SCIENCE NEWS

Science Service, Washington, D. C.

ATMOSPHERIC CONDITIONS FAVORABLE TO HEALTH AND WORK

PEOPLE work best when the thermometer registers between 40 and 75 degrees Fahrenheit. A temperature greater than 90 degrees in moist, still atmosphere would soon become unbearable. A pulse rate of 160 beats per minute indicates that the limit of endurance of atmospheric conditions has been reached.

These facts are indicated by experiments conducted at the U. S. Bureau of Mines in Pittsburgh to find the conditions of temperature, humidity and ventilation at which man can live and work best. They were described by Dr. W. J. McConnell, of the Metropolitan Life Insurance Company's Industrial Health Service, before the American Institute of Mining and Metallurgical Engineers meeting in New York on February 17.

Although conducted primarily to find means of increasing the comfort and efficiency of mine workers, the experiments will have many other practical applications, Dr. McConnell said. "They enable the engineer to predict how human beings will respond to certain temperature conditions and to suggest the most efficient system of combating exigencies of environment."

The possibility of controlling atmospheric conditions to treat such pathological disorders as nephritis, rheumatic infections, other forms of arthritis, certain skin troubles, superficial infections, and a variety of respiratory infections was also told.

"According to these researches," said Dr. McConnell, "the maximum amount of work was performed by those tested between the effective temperature limits of 40 and 75 degrees Fahrenheit. Subjects of experiments were capable of performing four times more work in a temperature of 100 degrees with a relative humidity of 30 per cent. than in a saturated condition of 100 degrees. For ordinary humidity of 60 per cent., the subjects did about five times more work in a temperature of 90 degrees than in one of 120 degrees."

An upper limit of man's ability to compensate for atmospheric conditions has also been established. When at rest or in still air, it was explained, this upper limit lies around 90 degrees saturated, or an effective temperature of 90 degrees.

But if an air velocity of two and a quarter miles per hour is introduced, the other conditions remaining the same, the upper limit is raised to 95 degrees. With increased air velocity, a still further shift results.

When ordinary muscular work was done, measured as 90,000 foot-pounds per hour, this limit was reached at 80 degrees.

"The observations further indicate that the pulse rate rather than the rise in bodily temperature determines the extent of discomfort experienced. When the pulse rate exceeds 135 pulsations per minute, the subjects complained of discomfort. They became restless and irritable and acquired a headache and palpitation of the heart. They became very thirsty; they noticed a metallic taste and spoke only with effort.

"The condition became distressing and unbearable after the pulse rate exceeded 160 beats per minute. Dizziness and confusion resulted, followed frequently by nausea, and numbness or soreness of the face. As the severity increased a feeling of 'floating in the air' was experienced, and it is probable that heartstroke would supervene if the exposure were continued. When the subject left the test chamber, . . . the pulse rate began to drop rapidly and his condition immediately improved."

The tests were conducted in compartments insulated by cork board. Fans, heaters, humidifiers, refrigeration equipment, distributing system and automatic control could hold any dry bulb temperature from 20 to 180 degrees, humidity from 10 to 100 per cent. and velocity from still air to 1,000 feet per minute.

EPIDEMIC INFLUENZA

IN spite of considerable effort to find the causal agent of epidemic influenza, the present time finds the problem still unsolved, Dr. Peter K. Olitsky, of the Rockefeller Institute for Medical Research, said in a De LaMar lecture which he gave recently at the Johns Hopkins School of Hygiene and Public Health.

There are several factors which contribute to the existing confusion, and the outstanding difficulty arises from the necessity of selecting cases of undoubted acute influenza. There has been in the past frequent failure to recognize influenza as a specific, primary disease, and therefore physicians and other scientists have failed frequently to consider as secondary infections the various bacterial pneumonias that develop in lungs injured by the influenzal agent.

Moreover the primary uncomplicated disease is usually mild and transitory; so that unless the cause is sought in the early hours it may become masked or even supplanted by associated organisms. Also, the rapid and extensive spread of influenza during pandemics makes it difficult to select for control observation cases of perfectly healthy individuals who have never suffered from the disease. Finally, to add to the confusion, a clear clinical distinction has not always been made between primary, uncomplicated epidemic influenza and many different types of upper respiratory infections, such as common colds, acute rhinitis, acute bronchitis and other indefinite conditions which may simulate a true influenzal attack.

Dr. Olitsky discussed three different agents which have been thought to cause influenza. Pfeiffer's bacilli have not yet been universally accepted as the causative agent, although there is considerable evidence to show that these organisms have some relationship to the cause of the disease. The same holds true for streptococci which have been implicated by several investigators since 1917, and most recently by Dr. I. S. Falk, formerly of the University of Chicago.

Some investigators believe that the cause of influenza is a filterable virus free from bacteria of the ordinary species, or bacteria which can be cultivated artificially. Here again additional experimental evidence is necessary before a conclusion may be reached.

