SCIENCE NEWS

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PSYCHOLOGY APPLIED TO THE AIR SERVICE

DOCTORS and psychologists of the U. S. Air Service are trying to discover what it is that makes fliers fly.

"Every one that wants to fly can't learn," says Major Francis H. Poole, chief of the School of Aviation Medicine now located at Brooks Field at San Antonio, Texas. "Many a man apparently physically and mentally fit and ambitious to become an aviator can never safely leave the ground. Inherent flying ability is hidden below the surface, and the staff of experts here is trying to devise various means of detecting it." The U. S. Army wants flying in the air to be as safe as walking on the ground, and the personality of the pilot is as important as the motion of the motor.

A machine now being built at Washington, D. C., at the U. S. Bureau of Standards under the direction of Dr. L. J. O'Rourke, psychologist, director of Federal Personnel Research, will mechanically probe the mental make-up of prospective fliers and aid in the elimination of those whose reactions make them unfit for the air.

Major Poole points out that Dr. O'Rourke at the request of the Air Service has undertaken the work as part of the extensive program of cooperation of the Personnel Research Division of the United States Civil Service Commission in industrial and personnel research problems involving selection and training.

The speed with which the man examined reacts to signals in color, light and sound, the rapidity with which he makes decisions of what to do in emergencies, the degree of coordination of his movements and other mental characteristics, will be determined by the machine.

The machine is expected to be put to work around March 1, and Captain Neely C. Mashburn, chief psychologist of the school at Brooks Field, says that some such apparatus has been sought for because it is necessary that the verdict on the ability of the prospective flier be uninfluenced by the whims and peculiarities of the examining officer.

Emotional stability, in the opinion of Captain Mashburn, is the most important single characteristic of a good flier. Signs of nervous unbalance often do not show on the surface and no known apparatus or mental test has been able to delve into a man's inner nature and prove whether or not he could stand up under an extreme strain. Even the trick horrors of initiation stunts do not go deep enough.

For this reason, aside from machine-made tests and medical examinations flying students have to undergo, each applicant is now subjected to a searching personality study. The past life of the applicant is as carefully gone over as his eyesight, hearing or heart action. The way in which he is found to have faced emergencies in his past life indicates how he will probably behave in the air in the future. The United States is making rapid advances in the psychological study of its future fliers and the very low mortality in the American flying services is due to this.

In the United States only about a dozen lives were lost during 1926, while in England in only eleven months of that year there were 81 deaths and 51 accidents. There were 230 crashes in the British service where the machines were wrecked beyond repair. "It is my opinion," Major Poole said, "that 90 per cent. of all accidents are due to the pilots and not to the construction of the plane. Machines to-day are almost foolproof, and it is easier to get good mechanics than experts to pick out the men who will not kill themselves."

"EXCITED" ATOMS

A NEW method of chemical decomposition by which "excited" mercury atoms collide with the chemical molecules and split them apart into their constituents just as a bullet from a rifle shatters a clay pigeon, was recently described by Professor Hugh Stott Taylor, chairman of the chemistry department of Princeton University.

This method, which has been developed in the Princeton laboratories by John R. Bates, Charlotte Elizabeth Procter fellow in chemistry, shows that the effect of high temperatures on chemical compounds can be imitated at ordinary room temperatures by introducing into the system mercury atoms endowed by light with high energy.

In this way, water molecules are broken into fragments of hydrogen and oxygen, ammonia into nitrogen and hydrogen, reactions which are generally achieved at high temperatures.

The fragments of the decomposing molecule are very reactive and new combinations can therefore be secured. Thus, when benzol is shattered in the presence of oxygen, phenol or carbolic acid is obtained.

According to Professor Taylor, such a reaction would be of great commercial importance if cheaper methods of producing "excited" atoms could be found. Experiments in this direction are in progress at Princeton as well as the investigation of "excited" atoms of zinc and cadmium.

THE MOUSE PLAGUE IN CALIFORNIA

HALF a million dollars will probably be the loss to farmers from the severe plague of mice in Kern County, Calif., which shows signs of abating. The U. S. Department of Agriculture joined farmers and state workers in conducting a poison campaign. Strychnin poison, laid about the edges of the great alfalfa-planted area where the mice are feasting, is killing them off by millions. At the end of a month the plague should be over, according to Vernon Bailey, of the U. S. Biological Survey, and the farmers of Kern County will be able to start their spring planting with a clean slate—after paying the big board bill that the mice ran up during the plague.

