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CHATS ON SCIENCE

JOB WANTED FOR FURFURAL

A new material has come into the market and wants to make itself useful if anyone can show it how. Its name is "furfural"; queer sounding, but not so hard to pronounce as most chemical terms. The public is lucky to be let off with only three syllables and those slipping easily off the tongue.

Two years ago furfural was selling at $30 a pound. Or rather this was the price it was quoted at in lists of rare chemicals. Really it was not selling at all, except when professor wanted a little vial of it to put into his museum case of organic preparations.

But it is now known that the stuff can be made cheaply from materials that are now going to waste in unlimited amounts, such as corn cobs, oat hulls, straw and the like. Consequently, furfural is now quoted at 25 cents a pound and could be made very much cheaper, perhaps 6 cents a pound in a large scale plant, one capable of taking in say a hundred tons of bobs a day and turning out six tons of furfural. All that is needed is to cook up the cobs with steam.

I saw it done at the Color Laboratory of the Department of Agriculture, on the Arlington Farm, just across the Potomac River from Washington. A large steel still was set up in the center of the big building. Two bags of corn cobs were dumped into the cylinder; then the top was screwed on and the steam turned in. After digesting for a couple of hours the furfural was distilled in a stream of steam, and the water and furfural condensed together by cooling. This mixture is afterwards separated by redistillation.

Furfural is a liquid, clear and colorless as water when fresh and pure, but turning brown when exposed to light and air. It takes fire easily and burns with a bright flame. It has a characteristic odor, but not strong or unpleasant. It is what the chemists call a "ring compound", for its molecule is composed of four carbon and one hydrogen atoms, connected in a ring with an extra atom of carbon and another of oxygen and four hydrogen atoms attached outside.

But we are all more interested in what furfural can do than what it is. This, however, remains to be found out. The first thing that we think of is using it as a motor fuel since a shortage of gasoline is impending. Furfural can run a car but does not seem to be suited to the ordinary type of motor and anyhow it is still twice as high as gasoline and therefore out of reach.

Furfural is poisonous to insects and germs. Perhaps it could find employment here. It will dissolve paint and varnish, also fats and airplane dope.

More promising yet are its compounds. Furfural will combine with various coal tar products such as aniline and carbolic acid. With aniline and the like, it makes dyes of a variety of colors but those so far made are fugitive.

With carbolic acid, furfural combines to form resins very much like bakelite, which is made from carbolic acid and formalin. These may be used in liquid form for varnishes or in solid form as insulation in electrical apparatus. We may expect furfural some day to appear in disguise as amber beads or tortoise shell combs or ivory billiard balls or horn buttons. Phonograph records may be made from it, also plates for printing from instead of type. They are light, hard and tough.

In short, furfural is now in the position of a high school graduate whom the principal claps on the shoulder and says: "You are a bright, versatile fellow. There is a great future before you." But when the boy asks, "Where?", he gets no answer.

This newcomer is knocking at the factory door with no credentials but a letter of introduction from the chemist which does not go far in the factory. The busy manufacturer turns to him long enough to ask: "Can you do anything better than those I've got or do it cheaper?" The applicant can only answer: "I don't know, sir. I think so but I've never had a chance to show what I can do yet. Won't you give me a try-out?"

I can't give the answer of the business man because I don't know what it is.

READING REFERENCE- Hemming, Emile. Plastics and Molded Electrical Insulation. New York. Chemical Catalog Co. 1923.

THE WARMTH OF A SNOW BLANKET

By Dr. Charles F. Brooks,
of Clark University and Secretary
of the American Meteorological
Society

Snow is a most effective insulator, and constitutes an important factor in making winter cold, by hindering the escape of heat from the ground. While the snow blanket keeps the ground beneath it relatively warm, its surface becomes very cold and chills the air above it much more than does the ground under the same atmospheric conditions.

Air is one of the best insulators known. Newly fallen snow is generally about 10 parts air to one part ice; sometimes the ratio is as great as 30 to one. And ice, too, is a poor conductor. Therefore, a new snow blanket is highly efficient as an insulator, and even old snow, with only three or even two parts of air to one of ice, is fairly effective. As a consequence, by keeping in the heat, snow serves to reduce the depth to which frost penetrates the ground.

Another influence of importance in the protection of the ground from frost, though not from low temperature, under the blanket, is the phenomenon that the soil will not freeze at 32 degrees, the freezing point of pure water, but requires a

temperature from two to nine degrees below 32, in spite of the fact that it is the water in the soil that freezes. This lowered freezing point is owing to capillarity and salts in solution.

The extreme of frozen ground is found in the tundra of northern North America and especially in Siberia, in regions where there is little snow. There the depths of the soil never thaw, but remain a rock-hard solid mass extending down hundreds of feet. Unless the thick moss at the surface is removed only a foot or two of melting occurs in the warm, short summer. The result is the soil retains the surface water, which insures marsh conditions and the terrible hordes of mosquitoes throughout the few weeks of warm weather.

