Altitude

GENERAL SCIENCE

Lofty Research Laboratories

High on mountain tops all over the world, scientists are battling glittering snow and howling gales to carry on research in all fields of science.

By ANN EWING

➤ HIGH ON wind-swept mountain tops all over the world, scientists are battling howling gales, or learning to live with dazzling snow and the unearthly silences of these remote places.

They have made themselves modern mountaineers in lofty research posts, located on mountains in the Alps, in the Rockies and in the Andes. Here they are doing experiments, particularly in cosmic ray research, that can not be duplicated in laboratories at lower levels.

Some high altitude laboratories, for instance, are giving astronomers a chance to study the sun without interference from haze, dust or dense atmosphere. They can train coronagraphs, instruments for getting man-made eclipses, on the solor disk more accurately when the atmosphere is clear, not cluttered up with smoke and dust particles.

From such lofty spots, meteorologists can make continuous records of such information as the wind's speed and direction, the humidity and air pressure. Better weather forecasts may result, for these stations are helping to give a world-wide picture of the weather.

Medical scientists and biologists are studying the effects of high altitudes on the heart, on blood counts, on breathing and on the functioning of the various glands.

6,000 or 7,000 Feet High

When scientists speak of high altitude laboratories, they generally mean stations above six or seven thousand feet. At or below this height, there are many large cities with adequate facilities for all types of research, Denver and Salt Lake City in the United States, for instance.

Nairobi in Kenya and Arequipa in Peru are among examples of cities in other nations located at or well above the mile-high level.

In the altitude level from about 9,000 to 12,000 feet, there are a number of good stations equipped for cosmic ray and other research. Among the finest of these is the Jungfraujoch at 11,000 feet in Switzerland, which was built before the discovery of cosmic rays.

In 1880, the Jungfrau Railroad Company applied for a charter from the Swiss government and received it on the condition that the company establish a laboratory on the mountain.

Many governments have aided in its upkeep since that time. Beginning in 1947, UNESCO—the United Nations Educational, Scientific and Cultural Organization—has given it international financial support.

At Jungfraujoch there is avaliable not only the good supply of electricity needed for cosmic ray research, but workshop facilities for making equipment, a darkroom and a kitchen where scientists can cook their meals.

At almost exactly the same altitude in the Alps as the Swiss laboratory is the Italian station at Testa Grigia. Another outpost at this approximate altitude is in France's part of the Alps, on the side of Mont Blanc.

In the United States, there is a high altitude laboratory at Echo Lake, Colorado, with facilities comparable to those at Jungfraujoch. At 10,700 feet above sea level, Echo Lake is almost exactly two miles high, yet it can be reached by highway the year round. Thus getting equipment to the laboratory is quite easy.

Cosmic Rays at Climax

Also close to Denver is the astronomical observatory at Climax, Colorado, where some cosmic ray as well as astronomical research studies are made.

The Peruvian government runs the Huancayo Observatory, located on an 11,000-foot plateau some 12 miles west of the town of Huancayo in the Andes.

A recent addition to stations at this level is the Sacramento Peak station in southeastern New Mexico. At 9,300 feet it can be reached by road from Alamogordo, scene of the first man-made atomic explosion. Also at exactly this same altitude, 9,300 feet, is France's Pic du Midi Observatory in the central Pyrenees.

In the altitude level that centers about 3,000 feet higher, or about the 14,000-foot level, research stations are fewer and less well distributed. The United States posesses the only continuously operating facility—the Mount Evans Laboratory in Colorado. Located at 14,156 feet, this station is also within a short distance of Denver and it can be reached by road, though this road is not now kept open during the winter.

In Peru, at Morococka, about 90 miles from Lima, there is a high altitude laboratory—The Institute of Andean Biology—devoted primarily to a study of the physiological effects of high altitudes. The Institute building, at 14,900 feet, is easily reached and well equipped.

From this location, heights up to 17,000 feet can be gained without having to engage in any mountaineering regarded as difficult.

In both North and South America, many peaks are suitable for future high altitude laboratories. Because scientists have found that cosmic rays are affected by latitude, they would like to see a string of research posts down the western coasts of the two continents.

In the United States alone there are more than 50 peaks over 14,000 feet high, although the highest spot in this country, Mount Whitney's peak in California, is only 14,495 feet. Three of these lofty mountains already have roads to their summits.

High peaks fairly easy to reach also abound in South America. At many of these high altitude places, mining communities already exist, making access and setting up much easier.

Three Areas Left

Since the Caucasian mountains are not now open to scientists from the western world, Africa, Australia and India are the only areas left for future establishment of high altitude laboratories.

Stations in all three of these areas would be most welcomed by scientists and would provide valuable data. Probably the mountains of India promise the best opportunity of furnishing a high altitude laboratory in the near future. Cosmic ray scientists, particularly, would find such a station of special value, because it would be half way round the world in longitude from the Americas.