Field mice present a real agricultural problem. Their appetite is for things important to man such as grass, grains, bark of trees, and even root crops and vegetables. They are almost incessant feeders and, moreover, are prolific and rapid breeders. The total increase from a pair of field mice if all lived and bred would be over 1,000,000 individuals at the end of a year. Thirty-eight states in this country are "mouse states" in which precautions should be taken to prevent such plagues as the one now raging in California. The only states in which mouse plagues may not arise are the states bordering on the Gulf of Mexico, and Tennessee, Kentucky, Arkansas and Oklahoma. As few as ten field mice to the acre on the 65,000,000 acres of hay raised in mouse states would cause a yearly money loss of some $30,000,000 in hay alone. During a mouse plague when the mice are present in much larger numbers the loss is immense.

To minimize the chances of such plagues, Mr. Bailey recommends that the farmers clean up the fields, meadows, borders, roadsides and ditch banks to give the herons, hawks, owls, gulls and other birds of prey a chance to see and catch the mice and thus preserve the necessary degree of control.

The situation in parts of France is so serious that the Pasteur Institute has been experimenting with a disease which kills off the mice in three days. Grain is soaked in a solution containing the bacilli which cause the disease. The mice eat the grain and develop a mortal distemper which they rapidly transfer to each other.

PROTECTION OF THE TEXAS LONGHORN

THE Texas longhorn whose wild head tosses through a thousand romances of the old Southwest, until now threatened with the extinction that nearly overtook the bison and the plains antelope, has joined these animals as a protected ward of the government on a special reservation in the Wichita National Forest in Oklahoma. Though not a native of this continent like its two companions and predecessors of the plains, it was introduced so early by the Spanish settlers and became so wild that it fits into the landscape of the Homeric days of our frontier as completely as they, and naturalists and historians at Washington express themselves as much gratified by the action of Congress in adding this item to the agricultural appropriations bill, which has been signed by the president. Members of the U. S. Forest Service were especially active in promoting the measure, which was cared for at the Capitol by Senator Kendrick, of Wyoming.

The Wichita National Forest and game preserve is an ideal location for these animals. It lies in the heart of the range of the old southern herd of plains buffalo, and is surrounded on all sides by the region formerly known as the Indian Territory where now live more than fifty thousand Indians. Here also grazed the forefathers of these long-horned cattle when the livestock industry of the southwest was in its infancy.

There are still a few living members of this once numerous breed of cattle to be found down in what is known as the prickly pear country of Texas. The herd for the Wichita Forest will be selected with great care by men who are familiar with the characteristics of the old timers of the southwestern ranges. They will be grazed in a pasture immediately adjoining the one occupied by the herd of buffalo now established on the Wichita, and the men who conceived the idea feel sure they will flourish in their new surroundings. Moreover, they claim it will be a profitable investment for the government, for the increase can be sold either for park zoos and other exhibition purposes or else for its beef value. This insures a permanent market for the surplus animals and an excellent financial return on the investment.

MICROSCOPIC PHYSIOLOGY

PROTOPLASM, the stuff that makes things alive, was described by Dr. Robert Chambers, professor of microscopic anatomy at Cornell Medical School, in a recent lecture at the Manhattan Trade School, New York. Rapid advances are being made in our understanding of the chemical and physical foundations of life, the speaker said, and every day the secrets that lie in the living cell are more intimately penetrated.

Protoplasm, as Dr. Chambers described it, shows itself under the microscope to be a clear, colorless material sometimes viscidly fluid like the white of a raw egg, sometimes firm and jelly-like. But whatever its state, it always shows three properties so long as it is not dead: it grows, it moves, it can "feel"—that is, it can respond to stimuli. Nothing that is not alive can do any of these three things.

Although protoplasm is necessarily present wherever life is present, it is divided into such tiny masses, each within a cell wall, that it can not be collected into large quantities for ordinary chemical analysis without killing it, when it would of course no longer be protoplasm at all. It is therefore necessary to carry on all researches on it by means of powerful compound microscopes. Because of this limitation on research into the properties of living matter, scientists could learn nothing at all about it until the microscope was invented, and that occurred only as recently as the seventeenth century. It has therefore come to pass that gross physiology, which deals with the activities of the body in general and can be studied with the naked eye, aided by ordinary chemical and physical apparatus, got a much earlier start than microscopic physiology, which pries into the secrets of the tiny particles of protoplasm themselves. This situation, however, is rapidly being changed, for the science of microscopic physiology, especially during the last half of the nineteenth century and the first quarter of the twentieth which has just ended, has been making great strides to overtake its older companion.

ORION IN THE SOUTHERN SKY

IN the southern evening sky Orion has again become a prominent feature. This constellation is generally considered one of the most magnificent in the heavens, a judgment well warranted by the numerous interesting

objects that it contains. One of these is the star Betelgeuse. In the old star maps which represented Orion as a giant warrior attacking the bull, Taurus which appears in the neighboring constellation, with an upraised club in his right hand and with a bear skin thrown over his left arm, Betelgeuse was in his right shoulder. The three stars in a row formed his belt, the curved row of stars running from it his sword, and the bright star Rigel his left foot, which was lifted.