The other extreme is found in the region south of Lake Superior, where the snow comes very early and covers the ground continuously until the spring thaws. The result is that the ground does not freeze. The snow keeps the heat in.

The snow surface becomes very cold because the loss of only a small amount of heat by radiation and evaporation will lower the surface temperature greatly, only a little heat being conducted through. By day the reflection, which from new snow is about 70 per cent of sunlight, reduces heating, and melting and evaporation take much of the rest and keep the maximum temperature from rising above 32 degrees. There is, however, no such limit to the minimum. In this manner the snow blanket makes the air cold, while it keeps the ground warm. Thus banked snow about a house keeps the cellar warm, and over underground water and gas pipes keeps them from freezing.

The protective effect of the snow blanket is proved in times of extremely cold weather: On a morning in central New England last winter, when the air three feet above the ground was 8 degrees below zero, and the temperature of the snow surface 16 degrees below, a thermometer placed four inches down in the snow registered 7 degrees above, and five inches down 10 degrees above. In the coldest weather ever recorded in Washington, D. C., in February, 1899, the lowest air temperature was 15 degrees below zero, yet at the bottom of the 13 inch snow blanket the temperature remained nearly at the freezing point, and observations made while the temperature at the surface was still 7.5 below showed 31 degrees on the ground.

In the latewinter the snow blanket allows the frost to come out of the ground beneath it, while that of the exposed ground remains solid. The accumulations of snow gradually waste away, slowly by evaporation in cold weather, and rapidly by melting on warm days. In March, 1916, a Connecticut forecaster, as the winter neared its end, knowing that the country about lay buried deep in snow, warned of disastrous floods to come and offered his hill as a refuge from the Connecticut river. But the snow blanket maintained cool air and high pressure over itself, deflecting the storms southward, while day by day under the warm sunshine the snow melted and its water trickled into the thawed-out ground. The pastures emerged from the snow-cover verdant with young grass. But there was no flood.

Evaporation goes on even under extremes of cold, and, if the air is dry, snow and ice evaporate. One of the Arctic explorers tells us that thin plates of ice, made in a shallow dish, suspended in the open air at exceedingly low temperatures, disappeared in a few days, and that washed clothing hung out of doors under similar conditions, frozen stiff, dried perfectly within a week. Thus it is with the snow blanket. It will give of its moisture to the atmosphere, no matter how cold

it is, On sunny days, when the molecules of water are coming off the warmed surface too rapidly to stay apart in the cold air, we see roofs and sidewalks, sometimes even the snow surface itself, "steaming".

READING REFERENCE- Talman, Charles Fitzhugh. Meteorology, the science of the atmosphere. pp. 115-120. P. F. Collier & Son Company, New York, 1922.

MISSING CHEMICAL ELEMENT REPORTED

Claimants of two nationalities dispute the honor of being the discoverer of one of the six missing chemical elements that scientists have confidently predicted will some day be isolated.

The disputed position in the periodic table of chemical elements is known as number 72. Prof. G. Urbain of the Sorbonne announced some years ago that he had identified and isolated a new rare earth element that he called "Celtium" as a tribute to the French or Celtic race. Prof. A. Dauvillier within the last few months has announced to the Paris Academy of Sciences that he finds by X-ray spectroscopy of rare earth mixtures that Urbain's celtium fits into the gap in the known elements where number 72 should be.

But from Denmark comes the counter claim that element 72 is not a rare earth metal, like cerium and thorium whose oxides are used in gas mantles, but an element very similar to the metal zirconium. D. Coster and G. Hevesy of the Copenhagen Institute for Theoretical Physics have investigated the spectrums obtained when extractions from zirconium minerals are made to produce X-rays and they have found lines in the resulting spectrum, hitherto unknown, that correspond to those that element number 72 should have. But the lines found by these Danish scientists are not the same as those found by the French physicist and chemist. The Danes have patriotically proposed that the new element they have announced be named "Hafnium", derived from Hafniae, meaning Copenhagen.

If the discovery of Drs. Coster and Hevesy is confirmed, Hafnium may sometime be found in considerable quantities as they report that "in a Norwegian zirconium mineral the new lines were so intense that we estimate the quantity of the element 72 present in it to be at least equal to one per cent." They believe that ordinary metallic zirconium contains at least one-hundredth to one-tenth of one per cent of the new element. Experiments are under way to isolate this new element and determine its chemical properties as it is at present known by its spectrum alone.

If on the other hand, the claims of Profs. Urbain and Dauvillier are substantiated by time, Prof. Urbain will have the credit of discovering two of the 92 possible chemical elements, a unique distinction. He previously discovered and isolated Lutecium, naming it in tribute to his native city, Paris, known in ancient times as "Lutecia".

