SCIENCE NEWS

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THE MIND AS AFFECTED BY INTERNAL CONDITIONS OF THE BODY

AN experiment in which Sir Joseph Barcroft, of Cambridge University, England, deliberately froze himself nearly to death was reported by him in a lecture at Yale University. The experiment was part of a study to learn how the human mind is affected by changes in the internal environment of the body. In similar experiments Sir Joseph stayed in a room filled with deadly hydrocyanic acid gas until a dog with him died, and later stayed for twenty minutes in a room containing 7.2 per cent. of carbon dioxide gas.

Man's intellectual development and motility, Sir Joseph pointed out in his lecture, depend on the temperature and other factors of his internal environment remaining constant. As little as one degree of fever affects the mental processes.

"In each of the two experiments which I performed there was a moment when my whole mental outlook altered," Sir Joseph said in describing his feelings during near-freezing. "As I lay naked in the cold room I had been shivering and my limbs had been flexed in a sort of effort to huddle up, and I had been very conscious of the cold. Then a moment came when I stretched out my legs; the sense of coldness passed away and it was succeeded by a beautiful feeling of warmth; the word 'bask' most fitly describes my condition: I was basking in the cold.

"Up to the point at which shivering ceased, nature fought the situation; my instinct was to be up and about, an effort of will was necessary to remain the subject of the experiment; after that point I gladly acquiesced, initiative had gone. Doubtless a second and more advanced stage would follow in which inertia would lapse into unconsciousness. For I suppose that, had the experiment not ended at that point, my temperature would have fallen rapidly and I was on the verge of the condition of travelers when they go to sleep in extreme cold never again to awake.

"And I was conscious of other reversions of mental state: not only was there a physical extension of the limbs, but with it came a change in the general mental attitude. The natural apprehension lest some person alien to the experiment should enter the room and find me quite unclad disappeared."

Sir Joseph concluded from these experiments that the most immediate effect of interference with the chemical or physical properties of the blood is impairment of the higher qualities of the mind. "The thoughts of the human mind," he said, "its power to solve differential equations, or to appreciate exquisite music, involve some physical or chemical pattern, which would be blurred in a milieu itself undergoing violent disturbances."

A LARGE SKULL FROM THE ALEUTIAN ISLANDS

DR. ALEŠ HRDLIČKA, of the Smithsonian Institution, reports the discovery by his expedition to Alaska, of a large skull belonging to a man who lived hundreds of years ago. The skull, belonging to a man of the Aleutian Islands, is shaped to hold a brain of fully 2,005 cubic centimeters. The average man has a brain of 1,450 cubic centimeters. A woman averages about 1,250 to 1,300.

Dr. Hrdlička makes a comparison of this with other brains on record. Daniel Webster is credited with having the largest head of any American within historic times. But his massive brain was smaller than the Aleut's, being about 2,000 cubic centimeters. Bismarck's brain is estimated to have been about 1,965; Beethoven's, 1,750. The Russian author, Turgeniev, with a brain of 2,030 cubic centimeters, still holds the world record in this respect.

The newly found American skull, only a trifle smaller than Turgeniev's, is pronounced entirely normal by Dr. Hrdlička. Examination showed that the man who carried the massive head on his shoulders was no sufferer from any such head-deforming malady as water on the brain, or the thickened bones of gigantism. He was not a person of great size or strength, judging by the moderate size of the bones for muscle attachments. It is believed probable that he was a man of intelligence as well as in quantity of brain matter.

Dr. Hrdlička explains that there is a rough but definite correlation between brain size and intelligence in normal human beings. Brain size, he points out, is the most essential physical difference between man and beast. In the collection of 16,000 skulls in the U. S. National Museum, which is the largest in the world, the smallest normal adult skull of a human being is capable of holding no more than 910 cubic centimeters of brain. This is close to the edge of the gulf separating man from ape, so far as brain size is concerned.

FORESTRY IN GERMANY

FORESTERS in Germany are trying to undo some of the mistakes their predecessors made. Earlier forestry in that country "split itself in two" over the conflicting interests of softwood timber and deer. The most profitable cash tree crop is spruce, and the past generation of German foresters planted great solid blocks of spruce, even and ordered as the cornstalks in a cornfield—and almost as tightly set. But such closed stands of conifers shade out the underbrush on which deer browse in winter, and of course all tenderer summer herbage as well.

Yet the German people, even the vast majority who never go hunting at all, want to have deer about. So the foresters have maintained a heavy deer population artificially, by feeding hay and giving doles of salt. This is recognized as illogical, but "It's a love affair," said one German forester to Professor Aldo Leopold, of the University of Wisconsin.

To restore something like natural conditions, the present school of German foresters is attempting to build what they call "Dauerwald"—the word translates rather awkwardly as "permanent forest." This is to be a balanced forest, with hardwoods mixed with the "fields" of spruce. The deer find certain hardwood trees

palatable browse in themselves. Moreover, hardwood growth, unlike the softwood, permits extensive development of the kind of undergrowth that deer prefer to eat—yew, mountain ash, raspberry, blackberry, wild rose.

