SCIENCE NEWS

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COLLAPSE OF THE TACOMA NARROWS SUSPENSION BRIDGE

COLLAPSE of the four-month-old Tacoma Narrows Brigde in a high wind seems to be different from past failures of suspension bridges. Generally, it has been the great cable that hangs in a graceful catenary from pier to pier that has given way, but the Tacoma cables apparently remained intact. Evidently the breaks which let the roadway fall into the stream occurred at the lower ends of the vertical cables, supporting the road.

No alarm need be felt for a suspension bridge which sways in the wind, for they are supposed to do that. However, the sway should not be so great as to make users seasick, as the Tacoma Bridge, nicknamed "Galloping Gertie," is said to have done.

There have been several cable failures in bridges, two of which, the Mount Hope Bridge near Providence, R. I., and the Ambassador Bridge at Detroit, were discovered in time, during construction, and before an actual collapse. When it was found that the cables were beginning to break, they were removed, and new cables were strung in their place. Other failures of cables were the International Bridge near Laredo, Texas, and the General Grant Bridge across the Ohio River at Portsmouth. In each case, the bridge was restrung with new wire.

The oldest large suspension bridge still in use is the one which carries a roadway for a span of 580 feet across the Menai Strait in north Wales. This was built in 1819–1826, and uses wrought iron links for the suspension. The Brooklyn Bridge, completed in 1883 with a center span of 1,595 feet, was the first large bridge to use cables of stranded wire.

The largest suspension bridge is the one crossing the Golden Gate at San Francisco, with a span of 4,200 feet. George Washington Bridge over the Hudson River at New York is second, with 3,500 feet. The Tacoma Bridge, of 2,800 feet span, was third; while the San Francisco-Oakland Bridge, with two 2,310-foot spans, ranks fourth. The behavior of these others, under all conditions, makes engineers feel sure of their safety.

Though the Tacoma Bridge was partly financed by the PWA, which is making an investigation, no announcement thus far has been made. The chief of engineers of the U. S. Army had to approve the bridge before it was built, as they do with all those crossing navigable streams. This, however, is not concerned with the design or construction, but merely with horizontal and vertical clearances, to make sure that there will be no obstruction to navigation.

NEBULIUM AND CORONIUM IN THE SUN AND NEBULAE

AFTER years of study, astronomers seem now close to solving the problem of the identity of nebulium and coronium, "mystery elements" found in the distant nebulae and in the sun's corona, which is visible best at eclipse time.

According to a paper by a British astronomer, Clifford G. James, in the annual report of the Smithsonian Institution, just issued, the former seems to be merely ordinary oxygen in disguise. The latter may be oxygen also, though this is not yet certain.

Each of the 92 known chemical elements, when its vapor is made to glow, gives off a characteristic kind of light. This can be identified by the lines which appear when this light is analyzed through the prisms of a spectroscope. Thus it is possible to tell the elements that exist in the distant stars and in the sun.

In 1868, Sir Norman Lockyer found a line in the light of the sun which could not be identified with any earthly element, so he called it helium. Later it was found on earth, as a light gas.

Four years before Lockyer's discovery, another English astronomer, Sir William Huggins, had found a strange green line in light from the distant nebulae in the sky. This was ascribed to a hypothetical element called "nebulium." Similarly, when in 1869 Charles A. Young, then of Dartmouth College, found a mysterious line, also green, in the sun's corona, this was credited to another element, "coronium."

"In many cases," says Mr. James, "speculation overrode sound scientific method and it was suggested by good authorities that this celestial radiance might be due to primeval world stuff, the cosmic protoplasmic fluid from which the world had been manufactured in the beginning. As new elements were discovered their spectra lines were matched with those of nebulium, but to no purpose. None was found to coincide. It gradually came to be accepted that the hypothetical nebulium was some familiar gas clothed in an unfamiliar fashion."

Explanation of nebulium came when Dr. I. S. Bowen, of the California Institute of Technology, showed that it is probably merely oxygen atoms excited to an abnormal state. The enormous energy required for this excitation seems to come from very hot stars, at temperatures up to 200,000 degrees Fahrenheit, associated with the nebulae. Under these conditions shifts of electrons in the oxygen atoms, which are "forbidden" on earth, can occur and these shifts give out the strange kind of light.

There is still some uncertainty about coronium, according to Mr. James, but, "it is possible that it may be diffuse oxygen in an unfamiliar ionized state."

NEW FABRICS MADE IN GERMANY

FABRICS made from a synthetic resin, polyvinyl chloride, are considered in Germany a great advance over rayon, Lanital and other materials derived originally from plant and animal sources. An enthusiastic description of the new fiber, written by Dr. Herbert Rein, is printed in a July number of the *Die Umschau.*

A chemically related product of American origin is already on the market in this country, under the trade name of Vinyon. The polyvinyl chloride fiber is given

the convenience-name "PeCe" (pronounced "pay-say"). It is derived from coal, lime, water and chlorine. The coal and lime are combined in the electric arc to form calcium carbide. This in turn is united with water to make acetylene. The acetylene, with the addition of chlorine, becomes vinyl chloride. Vinyl chloride molecules are linked together (polymerized) to form polyvinyl chloride.

