SCIENCE NEWS

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THE IMMUNITY OF WHALES TO COMPRESSED AIR ILLNESS

COMPRESSED air illness or caisson disease is the chief hazard of workers, such as divers and tunnel excavators, under high air pressure. The condition is caused by the release of bubbles of nitrogen which may form in any part of the body, or block any of the blood vessels. It can take many forms, but the cause is always the same, namely, change from a higher to a lower air pressure. The symptoms may arise from a long dive at a moderate depth or a short dive at a great depth.

It has been assumed hitherto that all mammals were susceptible to compressed air illness. However, Laurie, of the *Discovery* Expedition of the British Colonial Office, concludes that the whale is immune, as a result of certain biological studies. The work was carried out in the vicinity of the island of South Georgia in the South Atlantic.

The whales in this region live mainly on lower animals which exist at great depths, and therefore have to make long and deep dives to secure their food. The whale can descend to a depth of about 300 feet, remain there for 15 minutes and return rapidly to the surface without developing symptoms of compressed air illness. The human diver, under similar conditions, would undoubtedly suffer a critical attack of compressed air illness. It would be necessary for him to ascend by gradual stages over a period of about an hour and forty minutes to assure his safety.

The whales in this area spend the majority of their lives submerged, their sojourns at the surface being momentary; ordinarily only for the time of a single breath. The result is that the usual surface phase lasts a few seconds and the underwater phase 10 to 20 minutes. Naturally the nitrogen gas from one breath would not supersaturate the blood, but the accumulative effect of successive breaths followed by submersion would lead to supersaturation of the body fluids.

Therefore, if the whale were subject to human physiological limitations, it would be hazardous for the animal to delay at the surface on the penalty of gas bubbles being liberated in the body with the liability to a severe attack of compressed air illness. Actually, a whale can linger with safety at the surface as, for example, when suckling a calf.

Laurie found that the blood of freshly killed whales was not supersaturated with nitrogen. Indeed, he directs attention to a remarkable phenomenon of nitrogen removal which takes place in whales' blood and not in land mammals. If the blood is saturated with nitrogen of the air, it is so absorbed that it can not be recovered by evacuation. The nature of the reaction is not known, except that the presence of oxygen is essential. It is a striking fact that one of the mammals which might run the risk of compressed air illness is just the one to have a mechanism for protection against it.—E. W. BROWN.

THE COOPERATIVE BEHAVIOR OF CHIMPANZEES

No one has ever been able to teach an ape to speak despite the fact that the chimpanzee appears to be endowed with all the necessary vocal apparatus and perhaps with sufficient intelligence to make speech a possibility for him. What he may lack is, surprisingly enough, the ability to ape sounds. What he hears, he does not try to imitate.

Dr. Meredith Crawford, of the Laboratory of Primate Biology at Yale University, has been experimenting with the possibility of teaching chimpanzees to communicate by means of gestures. Compelling gestures that induce another chimpanzee to leave her play and do her share in a common task have actually been learned and used by chimpanzees under Dr. Crawford's instruction.

Five young animals were used, four of them females. All but Alpha, a timid creature of slightly below average intelligence, learned to work together in cooperation. But only two, Bula and Bimba, who are the most intelligent, succeeded in learning to use the gestures to secure aid from their cagemates.

Pulling a weighted box on a rope to secure its reward of fruit was not a difficult task for a single ape. But chimpanzees are individualists. When two animals were placed so that either or both could reach a single rope, they might both pull on it, but not at the same time. One animal would pull on his rope while the other watched. Then the other would try it for a while. Sometimes they would work alternately on the same rope, passing it back and forth between them.

After the animals had been taught to cooperate in the obtaining of food by means of pulling the ropes of a box together, one of them, Bula, was the first who learned to obtain with gestures work from another animal. Here is the picture of what took place.

The box was baited. But Kambi, Bula's partner, was not at her place at the ropes. Bula was excited. Back to the rear of the cage she ran, approaching Kambi with hands outstretched, palms down, fingers bent, arms beating up and down. Crouching, she would bounce up and down excitedly on flexed legs, whimpering and hooting as she always does when excited. Now Bula would tap Kambi on the shoulder or grasp her elbow and turn her about.

Not always did Kambi know what Bula wanted. She soon learned to know that the gestures meant, "Do something for me," but sometimes she would respond by offering to start the two-by-two lock-step marching that is such a favorite diversion of chimpanzee companions. Sometimes she would start grooming her. She would even present to her some treasure that she might have in her possession.

But Bula would persist until at last Kambi was at her post pulling her share of the burden.

Friendship makes for easy cooperation. Chimpanzees

have their preferences in companionship. The animals who had become very fond of each other could most readily learn to pull together in rhythm for a common reward. The dominant animal, the natural leader in any pair, can compel compliance with her urging though the other is decidedly reluctant to take hold of the task. This taking hold and pulling with the mate is sometimes done with no hope of sharing in the fruit reward. Occasionally it happened that one animal's share would fall off the box as it was being drawn in. That animal would go on pulling under the urging of the leader, despite the discouragement.

