

METEOROLOGY-AERONAUTICS

R. A. F. Weather Reports Include "Freezing Level"

ROYAL Air Force pilots will have a new aid this winter in their battle against ice. All weather reports sent out by R.A.F. weather officers will contain information about "freezing level," according to information received in the United States.

Freezing level is the altitude at which the pilot is subject to attack by the ice menace—worst enemy next to the Luftwaffe. It begins on the ground when you find hard frost outside your doorstep. On an average winter's day in Britain, it begins 3,000 feet up. On an average summer's day, it starts at 10,000.

Wherever the freezing level is, from there up for 7,000 feet is the ice danger zone, where the cloud sought for cover may be a death trap.

Above the ice danger zone—about 10,000 to 17,000 feet—the drops of water have already formed into ice crystals and so will not stick on an airplane, interfere with its operation, or force it down by weight.

Ice can form, it is explained, in a matter of minutes, so the pilot must climb or descend through the ice zone just as fast as he can. A "Spitfire" can do it in just over three minutes.

The "freezing level" addition to weather reports will benefit the anti-aircraft service as well as the flyers. If the enemy flyer avoids the ice danger zone, the British gunners can gauge his altitude. If he takes cover in the clouds of the ice zone, they can save their fire, for Jack Frost will do the job of destruction for them.

Science News Letter, January 4, 1941

MEDICINE

Better Use of Sulfa Drugs May Come from Experiments

BBETTER use of the sulfa drugs in treating pneumonia and human ailments may come from laboratory studies reported by Dr. George W. Raiziss, University of Pennsylvania Graduate School of Medicine, and Dr. M. Severac and J. C. Moetsch, of Dermatological Research Laboratories of the Abbott Laboratories, at the meeting of the American Association for the Advancement of Science in Philadelphia.

Sulfapyridine is a better weapon against the pneumonia germ than sulfathiazole, although the latter is less toxic, the investigators believe, on the basis of their studies with mice and rabbits.

Sulfathiazole, on the other hand, gives better results in treating infection with the staphylococcus aureus, the germ commonly thought of as the cause of boils.

The effect of the two sulfa drugs in Type II and Type III pneumonia infections in mice was almost equal in the first 48 hours, the scientists reported. After 28 days, however, 28% of the mice infected with Type II pneumonia and treated with sulfapyridine survived, compared to only 3% survival of mice treated with sulfathiazole. Of the mice infected with Type III pneumonia germs, 12% survived following sulfapyridine treatment, but only 3% survived with sulfathiazole treatment.

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ENGINEERING

Water Heating Systems Operate on Captured Sun

WATER heating systems that need no other fuel than sunshine are described by F. A. Brooks, agricultural engineer at the California Agricultural Experiment Station. He describes several types in the new Annual Report of the Smithsonian Institution.

Simplest, but least efficient, is merely setting the water storage tank where the sun can shine on it. This exposes so little absorbing surface in proportion to the mass of water that high temperatures are not obtained, but these bare tanks are satisfactory for hot showers in the late afternoon.

Greater efficiency is obtained by installing the tank indoors, preferably insulated against heat loss, and connecting it with flat coils of pipe exposed to the sun under glass. A convenient place for such exposure is on a south-facing sloping roof. Proper pipe connections provide for the continuous rise of heated water into the top of the tank, and a return flow of colder water from the bottom to the heating coils.

Frost damage at somewhat less efficiency, at the expense of slightly greater complexity, is achieved by using a light oil or other non-freezing liquid in the heating coil and transferring its heat to the stored water in the tank.

These solar heaters for domestic hot water are not suitable for steam production which requires a special design on which Dr. Charles G. Abbot, secretary of the Smithsonian Institution, has worked for many years. Several thousands of solar water heaters, of various types, have been installed in homes, especially on farms, in the South and on the Pacific Coast.

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IN SCIENCE

ENGINEERING

Having Difficulty Finding Metallurgical Engineers

IF YOU know a metallurgist or metallurgical engineer, tell him that the United States Government wants his services to help in defense work.

"Difficulty is being encountered in filling positions in the Bureau of Mines in connection with the National Defense Program for the development of strategic metals," says an announcement issued by the U. S. Civil Service Commission. "An insufficient number of eligibles for filling these positions resulted from the examination which closed in September, 1940."

As a result, applications for such positions, with salaries from \$3,200 to \$5,600 per year, will be accepted through 1941. Applicants must be under 60 years of age, and have had a 4-year college course with major study in chemistry, geology, mining, physics, engineering or metallurgy, as well as professional experience or post-graduate study. No examination will be given, but applicants will be rated on their records.

Further information regarding the examination and the proper application forms may be obtained from the Secretary of the Board of U. S. Civil Service Examiners at any first- or second-class post office, or from the United States Civil Service Commission, Washington, D. C.

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METEOROLOGY

Nature's White Elephant Is Formed of Ice

See Front Cover

THE UNUSUAL, fantastic "elephant" shown on the front cover of this week's SCIENCE NEWS LETTER is a peculiar ice formation such as would occur in caves.

The photograph, which is the work of Charles S. Marta, A.R.P.S., of Aurora, Mo., is one of most beautiful of the scientific prints which are on exhibit in the Second Annual Boston International Salon of Nature Photography, from December 17, 1940, to January 30, 1941.

