratosphere, by bomb explosions takes from several months to several years to fall on earth.

That is one of the reasons this spring's fallout is not expected to be as high as the number and yield of Russian bomb explosions last fall might suggest. Some of the debris was probably thrown so high into the stratosphere that it will not contribute to fallout this year, possibly not even next year.

The principal potential hazard from fallout is radioactivity within the body rather than external skin doses. Because of its long half life of 25 years (when half the radioactivity has disappeared), strontium-90 presents the greatest hazard, particularly for very young children since the radioactive chemical can be used by the body to replace calcium in bones.

Since fallout is not distributed uniformly on the earth's surface, or absorbed uniformly by living tissues, the hazards vary from place to place and from individual to individual. Many scientists believe that any increase in radioactivity, even though quite small, can have harmful effects on future generations.

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BIOCHEMISTRY

Human-Tree Link Seen In Water-Carrying Force

► THE FORCE that carries water up inside a tree may come from the same compound that supplies energy for flexing human muscles, the American Chemical Society was told in Washington, D. C.

This relation between plant and human life is shown by an extract of the Dutch elm disease fungus, which hampers the action of ATP (adenosine triphosphate), the same energy compound in muscles.

Dr. Ralph H. Kurtzman Jr., professor of plant pathology at the University of Rhode Island, Kingston, indicated the evidence may provide the clue to water distribution in plants, a puzzle unsolved by more than 70 years of research.

The antagonistic agent was extracted from the fungus that causes Dutch elm disease. This, in turn, causes wilting. When branches were immersed in solutions of the extract they wilted. When pure ATP was added to the solution, however, no wilting occurred, said Dr. Kurtzman.

"ATP is necessary for the maintenance of water in the stems, and anti-ATP is responsible for the wilting," he said. "It is logical that a tremendous amount of energy must be supplied to lift the large amount of water necessary for plant life."

No evidence of "plugging" has ever been shown. In fact, the opposite was demonstrated in the new work, Dr. Kurtzman pointed out.

"When the process was reversed to force water downward, the anti-ATP solution moved more rapidly downward than water alone, indicating that 'plugging' was not the reason for wilting and for the lesser amounts of water taken up. Additional tests established that it was the anti-ATP that was the cause.

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PHYSICS

Scientists Study "Beards" Grown From Table Salt

► "BEARDS" grown from common salt are a "new form of solid" being investigated by scientists, the American Physical Society was told in Baltimore.

The beards are so called because they are grown from "whiskers," which are narrow shafts that form as a single crystal from the surface of many metals. Normally they range in size from microscopic to very tiny, but scientists can grow them much larger by carefully controlling the conditions.

Because a whisker is one crystal, it lacks the imperfections usually found in crystals, which are actually masses of many tiny crystals. Whiskers, therefore, have unusual properties, including very high crushing and breaking strengths.

Richard A. Kane of the A&M College of Texas, College Station, Texas, reported that he had grown whiskers nearly an inch long from table salt. Each whisker consists of a narrow uniform shaft, which is a square in cross section.

The single crystal can be forced to grow in a different direction from a specific point, or to branch. Instead of extending farther into space, the branches develop branches. In this way, he said, a solid that completely occupies a region of space is formed.

This solid has "unique properties," Mr. Kane reported. Since it is a three-dimensional whisker, he suggests the name "beard" for it. The solid appears to be irregularly shaped and milky in color. Beards are not easily crushed or fractured.

When a salt beard is dissolved, considerable gas is given off due to the fact that the beard has a very large surface compared to its volume and gas is adsorbed on the surface.

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CHEMISTRY

Alloy Highly Resistant To Chemical Erosion

► A NEW ALLOY more resistant to chemical corrosion than any present commercial alloy was described at the American Chemical Society meeting in Washington, D. C.

The alloy contains eight elements, R. E. Maness of the General Electric Company's Hanford Laboratories, Richland, Wash., reported.

Developed to resist strong acids and a variety of corrosive chemicals used to dissolve waste from atomic furnaces, the new material "should be useful in any chemical plant where corrosive acids are used."

The elements are nickel, chromium, molybdenum, copper, iron, titanium, and traces of manganese and silicon.

R. E. Burns, also of General Electric, and C. L. Peterson and D. C. Drennen of the Battelle Memorial Institute took part in the development of the alloy.

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