But Betelgeuse has scientific as well as mythological interest, for it is one of the largest stars known, and was the first which F. G. Pease, of the Mt. Wilson Observatory, studied when he applied Dr. A. A. Michelson's interferometer to the measurement of stellar diameters. He found that it is about 215 million miles in diameter, or about 250 times the diameter of the sun.

The vast scale of this orb may be better realized when it is recalled that the sun is about 93 million miles away from the earth, so that if the sun were as large as this giant body, we should be inside it!

Another interesting object in Orion is the Great Nebula, which a very keen eye can just glimpse in the sword of the warrior. With even a small telescope, however, it shows up as a sea of light. Unlike the spiral nebulae, which are vast systems of stars, like the Milky Way, but beyond its confines, the Great Nebula of Orion is within the Milky Way, and consists of a cloud of glowing gas. But though not as far as the spirals, it is by no means close, for its light takes about 700 years to reach us, though traveling with a speed great enough to encircle the globe in a seventh of a second! Its diameter is approximately six and a half light years, the light year being about six trillion miles—the distance that light will travel in a year.

Just what keeps it going is unknown, but right at the heart of the nebula is a group of stars which some believe excite the rest of the material to luminescence, just as the cathode rays from the tube recently devised by Dr. Coolidge, of the General Electric Company, cause certain substances to glow, when placed in their path. By means of the spectroscope astronomers have determined what the substances are in the nebula. Most of them are found on earth, but one set of spectral lines corresponds to nothing in the terrestrial laboratory, so astronomers have named it nebulium. Some day it may be found here, just as helium was after it had been discovered on the sun, but its properties are, as yet, unknown.

ITEMS

THE discovery that vitamin A, the physiological preventive of rickets, could be added to food, claimed as original a few days ago by Professor A. Windaus, of Göttingen University, was anticipated by an American scientist by at least two years. In March, 1925, Professor Alfred F. Hess published a notice in the *Journal of Biological Chemistry* of experiments in which he learned that either of two chemical substances, phytosterol and cholesterol, would prevent rickets in animals if they were exposed to ultra-violet radiation and then added to their diet. In the experiments of Professor Windaus, so far as reports received in this country indicate, the same procedure was followed with another compound, ergosterin.

ANTHRAX, the great sheep and cattle plague, may be spread by infected forage. Research recently completed at the Louisiana Experiment Station by Dr. Harry Morris and Harland K. Riley indicates that growing rice, corn, oats and beans are carriers of anthrax spores. Certain sections of the Mississippi delta are known as anthrax districts where frequent outbreaks occur during the summer months and the state investigation was undertaken to clear up one of the little known points in the history of this ancient disease which has in the past attracted the attention of such classical authorities as Koch and Pasteur. How the germ gets from the soil into the body of the animal is a question vital to stock raisers that the investigators have attempted to solve. Their results indicate that anthrax spores can be transferred from contaminated soil to germinating and growing crop plants and thereby facilitate the spread of the disease.

TURN in your old silk stockings or worn-out clothes of that material and have new silk threads made of them. According to experiments recently carried on by Dr. P. P. von Weimarn, of the Imperial Research Institute at Osaka, Japan, this is indeed possible. Dr. Weimarn states that filaments actually better in quality than natural silk can be produced from worn-out silk materials or from the waste silk from cocoons or factories. Threads can be drawn which closely resemble the natural silk in quality. Frequently the threads so spun in these experiments possessed even greater tensile strength than the original threads of natural silk. The other qualities of natural silk, such as elasticity, softness, resistance, satin gloss, were present in the threads so obtained.

IN spite of the usual winter prevalence of children's diseases, mothers of babies less than six months old need not fear, in most cases, that their youngest will catch a disease which an older brother or sister may bring into the house. Infants under six months are as a rule immune to the contagious ills of childhood. This immunity is a birthday gift from their mothers, according to Dr. William H. Park, of the New York City Health Department. A child at birth possesses its mother's immunity. And this immunity stays with the child for about six months. Most mothers are immune to children's diseases. Therefore there are few cases on record of infants under six months contracting the contagious ailments that older children are prey to.

JAZZ is penetrating even into the Orient. American pianos, violins, mandolins and guitars make life merry in the progressive empire of Japan, according to information received by the Department of Commerce. The flowery kingdom is only outstripped by Canada as a purchaser of sheet music and is our third largest buyer of phonograph records. Though the piano has no counterpart among native Japanese instruments it is growing in popularity and musical education is regarded with favor in families of wealth.