Dr. Olitsky and his colleague, Dr. F. L. Gates, have been studying the *Bacterium pneumosintes*. These are filter-passing bacteria found in the naso-pharynx of man. There are now reported in the literature at least 30 groups of pneumosintes-like organisms, mostly isolated by Drs. Olitsky and Gates and by workers studying in their laboratories. Dr. Olitsky drew attention to the fact that this germ was obtained only from cases of influenza. While there has been confirmation now and again of the occurrence of this filter-passing organism in influenza and not in other conditions, Dr. Olitsky said that he and Dr. Gates still maintain the cautious attitude they have previously expressed and prefer merely to present the experimental facts.

In conclusion, Dr. Olitsky is of the opinion that in view of the many workers engaged on the problem, it is likely that all obstacles will be overcome and an exact knowledge of the cause of the disease will be attained.

THE MUENCHEN DISASTER

WHEN the chemical cargo on the liner *Muenchen* burned and exploded at pier 42 in Hudson River, New York, there was added another chapter to the history of fires in which nitrates have played a part.

The *Muenchen* is reported to have had among its cargo quantities of sodium and potassium nitrate, chemical materials largely used in the making of fertilizers, explosives, nitric and sulphuric acids, dyes and many other chemicals. With the development of the fixation of atmospheric nitrogen on a large scale in Germany, that country has been a large exporter of these chemicals to the United States.

Nitrate does not burn in the sense that coal or wood does, but it does supply oxygen necessary for the combustion and it is therefore a great promoter of fire. Jute or other cloth bags used to hold the nitrate often provide the fuel for the fire while the nitrate supplies the oxygen. Shellac and peat moss are said to have been stowed in the same hold with the nitrate, and being highly inflammable they would have furnished fuel for the fire.

Paradoxically the worst thing to do to a nitrate fire is to pour water on it and therefore the firemen fighting the *Muenchen* blaze by conventional methods probably added to its fury. The molten nitrate is carried to fresh burnable material by the water and the chemical itself dissolves in the water with the generation of heat. On cars and warehouses in which nitrates are stored warning notices are often posted: "In Case of Fire, Keep Water Away!"

Dr. Charles E. Munroe, chief explosives engineer of the U. S. Bureau of Mines and a veteran investigator of explosions, declared that his researches show that "sodium and potassium nitrates present no fire hazard when by themselves and that to retain this security they should be stored and transported out of contact with combustible materials."

Other famous nitrate fires of history were recalled by Dr. Munroe. On July 19, 1845, fire originating in a five-story warehouse in downtown New York caused the destruction of 230 houses, with $2,000,000 property damage and many casualties, some fatal. Over a million pounds of merchandise, of which nearly 350,000 pounds consisted of Indian saltpeter (potassium nitrate), were stored in the building with the nitrate mixed indiscriminately among madder, raw silk, indigo, sugar, coffee, shellac and other combustibles. The final explosion wrecked the building and threw incandescent masses into the air so far that shipping in the Hudson River a quarter mile away was endangered. In May of the same year a ship, *Virginia*, loaded with linseed and saltpeter, exploded and sank 20 minutes after fire was discovered.

In recent years the records show that every few years a vessel carrying nitrates catches fire and usually the loss is total. As nitrates find large application in industry and are transported by rail, one or more nitrate fires on railroads are to be expected each year on the average. At arsenals and powder plants where nitrates are used in the manufacture of explosives, nitrate fires have also occurred, but storage of the chemicals in fireproof buildings of concrete and hollow tile has minimized the danger.

The *Muenchen* as an incoming vessel did not come under the jurisdiction of the U. S. Steamboat Inspection Service. The federal regulations require that on passenger vessels sodium nitrate be carried where it is readily accessible in case of fire and there is no danger of contact with water. Potassium nitrate must be carried as a deck load.

PRODUCTION OF TANTALUM

TANTALUM, the metal rarer than gold, which absorbs 740 times its volume of hydrogen gas, successfully resists attack by the strongest mineral acids, and changes alternating into direct current, is finding greater use for dental instruments, surgical tools, pen points, hypodermic needles and acid proof pumps, Professor George W. Sears, of the University of Nevada, reported to the American Institute of Mining and Metallurgical Engineers.

Even though tantalum was used for electric light filaments in 1906, until the past few years it has been only a rarity. It forms a much smaller portion of the earth's crust than gold. The production in 1928 was 35,000 pounds.

Because it absorbs gas so well, it is used for the metal parts of vacuum tubes. Although there are other substances which when used as an electrode of an electrolytic cell permit the passage of electricity in only one direction, tantalum is the best. Electrolytic rectifiers for charging storage batteries contain it. "Aqua regia, which readily dissolves both platinum and gold, has no action on this metal," continued Professor Sears. Hydrofluoric is the only acid successful in attacking it. Strong alkalies have no effect on it.

