tive ingenuity of Department of Agriculture chemists, uses both dietary and industrial are being found for whey. The Miss Muffets of the future will get their whey in the form of candy, pastry, pudding and meringue. It will figure in the tanning of the leather for shoes and handbags, in the making of plastics for toilet sets, automobile panels and shiny high heels.

Whey is produced in simply awesome quantities in this country—enough to float a whole navy. It comes mainly from the cheese industry, to the amount of well over five and one-half billion pounds a year. Production of industrial casein adds more than another billion pounds.

The greater part of this is still fed directly to livestock—mainly the omnivorous and undiscriminating pig. But use as swill is a low-grade, low-price outlet; better and more profitable to find uses in human food and manufactured products if possible. That is what the chemists have been doing.

Science News Letter, March 25, 1939

ENTOMOLOGY

Grasshopper Plague Depends On Turn of Weather Now

GRASSHOPPERS will either reach plague proportions next summer or will remain relatively harmless, according to the turn of the weather from now on. If it is persistently cool and rainy, especially in the late spring, hatching will be retarded and young 'hoppers will be killed. If it is dry and warm there will be new trainloads of poison bait and armies of men to scatter it.

Surveys of the U. S. Department of Agriculture indicate a great wedge of grasshopper eggs distributed across the country from western Washington to northern Michigan and coming to a blunt tip in Texas. Most severe infestation follows two long lines: one right along the western boundaries of the Dakotas and Nebraska, on down to the Texas panhandle; the other from western Minnesota to an especially bad spot in western Iowa and eastern Nebraska, thence across southern Iowa and along the eastern "bulge" of Illinois. There is also an isolated island of infestation along the Mississippi river bottoms of Arkansas, Tennessee and Mississippi.

Grasshopper eggs were laid abundantly last fall, and the winter weather does not affect them to speak of. It is only when they are emerging from the eggs and crawling about as infant insects that they are susceptible to chill and wet.

Science News Letter, March 25, 1939

ASTRONOMY

New 82-Inch Telescope Receives Its First Starlight

THE NEW giant among telescopes, the 82-inch mirror of new McDonald Observatory, Fort Davis, Texas, has been given its baptism of starlight and proved to be practically perfect in mirror quality and operation.

For a number of nights, it was learned, the new telescope has been in use.

"Every new observation will mean an addition to our knowledge of the universe," said Dr. Otto Struve, director of both Yerkes and McDonald Observatories, after the preliminary observations.

The telescope was first pointed at a star on March 2. When brought to a focus the star image was steady and sharp, showing that the mirror was practically perfect. Photographs of brighter stars and of the moon were then obtained at the Cassegrain focus of the instrument. The first star whose spectrum was photographed was the fifth magnitude object, 17 Lepocis, located south of Orion. This spectrum shows many features never before recorded with any instrument.

The McMath type electric drive controls the telescope so accurately that once adjusted for an observation the astronomer does not need to stay at the eyepiece to guide the telescope. The astronomer at the telescope moves it into position by push-button controls.

Since all mirrors of the 82-inch telescope are coated with aluminum, observations in the ultraviolet region of the light spectrum will be particularly efficient. Most of the old telescopes are designed in such a way that the ultraviolet light is lost, even when the conventional silver mirror coating is replaced by aluminum with its superior reflecting power in the ultraviolet.

A group of eager astronomers who made the tests included Dr. Struve, Prof. George Van Biesbroeck, Prof. Gerard P. Kuiper, and Prof. C. T. Elvey of the joint Yerkes-McDonald Observatory staffs, as well as Dr. J. S. Plaskett of the Dominion Astrophysical Observatory at Victoria.

McDonald Observatory was built by the University of Texas and is operated jointly by that university and Yerkes Observatory of the University of Chicago.

Science News Letter, March 25, 1939

AGRICULTURE

Brazil-U. S. Agreement Is Part of Greater Plan

THE ARRANGEMENT for cooperative agricultural research included within the new Brazil-U. S. trade agreement is part of a greater plan which is intended to extend American research facilities to all tropical American countries, with a view to mutual interchange of products that will not interfere with existing agricultural systems.

Possible developments under the new arrangement include: re-establishment of the Para rubber industry, now largely in the hands of the British and Dutch in the East Indies; stimulation of existing trade in cacao, cubé (for insecticides), palm oils and waxes, manioc, etc.; development of traffic in tropical fruits through better refrigeration facilities; experimentation in new crops like tea, spices, hemp and jute.

Bills now before Congress call for appropriations to finance three specific projects:

(1) The establishment of a new agricultural attaché in Rio de Janeiro.

(2) A survey of the tropical resources of Brazil by scientists of the U. S. Department of Agriculture.

(3) The loan of Department of Agriculture research workers to investigate problems of Brazilian farms and forests.

