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THE SCATTERING OF LIGHT IN DUST STORMS

BLUE light during a dust storm has no necessary connection with the color of the dust itself, but is an effect of the scattering of light that strikes the microscopically tiny particles that fill the air. This explanation of a phenomenon often noticed this spring was given by Professor W. J. Humphreys, physicist of the U. S. Weather Bureau.

Daylight does not always turn blue during a dust storm, but only when the air is densely filled with particles of the right size. Then the effect is not the blue haze of distance, but a bluishness of the light falling on objects near at hand: the letters on your desk will look as though you were working at night by the light of a dim blue lamp.

The light turns blue, rather than another color, because of all the wave-lengths that combine to make up ordinary white daylight, blue is most sharply scattered upon striking a reflecting surface. Other wave-lengths are scattered also, but to a less extent than the blue, so that blue comes to predominate. A similar bluing of the light occurs when a cloud of wood smoke, which is made up of very small particles, comes between the observer and the sun.

The same phenomenon is responsible for the blue haze of distance. There are always large numbers of reflecting dust and water particles in the air, though fortunately not nearly so many as during a dust storm. Where their density is relatively low, you have to look a long way to see a blue horizon, as in the Rocky Mountains. Where the particle density is high, as it is in the East, comparatively near-by objects assume the hazy appearance that have given Eastern mountains such characteristic names as the Blue Ridge and the Great Smokies.

THE ORIGIN OF NEBULAE

ARE the great, misty nebulae seen by astronomers the ghost-shrouds of some prehistoric star which exploded as did now-famous Nova Herculis just before Christmas? Astronomers are asking themselves that question.

Dr. Gustaf Strömberg, of Mount Wilson Observatory, in a summary of exploding stars written for the Carnegie Institution of Washington, points out one case, at least, which links the appearance of nova stars with the great nebulae. Dr. Strömberg says:

"In the sky there are certain objects whose appearance and spectra are similar to those of the later stages of a nova. It is quite possible that all of these bodies have once gone through a nova stage. A peculiar case is that of the so-called Crab Nebula in the constellation Taurus. By comparing photographs taken from time to time we have found that the nebula is gradually expanding. By calculating the time required to reach its present dimensions at a uniform rate we find that the hot gas must have left the star's surface about 900 years ago. In the records there is only one account of a nova star in that part of the sky in which the Crab Nebula is located. Chinese astronomers saw a nova there in the year 1054!"

THE SEPARATION OF THE STARS IN PLEIADES

THE Pleiades, or "Seven Sisters," are not so sisterly as their name might indicate. New measurements with the world's oldest photographic telescope show them to be moving apart, going their separate ways, despite current astronomical ideas to the contrary.

This discovery was announced by Professor Jan Schilt, of the department of astronomy of Columbia University. It is the result of the comparison of photographic plates made 67 years ago with similar plates made recently. The angular motion between the six visible and many lower-magnitude stars composing this familiar group is so small, however, that Professor Schilt likened it to the movement in 100,000 years by an insect on 42nd Street, New York City, as it would appear to an observer on top of the Chrysler Building.

To make the new set of plates duplicate the old as nearly as possible, Professor Schilt resurrected from a museum the old telescope originally used. It was made in 1868 by a Mr. Rutherfurd, an old-time trustee of Columbia University, and had long since been retired from use. However, with a new plate holder and specially made plates to give as nearly as possible the same effects as the old plates, it functions as well as ever.

THE AUTOGIRO FOR PRIVATE FLYING

PRIVATE flying for every one becomes a step nearer with the announcement by the Bureau of Air Commerce that contracts have been awarded for a "jump-off" wingless type autogiro which needs a minimum of space in which to land and take off. Having rotor blades in place of wings, the trick of controlling the pitch of these rotors enables the autogiro to "jump" into the air some twenty-five feet and thus rise above the level of low trees and houses before starting its forward flight. Moreover, the folding back of the rotor blades parallel to the fuselage makes it possible to taxi the machine like a motor car and store it in a backyard hangar.

Paralleling research on private planes in America is England, where the Kay gyroplane has been finished and awaits tests. By controlling the rotor blade angle within eight degrees pitch the Kay machine can be made to take a negative angle and make it "hug" the ground when high winds are blowing at take-off.

Surprising is the method of take-off of the Kay gyroplane. The wheel brakes of the machine are locked. The rotor blades are spun rapidly at 400 revolutions a minute without positive pitch. Then as the pitch is varied for normal lifting flight the rotor speed falls to about 220 revolutions a minute and the plane rises vertically ten or twenty feet. During these operations a small amount of power, only 20 horsepower, is being transferred to the normal airplane type tractor screw. At a point twenty feet in the air the tractor propeller gives the gyroplane its full flying speed.