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CE FIELDS

PHYSICS

More Physicists Needed For National Defense Work

BECAUSE civil service examinations recently announced for physicists needed in the National Defense Program have not produced enough applicants, the requirements for these posts have been simplified.

According to a new announcement by the Civil Service Commission, written examinations will no longer be required for the positions, which are of five grades, with salaries ranging from \$2,600 to \$5,600 per year. Instead, applicants will be rated on their records. Applications will be received until Dec. 12, 1941. Only one application need be filed by a person wishing to apply for two or more places.

The applicant must have completed a 4-year college course with major study in physics, for the higher grades, or at least 24 semester hours in the subject, for the lower. They must also have had professional experience in physics, though for some of this, post-graduate study may be substituted.

Application forms may be obtained from the U. S. Civil Service Commission in Washington, or any first- or second-class post office.

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PHYSICS

Special "Finishing School" For Electricity Needed

A MASS of special electrical equipment occupying the space of a two-story house, including transformers, rectifiers, capacitors, etc., will form the unique "finishing school" to prepare the electricity needed to run the University of California's new 4900-ton cyclotron.

This huge atom-smasher is now under construction as a result of a \$1,150,000 grant from the Rockefeller Foundation, supplemented with \$250,000 from other sources.

Its electrical apparatus, which will take more than a year to construct, was designed by Dr. Edwin McMillan, of the University's Radiation Laboratory. It has

been ordered from the General Electric Company.

Dr. E. O. Lawrence, Nobel laureate and inventor of the cyclotron, in charge of the laboratory, said that 2,500,000 watts of electrical power will be needed to run the machine. Power supplied from the lines is three-phase, alternating current, but it will be changed to single-phase direct current before it is fed into the cyclotron.

The new equipment will be finished in three years, Dr. Lawrence announced, saying that it will be capable of accelerating charged atoms to 100,000,000 electron volts energy, which may open new worlds of discovery in the atomic universe.

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PHYSIOLOGY

Chemical Changes in Blood During Pneumonia Found

SIGNIFICANT chemical changes take place in the blood of animals suffering from pneumonia, Dr. M. L. Crossley, of the American Cyanamid Company, has found.

He and his associates, Bruno Vassel, L. G. Christopher, R. H. Kienle and G. L. Christopher, discovered changes suggesting a breakdown of the protein of blood serum during the course of the disease. When the animals got well, the blood serum became normal again.

The investigations of blood chemistry during pneumonia were undertaken in the hope of providing clues for better chemical treatment of this and other infectious or germ diseases.

"How infecting agents cause disease," Dr. Crossley explained, "what changes occur, where these changes are initiated, the nature of the resulting products and their effect on the animal are questions which must be answered before chemotherapy can be highly effective in relieving man of the many ills that now reduce his efficiency, limit his usefulness and endanger his life.

"These are difficult problems to answer. Even if microorganisms worked as termites, boring into the tissues and reducing their strength, it would still be a difficult task to examine the nature of the damage done and relate it to the cause, and man cannot be sawed up like a log nor subjected to physical and chemical tests in ordinary laboratory equipment. It is imperative to know the nature of the chemical reactions involved in infectious diseases, this knowledge is essential to the future development of chemotherapy."

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GEOPHYSICS

Core of the Earth Like Bowl of Jelly

THE MOVEMENT of the core of the earth, which some scientists believe to be fluid, resembles "the motion of a bowlful of jelly when you rock the bowl a little bit, but quite fast," David Rittenhouse Inglis, of Johns Hopkins University, told the American Physical Society.

He studied the problem of whether this fluid core would be made by friction to rotate with the solid outer crust of the earth. It would, if the globe rotated about a fixed axis, he stated, but actually the axis shifts, during a period of about 26,000 years. If ordinary fluid friction alone is considered, he declared, there would not be enough to pull the core around in all the earth's complicated motion.

However, he said, the core is so big that there is a considerable amount of turbulence, which increases the friction, making it nearly enough.

"The axis of rotation of the core is expected to lag behind the axis of rotation of the solid exterior by an angle of about one degree," he said.

A very recent paper by Rev. Joseph S. Lynch, S. J., Fordham University seismologist, suggests that the earth's core is solid after all. (See *SNL*, Dec. 28) Apparently this was too new for Mr. Inglis to take into account.

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MEDICINE

American Tablets Fly To Save Stricken Chinese

TWENTY THOUSAND anti-beri-beri tablets have flown to China to fight hidden hunger among Chinese victims of Japanese aggression.

Additional millions of American tablets of aspirin, sulfanilamide, and other medicines and surgical supplies are to follow on the first available boat to Rangoon, Burma, as the American Red Cross goes into action to aid the stricken in both free and occupied China.

Cabled reports that beri-beri, malnutrition disease, has become seriously prevalent in the Hong Kong-Canton area caused the Red Cross to speed 20,000 vitamin B₁ tablets by clipper plane, with similar amounts on two later planes. An additional 100,000 of these tablets of the only known medical remedy against beri-beri are in transit to the Orient on the *S.S. President Taft*.

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