The results of this experiment are reported in the *Comparative Psychology Monographs*.—MARJORIE VAN DE WATER.

FUEL RESOURCES

AMERICA may begin to feel the cramping hand of an oncoming oil shortage in from ten to twenty years, according to Dr. Arno C. Fieldner, chief of the technologic division of the U. S. Bureau of Mines, unless new methods of obtaining and processing petroleum are developed. Dr. Fieldner, speaking as president of the American Society for Testing Materials, which opened its annual meeting in New York City on June 28, outlined the present resources of the nation's fuels in his address entitled, "Fuels of To-day and To-morrow."

Of coal America has plenty, said Dr. Fieldner. Enough to last hundreds and perhaps a thousand or more years. But natural gas and oil obtained by present methods may be exhausted in less than a century. Coal will continue to be the chief fuel for the generation of public-utility and major industrial power. While improved burning of coal might tend to decrease consumption and the further development of water power may be expected to increase, Dr. Fieldner sees an increasing demand for total energy needed by the country so that coal's relative position should be favorable. Moreover, after ten or fifteen years oil resources will become more difficult to exploit, so that the trend will favor the increased consumption of coal.

"To-morrow's power and central heating plants will burn any kind of coal completely and efficiently," said Dr. Fieldner. "There will be no smoke, no dust, and no sulfurous gases emitted to the atmosphere." No substitute for metallurgical coke has appeared. The coke-oven industry should expand. Regulations prohibiting the waste of natural gas and the urge for additional markets will lead to the construction of more long-distance pipe lines which already go from Texas to Chicago and to Detroit. Gas will find industrial and domestic use and will displace oil as well as coal for fuel in some places. As natural gas approaches exhaustion gas from coal will take its place.

Dr. Fieldner sees a further use of automatic coal and gas heating of homes and believes improved insulation will permit heating at about present costs, despite inevitable advances in the price of the fuel. While oil-fuel Diesel engines on railroads may be expected to increase, Dr. Fieldner foresees coal retaining its predominance as the fuel for freight traffic throughout the age of oil and natural gas. Three fourths of the world's shipping is now powered by oil fuel. Oil, in fact, has energized marine transport. Dr. Fieldner foresees further widening of oil as a fuel in ships and predicts that when natural petroleum sources dwindle, oil from shale or from coal may come into use.

On the crucial question of gasoline supplies for automobiles Dr. Fieldner regards present pessimistic fears of a shortage by 1945 as unjustified. Such warnings have been issued regularly since the automobile came into use. Scientific research, both in cracking heavy oils to yield more gasoline and the reverse process of polymerization where gasoline is created out of lighter gaseous vapors, should hold the production to levels of demand. Improved scientific prospecting for new reserves of petroleum and the drilling of deeper wells to tap now-unreachable sources should be a further aid for the next two decades. Eventually gasoline supplies will dwindle. However, improvements in engine construction to take lower-quality fuels and the expected improvements in Diesel engine operation will help materially.

TORREYA TAXIFOLIA

RARE trees in northern Florida are the subject of a report to the Florida Academy of Sciences by Professor Herman Kurz, of the State College for Women. The trees belong to the genus *Torreya* or *Tumion*, which is a conifer that looks somewhat like a yew. In fact, its full name, *Torreya taxifolia*, means "yew-leaved Torreya." Because of its odorous leaves and wood, it has borne such English names as stinking cedar and polecat wood. It has also been nicknamed gopher wood.

In earlier geologic times the genus was world-wide in its distribution, but during the Ice Age it was cut down to a few relict patches—one in Florida, larger ones in California, Japan and China. The Florida Torreya trees, a distinct species, are found mainly in a small block of land just east of the Appalachicola River in the north part of the state. In the books all the trees are declared to be on the east bank of the river.

However, in 1885 a southern botanist, Dr. A. W. Chapman, found a few trees about half a dozen miles west of the river, and so reported in one of his publications. But the find was lost sight of, and from then until now apparently has never been mentioned. A short time ago, one of Professor Kurz's students obtained some specimens of the old, forgotten "lost battalion" west of the river. Professor Kurz has since visited the locality and studied the trees in detail.

There are about 60 of them, ranging in height from 18 inches to 30 feet, scattered over about an acre of ground. Their assorted sizes constitute evidence that the trees are reproducing, an encouraging sign of their survival. Mixed with them are larger trees, mainly magnolias and beeches—a common timber type in northern Florida. The locality is now known as Dog Pond, near Lake Ocheesee. In Dr. Chapman's time is was designated as Cypress Lake. Professor Kurz, in addition to sending a technical report of the discovery to the Florida Academy of Sciences, has deposited a specimen of the Torreya in the

herbarium of the Florida Agricultural Experiment Station at Gainesville.

THE INCIDENCE OF DIPHTHERIA

SIX large American cities have the record of no deaths from either diphtheria or typhoid fever during the past year. These cities are Cambridge and Somerville, Mass.; Syracuse and Utica, N. Y.; Duluth, Minn., and Salt Lake City, Utah. Nineteen cities had no deaths from diphtheria during 1936 and 18 had none from typhoid.