Tantalum can be cold-rolled to a sheet one thousandth of an inch thick. It is found in the Black Hills of South Dakota and in Australia.

PATENT FOR EXTRACTING RUBBER FROM GOLDENROD

MR. THOMAS EDISON has taken steps to protect his scheme for getting rubber out of goldenrod and other small plants by taking out a patent on the process. His new patent, just issued, bears the serial number 1,740,079.

The difficulty about getting rubber from such plants as goldenrod lies in the fact that most of it lies in the pith and in the cortex, or bark-like outer portion of the stem, while the bulky woody inner parts contain little or no rubber, yet clog up the extracting machinery and involve a lot of expensive handling of worthless material. Mr. Edison's process aims to get rid of this rubberless part of the stem.

In the process as described in the patent, the dried plants are first crushed between rollers, to open up the pith seams and break the bark. The crushed plants are then cut into pieces half an inch long and soaked in water. After this they are put into a water-filled ball mill. A ball mill is a device somewhat like a concrete mixer, which tumbles its contents over and over with a number of hard steel balls. This rapid pounding breaks the bark into small fragments, but shreds the woody part into fibers. After about an hour in the ball mill the contents are screened, separating the bark fragments from the fibrous inner portions of the stem. This mass can be used in paper-making or similar manufactures. The second stage of the process consists in grinding the separated bark and pith pulp in water and permitting the solid matter to settle in a tank. The rubber particles, being lighter than water, rise to the surface and are floated off.

Mr. Edison claims that this process is commercially practicable for producing rubber from goldenrods and other small herbs and shrubs. It is not known whether he actually intends to begin commercial operations using this process.

ITEMS

GOVERNMENT workers who do distinguished work along scientific lines would be rewarded with a medal of honor if a bill introduced in Congress by Representative Anthony J. Griffin, of New York, were passed. Recommendations for not more than five persons annually to receive this honor would be made to the President by a commission consisting of representatives of the National Academy of Sciences, the American Association for the Advancement of Science and the American Engineering Council. Upon presentation of the medal, which Representative Griffin desires to have known as the "Jefferson Medal of Honor for Distinguished Work in Science," the person so honored would receive one hundred dollars, and thereafter for the remainder of his or her life, an amount of money annually, of not less than one hundred nor more than five hundred dollars, "said sum to be exclusive of salary or pension." If the medal and award were granted posthumously, it would be paid to the wife or children or parents of the honored worker, with certain restricting and modifying provisions.

EUROPEAN travelers from New York will have a slightly longer trip beginning on February 15, for then the southerly route known as Track B will be in effect. This announcement is made by the U. S. Navy Hydrographic Office, following information received from the headquarters of the North Atlantic Track Agreement in London. During the fall and early winter Track C has been in use, but as icebergs and field ice are now moving down towards this part of the Atlantic, the southern track will be used. This year the ice is coming south much earlier than ordinarily, but this does not necessarily indicate that the ice will be unusually heavy later in the season. A still more southerly track, known as A, is sometimes used when the ice is particularly severe.

THE War Department has announced approval of plans for the construction of a highway bridge across San Francisco Bay to contain two cantilever spans, each 1,000 feet long. One span will allow a vertical clearance of 200 feet and the other 175 feet above navigable water. The bridge will join the city of Richmond and Marin County. It will be 17,769 feet long, nearly three and a half miles, including the approaches, and will contain 19 deck spans besides the long cantilever clearances. While the length of span of this bridge has been exceeded in other structures, it is unusual to have two such long links in the same bridge.

EVERY child will be its own danger signal, if the advice of specialists in home economics of the U. S. Department of Agriculture is followed by mothers. Protect your child by dressing it in vivid red, orange, bright blue or green that will attract the motorist's eye and prevent an accident when the child crosses streets or plays in the path of automobiles. Avoid inconspicuous dull coats of gray, brown, or navy blue.

A PORTABLE instrument which measures the intensity of ultra-violet rays by counting numbers on a meter was described to the American Institute of Electrical Engineers by Dr. N. C. Rentschler, director of research for the Westinghouse Lamp Co. The instrument makes use of a photoelectric cell with a uranium electrode which is sensitive to the ultra-violet rays that have the most healthful effect. The current flowing through it, which varies with the amount of light shining on it, charges a condenser. When the condenser, which holds electricity somewhat as a tank holds water, is filled, it overflows, or discharges, through a device known as a glow relay tube. This operates a relay, which in turn moves a counter up one number. To use the instrument, the operator simply opens it up where the light is to be tested, and takes the number of counts in five minutes. In bright sunlight, said Dr. Rentschler, there will be a hundred counts in this period, while for half the intensity there will be fifty. If a longer record is desired, the counter can be connected to another device, which automatically counts the number of discharges in each five-minute period over as long as thirty days.