Up to this point the process is not unlike that followed in American chemical plants to make the transparent plastics used in such things as the "sandwich" layer in safety glass, stretchable belts and suspenders, and similar products. It is also somewhat akin to the making of the synthetic rubber, Neoprene.

However, the German manufacturers dissolve the plastic into a gummy mass and then spin it out into fine fibers, very much as rayon, nylon and other synthetic fibers are produced in this country. These are then spun into thread, to be woven into cloth, knit into hosiery, twisted into cordage or otherwise processed. Many advantages are claimed for the new fiber. It is highly resistant to both strong acids and strong alkalis, so that it can be used for safety-garments in chemical factories, as lines and handles where cotton or hemp are quickly corroded and destroyed, and as filters where ordinary cloth or paper do not stand up at all. It is fire-resistant to a certein extent: while it can be ignited, it is easily extinguished, and does not smolder afterwards. It is also resistant to decay through the action of molds and bacteria.

Nevertheless, it has some drawbacks, which probably would militate against its successful competition with such a fiber as nylon. PeCe is thermoplastic, that is, it softens and loses strength and shape when heated. For this reason, it can not be washed in really hot water and ironing, even with a moderate iron, is regarded as inadvisable. For the same reason, exposure to steam is injurious to PeCe fabrics and filters used for industrial purposes.

FOSSIL BIRDS

A SINGLE fossil jawbone of a long-extinct big bird, found recently in Alberta by Dr. Raymond M. Sternberg, of Hayes, Kansas, becomes the basis of an entirely new order of birds, the Caenagnathiformes, in a technical revision of the birds of the world just published by Dr. Alexander Wetmore, assistant secretary of the Smithsonian Institution. It is placed just below the ostriches in the classification table.

The fossil came out of a bed of dinosaur bones and is itself so primitive that it may be reptilian rather than a bird. However, Dr. Wetmore accepts it as such pending further information. The age of the deposit was Late Cretaceous, about 100 million years ago. Another fossil bird family, the Paranyrocidae, belonging to the general class of ducks, geese and swans, is included because of one curious fossil found in South Dakota deposits about 30 million years old.

Fossil records of birds are far less complete than those of reptiles and mammals. Vertebrate fossils are formed, as a rule, through the settling down of a dead body in the mud of a marsh, or through covering with volcanic ash during an eruption. This is far less likely to happen to birds than to the heavier-bodied ground-dwelling animals. Smaller birds especially, falling to the ground when they die, are usually either picked up by carrion-eaters or decay as they lie, even their delicate bones becoming shattered and scattered before they can become imbedded under conditions suitable for fossilization.

In Dr. Wetmore's revision, the birds of the world are divided into 34 orders, comprising 202 families.

VITAMIN B_1

DR. C. A. MILLS and Dr. J. W. Colvin, of the University of Cincinnati, reported at the recent meeting at Louisville, Ky., of the American Society of Tropical Medicine that the depressing effects of tropical heat can be overcome by doubling the daily intake of vitamin B_1, or thiamin. The laboratory findings will be tested on natives of Panama early next year. The authors stated that "Thiamin protection against the evil effects of excessive heat has further important bearings for temperate zone inhabitants during severe heat waves of summer, and for industrial workers who are exposed to the severe heat of boiler and furnace rooms or other conditions that render body heat loss very difficult. A thiamin intake double that ordinarily considered ample seems likely to offer a large measure of protection against such heat effects and also to offer a most effective therapeutic adjunct in the treatment of heat exhaustion states. Energetic people going from stimulating climates into tropical warmth would probably suffer less of a physical slump if they fortified their ordinary dietary thiamin intake with 2–5 milligrams of additional thiamin each day. A large part of dietary thiamin is found in the protein foods that are unconsciously avoided in warm climates because of their specific dynamic action in increasing body heat production."

The reason why thiamin could be expected to put pep into people living in tropical climates or soldiers fighting there is because of its rôle in the burning of sugar and starch in the body. Without this vitamin the oxidation or burning of glucose stops midway.

Combustion in the body, however, is necessarily lowered when tropical warmth makes it more difficult to keep cool by dissipating heat from the body. With this lowering of tissue combustion goes a fall in "all measurable indices of individual vitality—slower growth, retarded development, lessened fertility, lowered resistance to infection and ability to produce protective antibodies against pathogenic invaders, and in all ways a lowered existence level."

At the University of Kansas there is now in progress a study showing a lower order of cerebration in animals kept under conditions of moderate difficulty of heat loss—greater difficulty in mastering the intricacy of a maze and in performing other feats of animal learning.—JANE STAFFORD.

