

PHYSICS

Earth's Current Balanced

Thunderstorms supply the necessary reverse current to keep a charge of electricity amounting to 1500 amperes on the earth.

➤ ONE of science's major puzzles, what keeps a charge of electricity on the earth, has been solved, Dr. Vannevar Bush announced in his annual presidential report of the Carnegie Institution of Washington in Washington, D. C.

The thousands of thunderstorms active at any instant all over the earth counter-balance the current of 1500 amperes that has long been known to be dissipating from all the fair-weather areas of the earth.

Proof that the thunderstorms supply the necessary reserve current was obtained by extensive researches by the Carnegie Institution's Department of Terrestrial Magnetism since the end of the war. More than 20 years ago the suggestion that this was the cause was made in England. But it took many hours of flight at record heights by cooperating U. S. Air Force planes to prove the theory. The clear air high above the flashing thunderheads showed that the electric current between the upper atmosphere and the earth is reversed in sign to fair-weather current and stronger in intensity.

A new hint that the continents of the earth may have drifted from some earlier arrangement to their present pattern is contained in other research reported by Dr. Bush. Rocks in the Blue Ridge mountains of Virginia have been magnetized, Carnegie Institution scientists found, as though they had been originally laid down in South Africa. Possibly the magnetic north has been unstable through the long period of geologic time or there have been large-scale magnetic disturbances from electric current systems inside the molten earth. But another possibility is that the earth's crust has actually moved, a hypothesis that has been suggested in the past because of the way that the continents, now widely separated by oceans, fit into each other.

How the compass pointed more than 350,000,000 years ago is being discovered by studies of rocks laid down in ancient seas in past geologic times. The little particles of the rocks are found to line up like compass needles, telling the field of the earth in these ancient times. The investigations have been extended this past year to sandstones in Maryland and Virginia which have been folded and contorted by mountain building. When the geophysicists laid out the rock samples the way they must have been before the structural changes occurred, the particles were oriented as they should have been by magnetism. Such fossil magnetism shows that the compass direction in those ancient millennia

was quite different from what it is now.

Yeasts and algae can become sources of the protein and fats that the world must have to support larger population, Dr. Bush declared in telling of controlled experiments on *Chlorella* algae cultures. Given generous supplies of carbon dioxide, these

plant growths double themselves every day and can be made to yield varying proportions of fat or protein depending upon the conditions under which they are grown.

New knowledge of the heredity of corn showed that a bearer of heredity, called a gene locus, may control several reactions within the organism, some of which may have several biological effects.

In another research the chromosomes that carry the genes or units of heredity were dissected with biological preparations to determine their structure. This showed that no single protein or nucleic acid may be considered the basic structural component of the chromosome.

Science News Letter, December 17, 1949

ENGINEERING

Better Cake and Bread

➤ YOUR cake and bread may taste better soon because of a new method for drying the flour you use.

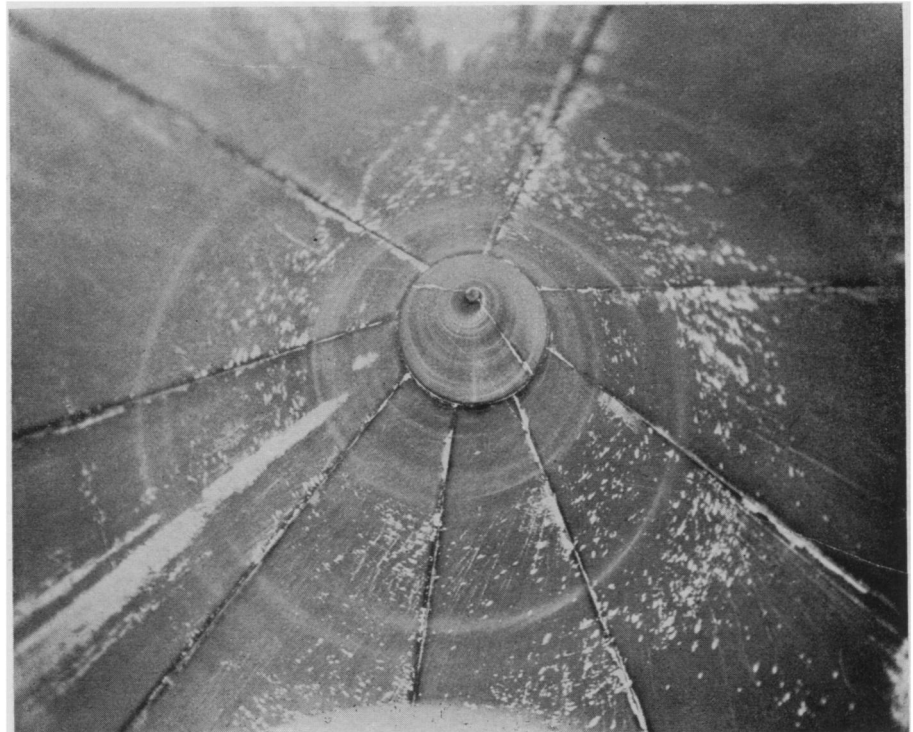
Flash-drying reduces the amount of water normally found in flour, about 14%. With moisture reduced as low as desired, flour can now be stored for long periods of time without spoiling. Bacteria and fungi are attracted to moist flour.