Similar set-ups for other Latin-American countries are contemplated. Additional agricultural attachés are planned for Mexico City, Havana and Panama. There is already one in Buenos Aires.

Other parts of the general plan call for the training of South American meteorologists by scientists of the U. S. Weather Bureau, the establishment of a tropical forest experiment station in Puerto Rico, cooperation with radio companies for the transmission and dissemination of information, and the publication of scientific results after translation into Portuguese, Spanish and French.

Science News Letter, March 25, 1939

CHEMISTRY

Death From Skies In War Would Strike Down Civilians

Three Menaces At Which Protection Is Aimed Are Threats of Explosion, Gas, and Incendiary Bombs

THE capitals of Europe have feverishly groomed their civilian populations for attacks from the sky. Very few doubt that the non-combatants, hundreds of miles behind the lines of active fighting, will immediately be plunged into warfare.

Any city which produces anything which can be construed as remotely affecting the final outcome of the conflict —and that, of course, includes all but tiny hamlets—may be a military objective under modern warfare.

Danger from the skies, in present day warfare, means aerial bombing and the civilians in the cities will be likely to have three distinct types of menaces dropped on them from high overhead.

1. Explosive bombs containing up to a ton of shattering explosive that will virtually destroy any objects they hit. Tests have shown that it takes 80 feet of earth or 12 feet of concrete to protect against some of these giant bombs. One explosion from such a bomb can shatter a whole city block of ordinary dwellings. Against such giant bombs civilians can expect little effective protection other than those bomb-proof shelters already built or the more massive buildings and subways which exist in cities.

It takes huge planes to carry effective payloads of such bombs. While older-style bombing planes would probably be used there is a relative scarcity of very modern large bombing planes comparable in performance with Uncle Sam's "flying fortress" type. The effective radius of these missiles is less than that of gas or fire-creating bombs.

2. More personal, in its attack on civilian populations, is the gas bomb. The rush to supply gas masks to all the people of Europe's capitals is evidence of the menace which military leaders believe poison gas bombs will bring.

The imminence of poison gas bombings raises the question of whether new and yet undisclosed gases exist in the laboratories that would be more deadly than anything now known. There is such a possibility, but reasoning suggests that while there may be secret gases they would probably not be more efficient than known gases. Chlorine and mustard gas (dichlorethyl sulphide) were potent weapons during the World War, and can do major damage by themselves.

One reason for their continued use, in a new conflict, would be that the methods for their efficient manufacture and handling have been worked out. There would not be the delay in their application which occurred during the World War. It took the Allies, at that time, a year to get into production of mustard gas after the first German attacks.

The enemy of all poison gases is wind, which can dispel the gases until the concentrations fall below those which will cripple or kill. A principal military advantage of mustard gas, during the World War, was its weight. It would seep down into trenches, shell pockets and dugouts and contaminate them for days.

This means, for civilian city populations, that the first menace of mustard gas could be overcome by going to the second stories of homes. Gas proof shelters, effective for some period of time, are cheap to construct in most homes and it is to be expected that city dwellers will retire to such shelters during the actual attack and await, if necessary, the arrival of trained rescue squads to clear up the gas menace by the application of chloride of lime about the premises.

The biggest danger from gas attacks is the panic that might be induced. Confusion, due to fear, and not due particularly to the action of the gas itself, would be expected to bring the greatest menace to the most people.

This has spurred efforts to combat fear by training the populations of large European cities in the use of the gas mask and the steps to be undertaken, in event of an aerial gas attack.

After the proper protective methods were worked out for defense against gas attacks, during the World War, the effectiveness of this wartime weapon declined rapidly among disciplined and trained troops. The basic idea behind civilian training is to obtain, to the greatest degree possible, civilian discipline.

3. The final menace from aerial attack is aimed—not so much at personal injury as poison gas but—toward property damage. The giant explosive bombs, of course, cause such damage, but these losses are costly to produce and would not be widely used for general destruction, but only against the most important military objectives.

However, fire is still about the best destroyer of property that exists and so a serious factor in an aerial bombardment would be the fire-creating bomb.

The thermit bomb, producing a temperature of 2,300 to 2,700 degrees Centigrade, is a fire producer par excellence.

These thermit bombs, containing aluminum and iron oxide, are tiny objects. A single plane could carry hundreds. Scores upon scores of fires could be created in a great city at practically the same instant and by this means give the fire-fighting units such an enormous task that the risk of a general conflagration would be great.

In cities where many of the homes are of masonry and the roofs are essentially fire-proof the risk from thermit bombs would be reduced. The danger in areas where the buildings are of wood would be great.

The weather would, perhaps, determine the type of attack which would be made on a given city at a given time. In windy weather thermit bombs, spreading fires, would be a good rule. This wind, however, would be just the thing not desired for gas bombing and so, on a quiet day, thermit bombs would probably give place to gas bombs. The great explosive bombs, of course, would be equally effective upon all occasions.

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