Professor Leopold believes that American forestry can profitably learn a lesson from the German book, before we repeat the German mistake too extensively. He would have "money-crop" forestry in this country concentrated on the best forest lands, leaving cliffs and rocks to "grow game and scenery."

He would let a reasonable number of predatory animals survive, to act as natural control on game population. He would encourage hardwoods, though keeping pure stands of conifers in obviously profitable places. Finally, he would unify game and forest administration, instead of leaving it in its present troublesome dual-control condition, and he would try to keep the food supply always well above the animal's demands upon it.

CONSERVATION OF THE BISON OF EUROPE

FUNDS from the United States are aiding materially in the effort of German conservationists to save and restore an almost-extinct big animal species that once roamed the Old World as its close cousin, the bison, roamed the New. The species is the wisent, a great, shaggy-maned beast that looks so much like the American bison that only a zoologist can tell them apart. There are at present only 75 pure-bred wisent left in the world, consisting of four small breeding herds and a number of scattered individuals in zoological parks.

Before the World War there were a fair number of wisent, but the war and the revolutions that followed brought about their almost total extermination, until there were only 60 specimens left. These have slowly increased to the present 75.

In a brief discussion of the wisent situation, sent to the official publication of the American Society of Mammalogists, Dr. Theodor G. Ahrens, an American naturalist long resident in Berlin, states that one reason for the very slow increase has been the lack of suitable underbrush for browse in the highly-cultivated German forests.

An effort will be made to overcome this and other drawbacks to wisent breeding at the new wisent park near Munich, in connection with the Hellabrun Zoo. The means for this undertaking were contributed by the New York Zoological Society, to the International Society for the Preservation of the Wisent.

In addition to the propagation of the carefully recorded pure-bred wisent, a second stock of animals is being built up by what is known as "suppression culture." In this, pure-bred wisent bulls are mated with American bison cows, and the hybrid offspring in turn bred back to pure-bred wisent bulls. This is kept up for generation after generation, until there is practically nothing left of the original maternal bison blood.

It is expected that the very slightly hybridized wisent obtained in this manner will finally come to be practically identical with pure-bred wisent in appearance, and that they may very easily be stronger and healthier than the pure-bred stock. Nevertheless, the pure-breds and the "suppression culture" strains will always be kept strictly separate.

A POWER-ALCOHOL PLANT

THE first power alcohol plant in America is producing new fuel for motor cars. Two batches of anhydrous ethyl alcohol made from corn, amounting to 2,000 gallons, have poured from the stills of the Chemical Foundation-sponsored plant of the Bailor Manufacturing Company at Atchison, Kans. Officials expressed themselves as pleased with the performance of the new plant and predicted that in a month the capacity of 10,000 gallons a day would be realized.

Alcohol-blended gasoline under the name of agrol will be on sale shortly in seven midwestern states at prices that will compete on a quality basis with straight gasoline fuels. The production of power alcohol from surplus farm products in this plant is being watched by leaders in agriculture, the oil industry and other fields, including government, because it is a practical demonstration of the thesis of the Farm Chemurgic Council that crops from American soil can be utilized for the manufacture of industrial materials.

The Atchison plant produces butyl as well as ethyl alcohol and as a valuable by-product evaporates the spent mash into a protein feed for stock. The butyl alcohol is used in connection with the ethyl alcohol production. The ethyl alcohol is blended with gasoline to produce motor fuel. The whole output of the Bailor plant is being taken by the Chemical Foundation of Kansas for distribution at a price not to exceed 25 cents a gallon.

At the plant the alcohol is denatured and then blended with an equal volume of a petroleum to make what is called "agrol fluid." This blend will be used by filling station operators to make three grades of agrol gasoline, known as agrol 5, agrol 10 and agrol 15. These numbers indicate the quantity of alcohol in each of the standard blends when 60 octane gasoline is taken as the base fuel. If the filling station uses higher octane gasoline, less agrol fluid is needed, and if lower octane gasoline is the base, more agrol fluid is blended.

The oil industry is watching closely the operation of the new plant and the distribution experience. In an article in the current *Oil and Gas Journal,* W. T. Ziegenhain tells how the economies of power alcohol-gasoline blends will work out. The anti-knock value of base fuel, he explains, is raised one number for each one per cent. of alcohol added to the 60 octane base fuel. Mr. Ziegenhain explains how an Omaha distributor might figure his relative cost. He pays 25 cents a gallon for the alcohol at the Atchison plant in the form of agrol fluid, and adds one cent freight charge. The present delivered cost of 60-octane refinery gasoline at Omaha is about seven and a quarter cents. If nine parts of this fuel are blended with one of alcohol, the resulting 70 octane blend costs nine and one eighth cents. Regular 70 octane refinery gasoline is selling at Omaha for about eight and one half cents. Large quantities of gum-solvent refinery gasoline is selling in the same area for one cent premium. The alcohol blend would fall in this classification and

Mr. Ziegenhain believes that "the marketer might be attracted to the alcohol blend and the potential composition made real." The Atchison plant is believed by its officials to be the only commercial alcohol plant that has attempted to produce both butyl and ethyl alcohols and protein feed commercially in its initial operation.