INFANTILE PARALYSIS

ENCOURAGING results in efforts to create a new kind of protection against infantile paralysis were reported by Dr. Harold K. Faber and associates of the Stanford Uni-

versity School of Medicine, at the meeting in New York of the National Foundation for Infantile Paralysis.

The new kind of vaccination is aimed at protecting the central nervous system where the virus of the disease does its damage. Previous efforts at vaccination against infantile paralysis have failed, it is generally believed, because the vaccine reached the blood cells, but not the cells of the central nervous system where it was needed to combat the virus. Vaccines against other diseases succeed when they cause an increase in germ-fighting substances in the blood.

Dr. Faber and associates have been trying to produce immunity to infantile paralysis by applying killed infantile paralysis virus directly to the cells of the central nervous system.

Results to date offer encouragement, although the studies have not progressed far enough to allow an evaluation. Dr. Faber and associates have, however, been able to produce considerable penetration of the dye, Prussian blue, into the central nervous system, and it may be possible to use the same method for the vaccine.

Dr. Alfred E. Fischer, of the New York University School of Medicine, believes as a result of studies during the 1937 outbreak in and around Toronto that a child who has had his tonsils removed is in greater danger of getting infantile paralysis than one who has not had this operation. He is not only in greater danger of getting the disease but is more likely to get it in the form which may make him a candidate for an iron-lung existence. This is the bulbar type of infantile paralysis that attacks vital centers of the brain, such as those controlling breathing. The incidence of the bulbar type of the disease was twice as great in patients who had had their tonsils removed at any time during the past as compared with those whose tonsils were intact.—JANE STAFFORD.

ITEMS

CALIFORNIA is to have a winter slightly moister and a little cooler than the average of the preceding twenty-two seasons, according to the long-range indications worked out by Dr. George F. McEwen, of the Scripps Institution of Oceanography at La Jolla. The rainfall excess probably will be least in the south and will become progressively greater toward the north. Dr. McEwen has been working for many years on a system of indications for regional rainfall and temperature probabilities, based largely on ocean temperatures during the summer and autumn. His forecasts have proved essentially accurate in a high percentage of cases.

A WIND tunnel, like those used by aviation engineers, has been built at the California Forest and Range Experiment Station for the study of forest fire conditions. It is described in *The Journal of Forestry*, by Wallace L. Fons, of the station staff. No effort is made to attain the wind velocities commonly attained in the wind tunnels used in aviation research, for these hurricane air speeds have little significance in connection with forest fires. Velocities below 15 miles an hour have been found sufficient for all practical purposes. A number of other research problems in forestry, outside the field of fire investigation, have been suggested for further use of the tunnel. These include effect of ground cover on wind erosion, evaporation of moisture from soil surfaces, efficiency of various types of windbreaks, distribution of tree seeds, and migration of insect pests.

BOVINE tuberculosis is now practically eradicated throughout the United States, according to an announcement made by the U. S. Department of Agriculture. The last two counties, Kings and Merced, in the last state, California, have completed their testing and retesting for infected cattle, and now every county in every state in the Union has fewer than half of one per cent. of its cattle infected. The campaign has been going on for twenty-three years, in the course of which more than 232 million tuberculin tests and retests have been made, and about four million tuberculous cattle detected and removed for slaughter. This does not mean that nothing further remains to be done. Retesting is still called for, especially in herds from which tuberculous animals have been removed in recent years, to prevent reinfection and a new spread of the disease.

X-RAY slicing as an aid in diagnosing sinus disease as well as other ailments that can not be accurately detected by ordinary x-rays was presented by Dr. Sherwood Moore and Dr. Alfred J. Cone, of Washington University School of Medicine, St. Louis, at the Chicago meeting. By the x-ray slicing technic, scientifically known as body section radiography, pictures are taken of thin, successive layers of the sinuses or other parts of the body. In ordinary x-ray pictures, all structures capable of absorbing the rays cast their shadows on the film. As a result, the thing the doctor wants to see may be obscured or entirely hidden by these unwanted shadows of structures not important to diagnosis in a particular case. The x-ray slicing technic greatly aids diagnosis.

TESTS of loudspeakers in movie theatres, usually difficult because of standing waves set up by reflection from walls and ceiling, can be made more reliably with a new method, according to S. L. Reiches, of Cleveland. A generator producing a pure tone, to avoid the complications arising from harmonics, is used, and the measurements are made of the sound which comes from the horns in the split-second interval before the standing waves are formed. Readings are made on a meter which is graduated in decibels, the units of sound intensity.

"MILKING" rattlesnakes and cottonmouth moccasins is a profitable business—if you have the right kind of nerves and know the ways of your snakes. The snake-milking operations of a quick and cool-headed Floridian, Ross Allen, are described in the new issue of *Natural History*. Mr. Allen gets twenty cents for the product of an adult rattlesnake, about one teaspoonful. He can "milk" about 150 snakes in an hour, and once succeeded in cleaning up that number in 44½ minutes. All told, he has "milked" about 40,000 poisonous snakes without ever having been bitten. The venom is used in certain kinds of medical treatment, and in research.