Science News Letter, August 18, 1951

PLANT PATHOLOGY

Name Changes But Oak Wilt Still Kills Trees

➤ THE FUNGUS that causes the dread oak wilt disease, tree killer now felling oaks over much of northeastern United States, will have a new name. The disease it causes will still be known as oak wilt, however, and it will still be just as deadly.

Reason for the name change for the fungus is the discovery of a new stage of the spore, the first time such a stage has been reported. Dr. T. W. Bretz of the Department of Agriculture's Experiment Station at Columbia, Mo., discovered the ascospore, or sexual, stage. A part of the name of any fungus shows the highest stage of development it has reached, and the just-discovered stage is higher than those previously reported for the oak wilt fungus, now known as *Chalara quercina Henry*.

Science News Letter, August 18, 1951

E FIELDS

SURGERY

Operation for Hiccup Saves Heart Patient

➤ WHEN A patient with the kind of heart disease called coronary thrombosis gets a bad attack of hiccups, his life may be in danger. If the hiccups go on, he is worried and frightened and may die of exhaustion.

A 70-year-old man was saved from such a death by a 2:30 a.m. operation, done at the bedside because the patient was too weak to be moved to the operating room. The case is reported by Drs. Samuel H. Rubin, Louis F. Albright, Paul K. Bornstein and David Schwimmer of New York. (JOURNAL, AMERICAN MEDICAL ASSOCIATION, Aug. 11).

The life-saving operation, in which the phrenic nerve to the diaphragm was crushed, was performed by Dr. Charles P. Bailey and his associate, Dr. Robert P. Glover, who were called in from Hahneman Medical College, Philadelphia, to Fitkin Memorial Hospital, Neptune, N. J., where the patient was.

Science News Letter, August 18, 1951

AERONAUTICS

Hot-Nose Turbojet Engine Safe From Icing Problems

➤ CRASHES OF jet planes due to ice formation in the vicinity of the engine air intake, such as recently occurred with a group of eight planes on routine flight in the Midwest, will be prevented by new turbojets with "hot noses" developed by General Electric of Lynn, Mass.

This new engine, one of the most powerful ever designed, has passed all test stages and is ready for mass production. First installations will be in the six-engine, jet-propelled bomber, the Boeing B-47 Stratojet. It will replace the General Electric J-47 engines which are now used in this bomber, the fastest in the world. It was a Boeing Stratojet that crossed the continent in 1949, an air-distance of 2,289 miles, in a non-stop flight of three hours and 46 minutes.

The intake icing problem is solved with this new engine by hot air from the turbojet compressor which is fed into the hollow parts of the nose. The heat is sufficient to prevent the formation of ice crystals.

In addition, the air inlet screen, designed to keep foreign matter from going through the engine on the ground, is retractable in the air to give unobstructed air flow. The screen, which could serve as the foundation of an "ice dam," is retracted soon after the plane is in flight.

The new engine is a version of the older General Electric J-47. Its official designation is the J-47-GE-23, called the "23" for short. Thrust provided by it is over 600 pounds more than its predecessor. It has a lower rate of fuel consumption, is completely deiced, has a special ignition system which makes possible high altitude starts, and may be equipped with water injection for thrust increase.

Science News Letter, August 18, 1951

DENTISTRY

Fluorides for Mother May Protect Baby's Teeth

➤ THE FIGHT against toothaches and decay is being carried back to the period before birth in studies supported by the Dental Research Institute of the National Institutes of Health.

Sodium fluoride in drinking water is known to provide about 65% protection against tooth decay in children drinking such water continuously from infancy. Whether the same water taken during pregnancy will protect the offspring against tooth decay is to be investigated by Dr. Reuben Feltman of the Passaic General Hospital, Passaic, N. J. Support for this idea comes from surveys in South Africa showing that the baby teeth of children whose mothers had fluorine in drinking water during pregnancy were remarkably free from decay.

Dental defects and susceptibility to tooth decay may develop as a result of diseases during the late stages of pregnancy. Investigation of this possibility will be made by Dr. S. J. Kreshover of the Medical College of Virginia, Richmond, Va., through another of the 25 National Dental Institute grants totalling $175,878 announced in Washington.

Science News Letter, August 18, 1951

INVENTION

Patented Process Gives High-Grade Soybean Oil

➤ SOYBEAN OIL substantially free of impurities, a product coming into wide uses ranging from foods to paints and plastics, is obtained by a refining process which brought Arnold L. Ayers, Bartlesville, Okla., patent 2,561,330. Rights have been assigned to the Phillips Petroleum Company of the same city. The process can be used for purifying soybean oil obtained from pressing or by use of a solvent.

It is described by the inventor as a two-stage process by which undesirable components of the oil are removed by liquid-liquid extraction from an oil-hydrocarbon solvent mixture with aqueous methanol, followed by a dilute aqueous solution of an alkali metal hydroxide, such as sodium or potassium hydroxide.