TUBERCULOSIS IN INDUSTRY

TUBERCULOSIS is the most important disease problem in all industry, from the standpoint of both workers and employers. This assessment of the tuberculosis problem was made by Dr. B. L. Vosburgh, of the General Electric Company, Schenectady, N. Y., at the meeting in Atlantic City on October 8, of the American Association of Industrial Physicians and Surgeons.

In spite of enormous strides made in the control of tuberculosis it is still a serious disease, Dr. Vosburgh explained, because it continues to take a heavy toll particularly in the age groups from 20 to 40 when man's productivity is at its peak. "From both an economic and a public health standpoint it outranks every other contagious disease with the possible exception of syphilis," he said.

The bright side of the picture appeared when Dr. Vosburgh told how the worker who has contracted tuberculosis can be protected from the most disastrous effects of the disease and can be kept in good enough health to go on working at his job.

The important thing is to discover the disease before it has progressed far enough to do irreparable damage. For this Dr. Vosburgh recommended regular examinations and supervision of all industrial workers. By such methods many cases of tuberculosis will be discovered even when the patient does not know he is sick. These are the cases in which the disease may have partially healed spontaneously, but there is always danger of its breaking out in severe form if the worker becomes over tired or works in a dusty atmosphere.

Illustrating this point, Dr. Vosburgh reported the case of a young millwright who pulled with all his might on a rope and then began to have bloody sputum. After five years of compensation, he died at the age of 44. This man had been working with a partially healed tuberculosis for years.

For both the worker whose tuberculosis has healed spontaneously, as discovered by examination, and the worker who has been discharged from a sanatorium with an arrested case of tuberculosis, the paramount thing is to find the proper job. The job that will be easiest is the one such a worker should have. Usually this means the job the man knows most about. He should not be put back at his own job, however, when the work itself was a factor in lighting up the disease in the first place.

ITEMS

A NEW star or nova has burst forth in the constellation of Aquila, the Eagle, the International Astronomical Union's central bureau at the University of Copenhagen has been informed by Nils Tamm at the Kvistaberg Private Observatory in Bro, Sweden. It is now eighth magnitude and not visible to the naked eye. News of its discovery has been cabled to observatories of the world. The brightening of this star takes on added interest because the most famous nova of this century, Nova Aquilae of 1918, was in the same constellation. The nova in Aquila was photographed on the night of September 20 at the Harvard Observatory and evidence that the star is expanding was discovered. On photographic plates, Nova Aquilae was twelfth magnitude on June 22, about tenth magnitude on July 22 and about ninth magnitude on August 17.

A NEW comet was discovered in the constellation of Aquarius in the southern evening sky at the Union Observatory, Johannesburg, South Africa, by Dr. Cyril Jackson on September 20. It is faint and diffuse with no nucleus. Astronomers rate it as twelfth magnitude. News of its discovery is being cabled to observatories by the International Astronomical Union's bureau at the University of Copenhagen. Whether Jackson comet will grow brighter can be determined only when more and later observations are made so that an orbit can be computed. The astronomical position of the new comet is approximately right ascension 23 hours and south declination 12 degrees 47 minutes.

DENYING that alcohol-blended gasoline is losing favor in Germany, Dr. Friedrich Bergius, Nobel chemist and inventor of oil from coal and sugar from wood processes, predicts that "a proper blend of ethyl (grain) alcohol, methyl (wood) alcohol, benzene and gasoline bears promise of supplying the world with the ideal motor fuel for internal combustion engines." Dangerous carbon monoxide in the exhaust gases would be reduced to the vanishing point by this properly blended fuel, Dr. Bergius contended in his statement issued by the Farm Chemurgic Council, protagonists for power alcohol made from farm products. Dr. Bergius explained that the German situation with regard to farm products is now quite different from that in the United States and that there is a smaller surplus of potatoes and other starch and sugar crops from which power alcohol in Germany can be made.

SOARING to a record height of 92,000 feet (17½ miles), a tandem of five balloons carried a sensitive self-recording electroscope to a new altitude record for cosmic ray research, Dr. Robert A. Millikan, of the California Institute of Technology, has reported. The instrument, one of five released early in July at San Antonio, and one of four recovered, obtained a perfect film record of cosmic activity at the extremely high level. The record is the first obtained by an electroscope that shows that ionization in the upper air reaches a definite maximum and returns rapidly to lower values as still higher altitudes are reached. Each electroscope, released by Dr. Millikan, Dr. H. Victor Neher and Dr. S. K. Haynes, was carried aloft by five balloons, and a reward of $6 was offered for the return of each instrument. The instruments, rising to an altitude varying from 55,000 to 92,000 feet, were found between 30 and 100 miles from San Antonio. The balloons were aloft about three hours.