The *Journal* of the American Medical Association announces this week its annual survey of diphtheria deaths in the 93 cities from which it has obtained death rates for the last 14 years. In 1923, when these surveys began, the average mortality rate from diphtheria was 13.13 per 100,000 population. To-day it is 1.51 per 100,000, owing to the preventive programs that have been instituted throughout the country.

In Oklahoma, Texas and Louisiana, the health picture is not quite so bright as elsewhere. In diphtheria, as in typhoid fever, these states continue to have higher death rates than those of any other section of the country. Dallas, Tex., with a death rate of 7.3 per 100,000, had the worst record of any large city. Along with El Paso and Oklahoma City, Dallas reported more diphtheria deaths than during the previous year. Tulsa, Houston and New Orleans showed slight decreases in diphtheria death rates. Fort Worth and San Antonia had a very creditable drop in mortality from the disease over the previous year. The 19 cities that had no diphtheria deaths during 1936 are as follows: Albany, Rochester, Syracuse and Utica, N. Y.; Cambridge and Somerville, Mass.; New Haven, Conn.; Wilmington, Del.; Elizabeth, Newark and Trenton, N. J.; Erie, Pa.; Grand Rapids, Mich.; Duluth and St. Paul, Minn.; Kansas City, Mo.; Salt Lake City, Utah; Spokane and Tacoma, Wash.

PRONTOSIL IN THE TREATMENT OF GANGRENE

GAS gangrene, the most serious danger in war wounds, and frequently fatal, can be successfully treated with the new chemical remedy sulfanilamide, or Prontosil as it is also called. Case reports and laboratory studies showing this were reported by Drs. Perrin H. Long and Eleanor A. Bliss, of the Johns Hopkins Hospital and University, at the recent meeting in Ottawa of the Canadian Medical Association. The laboratory work was done by Drs. Long and Bliss and the patients were treated by Dr. Harold Bohlman, also of the Johns Hopkins Hospital.

Drs. Long and Bliss were the first to use the new chemical remedy in this country in cases of deadly hemolytic streptococcus infection. They and others have found that sulfanilamide is highly successful in treating infections of these streptococci and also infections of pneumococci, meningococci and gonococci. The particular diseases for which the chemical has been used include scarlet fever, erysipelas, chilblain fever, meningitis, Type III pneumonia and gonorrhea. Gas gangrene is due to infection of wounds with still another disease germ, generally referred to as the Welch bacillus. It occurs particularly in cases involving severe bruises of the deep tissues about the wound, especially if cloth or dirt has been carried into the wound. The disease gets it name gas gangrene from the fact the germ causes gas bubbles to form as it invades the tissues. Treatment of the condition has heretofore not been very successful and it often has been necessary to amputate an arm or leg to save the patient's life.

ITEMS

ASTRONOMERS at the Observatory of the University of Michigan are now observing and photographing the double star known as VV Cephei, whose smaller component went behind the larger one in an eclipse some 450 days ago. Since May the light from the hydrogen spectrum has been getting brighter. The smaller star is therefore expected to emerge on schedule. The larger M type cool red star that is taking the rôle played by the moon in the solar eclipse is estimated to be several hundred times larger than the sun. The "small" star component, hot and blue-white in color, is ten times larger than the sun. No telescope can resolve the two stars into visible separation. They appear as a single star of the sixth magnitude. Studies of the spectrum disclose the dual nature of VV Cephei, according to Dr. Dean B. McLaughlin, of the Observatory.

HOW ordinary soap may prevent the "drowning" of oil wells and give greater yields of water-free crude oil is described in a patent granted to George E. Cannon, of Houston, Texas, and assigned to the Standard Oil Development Co. Mr. Cannon claims that by pumping a plain soap solution down into the bore holes of oil wells he can plug up the pores in the underground sands through which oozes the water that is responsible for "drowning" the well and contaminating the oil. The plugging action occurs when the soap reacts with the magnesium and calcium salts in the water. A reaction takes place to form a tough soap curd which fills up the pores in the sand and which does not let the water through. The action is the same as when salts in hard water react with soap to form a soap curd.

THE detection of blood stains on furniture, walls or wood after several weeks, even though it supposedly has been wiped clean and exposed to rain, is claimed possible by the discovery of chemicals which react with the hemin in the blood and create a brilliant blue luminescence. Dr. W. Specht reports the new aid for crime detection in a German scientific journal. A solution of peroxide and a complex derivative of phthalic acid are employed. Hemin is a constituent of all blood but is found in a higher proportion in old than in new blood. Dr. Specht's photographs, taken in the dark after a solution has been spread on suspected walls and furniture, shows a bright blue light even when the traces are old and appear to have disappeared. The chemical reaction is very specific and does not occur with other substances. It is possible, according to the report, to differentiate between animal and human blood and even between the different groups of human blood.