Climbing and diving in the Kay gyroplane is a curious change from the normal airplane technique of pushing the "stick" forward to dive and back to climb. One has to remember that, in addition to the elevator controls on the tail of the plane, the tilting of the rotor to the left makes the nose go down by gyroscopic action, while tilting the rotor to the right brings the nose up sharply. Patented hubs for the rotor blades adjust these forces automatically and make the actual flying of the machine somewhat less complicated than a written description might seem.

And finally, because the Kay gyroplane does have wings, it can be flown, landed or taken off as a normal airplane.

ALCOHOL IN GASOLINE

GASOLINE will be mixed with alcohol made from surplus farm products in a number of states in the West, if pending legislation fares generally as well as it has in South Dakota, where a bill to that end has already passed both houses of the Legislature. No national legislation on the subject, however, is at present contemplated, so far as is now known. Among the states where "power alcohol" legislation is now under consideration are Iowa, Minnesota, Nebraska, Idaho and California. Other grain belt states are said to be preparing to join the procession.

The proposal to encourage addition of alcohol (usually ten per cent. by volume) to gasoline, either by direct legislative requirement or, more often, by favoring tax differentials, has been agitated for some years. The claim is made by the proponents of the idea that with present engine construction and carburetor adjustments motor vehicles and tractors can use to advantage gasoline containing up to twenty per cent. of alcohol. Farm organizations have a stake in the legislation, since it promises a profitable way of using up surplus produce, especially off-grade grain unsuitable for feed or market and cull fruits and vegetables unfit for food.

Advocates of the various state bills declare, for example, that there is sufficient off-grade corn and wheat to supply the whole power alcohol need in the grain belt without having to draw upon the marketable grains at all. Even in California, where oil is produced in great quantities, the fruit-growers are interested in finding a large-scale industrial use for their culls.

The situation in Idaho is peculiar. The famous "great big potatoes" of that state sometimes get too big. They grow too fast and split, and would usually rot if shipped. At present these outsize potatoes are sheer waste. Promoters of the power alcohol idea declare that the alcohol obtainable by fermentation of these waste potatoes will come close to filling the state's fuel requirements, while the solid residue left in the vats will supply a nitrogen-rich "finishing" feed needed by the cattle industry, which now has to buy large quantities of other feeds of this class outside the state. A third product, the gas carbon dioxide, compressed into "dry ice," is counted on to aid in the shipment of Idaho-grown apples by truck.

In order to use gasoline with alcohol, the latter must be thoroughly dehydrated. Water prevents alcohol from blending properly with gasoline. Complete dehydration used to be an expensive process, but now several methods, operable on a commercial scale, are in common use.

BACTERIA IN THE HUMAN BODY

DR. LARS F. GULBRANDSEN, of the University of Illinois College of Medicine, has found that within a few minutes after birth, the blood and every normal tissue of the body are constantly invaded by the ordinary bacteria or "germs" found on the skin and in the mouth and nose.

This discovery upsets the prevailing idea that the blood and tissues of the body are as a rule sterile, that is, free from "germs" or micro-organisms. Dr. Gulbrandsen finds the "germs" present in a changed form and believes that this change constitutes one of the body's major means of defense against disease. So far there has not been time for other investigators to confirm Dr. Gulbrandsen's findings and theories, but his study is said to open a new field in the investigation of disease and resistance.

The bacteria or "germs" come to the tissues through the wall of the intestinal tract from food that has been taken through the mouth, Dr. Gulbrandsen believes. New-born guinea-pigs, he found, did not have bacteria in their body tissues at birth. But within fifteen minutes after feeding them pure cultures of bacteria by mouth, the micro-organisms could be found in the animal's tissues. The bacteria, however, had undergone decided changes of a type known to bacteriologists as dissociation changes. They had no power to produce disease in the healthy individual and would not grow under ordinary cultural conditions. It is this dissociation change which Dr. Gulbrandsen believes constitutes one of the body's major mechanisms of defense against disease.

Further work is being done to learn whether the bacteria pass through the lining walls of the intestinal tract intact or whether they are changed in that passage and can then return to their original form in the body tissues.

For this research Dr. Gulbrandsen was recently awarded the $500 Capps prize of the Chicago Institute of Medicine. This prize is given each year for the most meritorious medical research by the graduate of a medical school in Chicago completed within two years after graduation.

EMOTIONS OF THE CHIMPANZEE

WHEN you see an animal "movie" and think the chimpanzee is laughing uproariously at the pranks of his pals, he may actually be howling with pain or roaring with rage.

The chimpanzee, so like man in many respects, has a very different way of betraying his emotions in facial expression. How misleading the ape's expressions are to human judges is revealed by experiments conducted at Columbia University by John P. Foley, Jr., of the department of psychology.

When the chimpanzee sees a cat or a dog, or when he is punished, his mouth opens wide so that not only the teeth but also the gums are visible. The upper part of the face becomes deeply wrinkled, the eyes narrowed,

and the brows drawn together. He's exhibiting simian rage but many humans fail to recognize it.