This low-moisture flour will be especially valuable to the Armed Forces. It will also be used in cake mixes. The process

was developed at the Industrial Research Institute, University of Denver.

"Of course, you can get low-moisture flour by drying it in an oven," explains Prof. Dent C. Davis, chemical engineer and supervisor of the research project. "But flour dried this way doesn't have any good baking properties. When heated to 170 degrees Fahrenheit or more, there is a damaging change."

With the flash-drying process, Prof. Davis stated, the water is "flashed" or



"FLASH-DRIED" FLOUR—Swirling with centrifugal force from the top towards the bottom of the giant cone, flour particles are "flash-dried" in two seconds.

rapidly vaporized from the flour in a few seconds. During this time there is no change in the flour.

The flour is dried in a stainless steel structure shaped like a mammoth ice cream cone. Air, heated to a controlled temperature, is passed through a fan opening diagonally into the top of the cone, which is six feet in diameter. Just as the air reaches the opening to the cone, flour is mixed with it.

The mixture is then whirled around the

inside of the cone. In two to ten seconds, the flour drops through a hole at the bottom, having lost from 50% to 90% of its former moisture.

The air can be heated as high as 300 degrees Fahrenheit for this drying. The flour particles, however, reach no more than half that temperature. Evaporating water keeps the particles relatively cool in the few seconds that they revolve through the cone.

Science News Letter, December 17, 1949

is the largest producer of magnesium and is generally credited with developing this method of combating corrosion.

Science News Letter, December 17, 1949

● RADIO

Saturday, December 24, 1949, 3:15 p. m., EST
"Adventures in Science" with Watson Davis, director of Science Service, over Columbia Broadcasting System.

Dr. Howard A. Meyerhoff, administrative secretary for the American Association for the Advancement of Science, will talk on "Preview of National Science Meetings".

ENGINEERING

Ship Corrosion Prevented

➤ CITING possible savings of up to \$75,000,000, the United States Maritime Commission will ask Congress next year to authorize installation of a new method of preventing the hulls of the nation's 2,200 merchant ships in reserve from rusting away. Experiments just about completed have shown the Commission that corrosion of the outside metal plates below the water line can be halted merely by hanging small magnesium metal plates all around each ship.

Maritime Commission officials figure the system would cost \$25,000,000 over a 20-year period. Heretofore the only way to save a ship from permanent damage through corrosion was to haul it into a drydock periodically and sandblast and paint its bottom. Cost of this method of saving the merchant vessels would run up to \$100,000,000, commission officials say. If the magnesium plates were used, there would be no need to drydock ships until they were needed for service.

The magnesium plates halt corrosion by acting as anodes to the cathodes of the steel in the ship's bottom. The water acts as an electrolyte. Thus a primary cell is formed and an electric current flows from the magnesium to the ship. The current causes

slight decomposition of the film of water in contact with the ship's hull, thus arresting corrosion.

Maritime officials estimate that it would take only 39 men, each working one year, to install the magnesium anodes around each ship and that maintenance would be simple and inexpensive. The plates would be changed every three years.

This method doesn't prevent barnacles from gathering on ship bottoms but Commission experts point out that the ships would have to go into drydock before being put back into service anyway and the bottoms could be scraped clean then.

The Navy at present prefers the more expensive method of hauling ships out of water periodically, scraping their bottoms and applying anti-corrosion and anti-barnacle paint. The Department points out it is trying to keep the fighting vessels in such a state of readiness that it should not be necessary to send them to drydocks before putting them back into service.

At present, magnesium producing facilities in this country far exceed demand. Several plants built by the government during the war—magnesium is used in planes and incendiary bombs—are now idle. The Dow Chemical Company, Midland, Mich.,

SCIENCE NEWS LETTER

VOL. 56 DECEMBER 17, 1949 No. 25

48,800 copies of this issue printed

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.

Subscription rates: 1 yr., \$5.50; 2 yrs., \$10.00; 3 yrs., \$14.50; single copy, 15 cents, more than six months old, 25 cents. No charge for foreign postage.

Change of address: Three weeks notice is required. When ordering a change, please state exactly how magazine is now addressed. Your new address should include postal zone number if you have one.

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Printed in U. S. A. 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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