Science News Letter, August 18, 1951

TECHNOLOGY

Russians May Have New Machine Rifle in Reserve

➤ WHAT HAPPENED to Russia's Tokarev rifle? It has not shown up during the Korean war.

This is a situation which has American ordnance men puzzled. Perhaps, according to the magazine ORDNANCE (July-Aug.) the Russians "have developed this weapon into a machine-rifle and are just waiting for the proper time to spring it on a waiting world."

The Tokarevs were first produced in Russia in 1938 and were modified in 1940 and 1942 when the final form came out. What the magazine calls an "interesting" carbine on the Tokarev system was brought out in limited quantities in 1940.

It is believed that the rifle freezes up in cold weather. However, a frostproof oil was brought out to correct this. American ordnance men say that this freezing-up is not to be sneered at, in view of the fact that American rifles and machine guns, with ordinary lubricants, quit in Korea in cold weather as though soldered up solid.

The non-appearance of the Tokarev rifle has caused considerable speculation in this country, particularly since all the weapons given the North Koreans and Chinese Communists by the Russians have not been second line. Some have been first-grade.

Science News Letter, August 18, 1951

GENETICS

New Barley Shows Extent of Disease Damage

➤ AGRONOMISTS can now measure disease damage to such crops as barley without establishing chemically protected controls.

This new tool, developed by scientists of the University of California, is known to geneticists as "backcrossing"—a method of transferring a selected character from one variety to another by recurrent crossings to the desirable type.

A spectacular example is a barley known as Atlas 46, derived by backcrossing. It is a disease-resistant form of Atlas, the variety now grown on about 20% of the barley acreage of California. Atlas 46 has been used to measure damage from two of the most destructive barley diseases—powdery mildew and scald.

By comparing yields of the resistant Atlas 46 with those of Atlas, C. W. Schaller of the University of California was able to measure yield losses ranging from 3.8%, for 1949's light infection, to 17.6% in 1947, a year of severe infection.

Similarly, he measured reduction in kernel weights from the effects of both scald and powdery mildew infections.

The use of the resistant variety as a measuring tool points to the economic advantage of replacing presently grown Atlas with Atlas 46. Annual savings to the barley industry might easily run to $750,000.

Science News Letter, August 18, 1951

CERRO DE PASCO COPPER CORPORATION

40 WALL STREET, NEW YORK 5, N. Y.

July 30, 1945

Mr. Lawrence Addicks
Bel Air
Maryland

Dear Mr. Addicks:

Enclosed herewith you will find copies of Mr. McLaughlin's letter of July 11th and Mr. Wright's letter of July 19th written in connection with your letter of June 28th.

Yours very truly,

CERRO DE PASCO COPPER CORPORATION

Geo. P. Sawyer

Geo. P. Sawyer

GPS/vp
enc.

COPY

Return to L. A.

Date: July 19, 1945

To: Mr. V. L. McCutchan, Assistant General Manager

From: T. R. Wright

SUBJECT: Assay Comparisons
Altitude Effects

We acknowledge receipt of Mr. McLaughlin's memorandum of July 11 and the memoranda from Messrs. Sawyer, Addicks and Smith relating to blister-copper assay comparisons.

As Mr. Addicks points out, it would be desirable to make a study of the relationships between altitude and physical laws, For many years we have wanted to investigate such relationships, but we have never had time to engage in pure research. We shall give serious consideration to Mr. Addicks' suggestion and, later on, will outline a series of 'high-altitude' problems for study by C-de-P scholarship students.

Sgd. Theo. R. Wright.

Attitude

Clary

Cerro de Pasco Copper Corporation
Office of the General Manager
Oroya - Peru

C
O
P
Y

No. 2624

July 11, 1945

Mr. George P. Sawyer
Vice President
Cerro de Pasco Copper Corporation
40 Wall Street, New York City.

Dear George,

Thanks for the copy of Addicks' letter of June 28, 1945, in which he mentions the desirability of having special studies made of the relation between altitude and the physical laws that particularly concern our operations.

It is a good suggestion and I'll have our Research Department prepare a menorandum on means by which the problem might be effectively studied.

I am afraid it is somewhat beyond the range of the Peruvian graduate students we send to the States. Most of those boys need training in basic subjects and are not yet adequately prepared to handle research of original character. But, if one with proper preparation and ability should be found, the subject that Addicks suggests would be excellent.

Best wishes,

Sincerely yours,

(sgd. D.H.M.)

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CERRO DE PASCO COPPER CORPORATION

Lima, March 12, 1951.

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MR SMITH
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Memorandum to: A. R. Merz

From: R. P. Koenig

Subject: Assay Comparisons - Altitude Effects

Did anything ever come of this?

Robert P. Koenig

RPK:tv
Encls.

cc. NYO (3) ✓
JDS (2)
ARM (3)
L. Addicks.