A photograph of the face of a chimpanzee with such a typical expression of rage was shown to 127 college students who were asked to name the ape's emotion. Nearly half the judges, 61, or 48 per cent., thought the chimpanzee was displaying joy or laughter.

Movie directors of animal films have observed and take advantage of this human tendency to misjudge chimpanzee emotion, Mr. Foley found. He cited the filming of "School Pals" as an example.

"At the conclusion of this picture, when the chimpanzee had just 'played a trick' upon his adversary, it was desired to convey to the audience the impression that the chimpanzee was laughing," Mr. Foley wrote in his report to the *Journal of Social Psychology*. "The animal's hand, hidden from direct view behind a board fence, was pinched or otherwise painfully stimulated. This immediately elicited the typical facial expression of rage or anger, which was interpreted by the audience as joy or laughter."

Laughter is in reality never engaged in by the chimpanzee. When pleased, he does have a sort of smile with open mouth, and a sort of panting is heard. But the photograph of this facial expression of joy was interpreted by the greatest number of the human judges as betokening rage. The sad, grieved animal was judged to be showing interest and curiosity, and the animal showing contentment was judged to be sad.

When questioned about the method they used for judging the emotions shown in the photograph, the majority of the judges said they compared them with human expressions. It is this tendency to assume that the chimpanzee is like the human in facial expression that seems to lead to the errors of interpretation. Others, 29 of the 127, made their judgments by taking on the expression shown in the photograph and then judging their own feelings. "I tried to imagine how I'd feel with that expression on my face, but I was handicapped because I'm not a chimpanzee," one person said.

ITEMS

RAINS, though light, have "gnawed off" the northern end of the Western drought's "bone." While dust storms have raged over the utterly rainless lands of eastern Colorado and western Kansas and on southward into the Texas Panhandle, spring precipitation has been making Montana and the Dakotas, if not exactly garden spots as yet, then at least again possible farm and ranch lands. This is one of the optimistic notes brought out in last week's weather and crop survey of the U. S. Weather Bureau. While subsoil moisture is still deficient, and drought thus liable to return if summer rains fail, still any gain in the West is cheering to the watchers of crop weather. Over the country generally the weather has been abnormally warm. In the East and Southeast, the "plus-departures" were from 9 to 16 degrees, in the upper Mississippi-Missouri area the thermometer ranged from 16 to 20 degrees above normal, while over the Great Plains temperatures were "high" by from 10 to 15 degrees. All this has been distinctly encouraging to farm work, except in places where there was too much rain, as in the lower Ohio Valley and in parts of Oklahoma, Arkansas and North Dakota.

CHILDREN from the northeastern section of the United States are, on the whole, the largest and those from the western section are smallest, officers of the U. S. Public Health Service found in a study of body build of children throughout the country. The study was limited to children of native white parents and grandparents, living in four different sections of the country. The northeastern section included the New England and middle Atlantic states and the western section was limited to Utah and Nevada. Second largest children were found in states bordering the western Great Lakes. Next smallest were the children in a south central section extending from Kentucky to Texas. The stockiest children come from the northeast section; those of intermediate build from the north-central and south-central regions and the least stocky from the western area. Differences in weight between children of the same age and sex in different regions were greater than differences in height. Fourteen-year-old boys from the Northeast weighed on the average nine pounds more than those from the West but were only about an inch taller.

THAT moccasin venom, injected under the skin, controls various types of bleeding successfully is reported by Dr. Samuel M. Peck and Dr. Nathan Rosenthal, of Mount Sinai Hospital, New York, in the forthcoming issue of the *Journal* of the American Medical Association. Admitting that moccasin snake venom is a promising treatment to control bleeding, the American Medical Association warns physicians to use caution, even in experimental use of the powerful poison. Unfortunately, this snake venom is said to have no influence on the particular problem of hemophilia.

WARNING against the indiscriminate use of acetylsalicylic acid, or aspirin as it is commonly called, was issued by the American Medical Association. Aspirin is potentially a dangerous drug, is the verdict of the association's council on pharmacy and chemistry, which investigates new remedies as they come on the market and also the claims made by manufacturers for both new and old remedies. If aspirin is to be used as a home remedy it should first be prescribed by the family doctor whose knowledge of the individual's personal characteristics can alone make its unqualified use safe and advisable. Both direct and indirect harm can result from its use.

A NEW aid for diagnosis, a means of viewing a patient in three dimensions by x-rays, has been invented by Dr. O. Russo, physicist at the State Roentgen Institute, Moscow, U. S. S. R. Ever since x-rays were discovered physicians have sought some means of studying the human body with a depth perspective. X-ray photographs provide only two dimensions but have permanency. The fluorescent screen tells the same information but only while the x-rays pass through the patient's body and strike the screen.