Many of the chemical elements have been first discovered in the spectrum and then found and isolated by chemical means. Helium was discovered in the sun in 1868 by lines seen in the solar spectrum and not until 1895 was it isolated by Sir William Ramsay. The X-ray spectrum of a substance under investigation is much more certain of interpretation than an ordinary light spectrum because the positions of its lines are directly and simply related to the arrangement of its elements in what is called the "periodic table." Moseley, the young British physicist who

was killed early in the war, was able by applying X-ray spectroscopic methods to arrange the known chemical elements in an orderly series according to their atomic numbers. This classification is much more enlightening than the periodic table devised by the Russian chemist, Mendeleef, in 1869. Moseley's work showed that there are spaces for several elements that man does not yet know and among them was number 72. Numbers 43,61,75,85 and 87 are still missing, but by their positions in the series, scientists have predicted the properties of the unknown elements. The position of 72 in the series is such that it must be related both to the rare earth metals and to the metal zirconium so the theoretical data does not help in deciding the present scientific controversy.

READING REFERENCE- Recent advances in science. Science progress 17:27-30, July, 1922. Rutherford, E. Artificial disintegration of the elements. Nature 109: 584-6, 614-17. May 6-13, 1922. Kendall, James and Slosson, Edwin E. Smith's Intermediate Chemistry. pp. 549. New York, Century Company, 1922.

ICE WILL SOON ENDANGER SHIPS

Ice-bergs will soon menace trans-Atlantic traffic, Edward H. Smith, stationed on Coast Guard Cutter Senaca, told a conference of the principal trans-Atlantic steamship managers held in New York recently. Smith is the man who, from a ship at sea, answers all requests from steamer captains for ice information during the danger season.

"Already field ice has been sighted on the Grand Banks of Newfoundland and it will soon stretch south," he said. "Two Coast Guard Cutters, the Tampa and the Modoc, fine new electric drive vessels capable of keeping the sea in all kinds of weather, have been detailed for ice patrol this spring. The Tampa in Boston is now preparing for her duty and will be ready to proceed as soon as the first of the 1923 ice-bergs appear off the Grand Banks. We will be on the job continuously until next July when the danger of a berg drifting on the steamship tracks is quite remote".

He described the work of the international ice patrol undertaken by the U. S. Government for the past ten years. The navigation experts were also told how bergs are formed and carried into the ship lanes by the ocean currents.

As a rule field ice appears off the east coast of Newfoundland the latter part of January, coming down in a narrow strip fifty miles or so wide, Mr. Smith said. By the latter part of April, the banks are entirely free of this field ice which melts quickly in the lower latitudes. The berg ice carried down by the Labrador Current lasts until July.

Mr. Smith described how the patrol kept in touch with ice conditions, charted the drift of bergs, and broadcast warnings. Commenting on the mistaken notion that the patrol destroyed the bergs, he told of measuring one berg which rose 248 feet above the water and extended 1690 feet. There was enough ice in this one berg, he estimated, to fill every refrigerator in the United States for a month.

There is no means yet devised by which the presence of an iceberg can be detected during fog or darkness. The "feel" of the air and the temperature of surface water are unreliable, he said, but he held out hope that the sonic range finder

developed by the Navy can be perfected to give sound reflections from ice bergs that will result in knowledge of the distance and direction of the danger.

READING REFERENCE- Barnes, Prof. Howard T. Ice-bergs and their location in navigation. Annual report of Smithsonian Institution. Government Printing Office, Washington, 1913. International Ice Observation and Ice Patrol Service in the North Atlantic, Bulletin No. 9. U. S. Coast Guard. Washington Government Printing Office, 1922.

PROPOSES NEW USES FOR COPPER BY-PRODUCTS

Copper refineries in this country are in a position to produce much more tellurium and selenium if there is a demand for these unfamiliar elements, Dr. Victor Lenher, Professor of Chemistry of the University of Wisconsin, told the American Institute of Mining and Metallurgical Engineers at its recent meeting. He pointed out many possible uses to which these substances could be put.

Selenium is chemically similar to sulphur and experiments already made indicate that it might be used instead of sulphur in dyestuffs and in the vulcanization of rubber. The principal uses of selenium, at present, are in the manufacture of ruby glass and as a decolorizer of white glass. Crystalline selenium is an electrical insulator in the dark, but when exposed to light it becomes a conductor, the conductivity being proportional to the intensity of light. This property has lead to its use in many ingenious mechanical devices, including machines for sending pictures by radio, self-lighting buoys as sea-coast safeguards, and an apparatus to enable blind people to read ordinary type by ear.

Tellurium, now used as a crystal detector in wireless receivers, as a blue, brown, and red coloring agent for glass and porcelain, and for toning photographic prints, could probably, he suggested, be employed in electrolytic plating. One of the compounds of tellurium will prevent knocking when added in small amount to heavy gasoline, but he said that it is not abundant or cheap enough for general use in automobiles and a specially designed engine is required.

READING REFERENCE- Lenher, V. Selenium and tellurium, Journal of Industrial and Engineering Chemistry. 12; 597-8. June, 1920.

NO KNOWN PROTECTION AGAINST COBRA BITE

The body apparently does not produce an antitoxin to combat the deadly venom of the cobra in the same way that it fights the poison of the diphtheria germ, Prof. A. R. Cushny, of the University of Edinburgh concludes from experiments which he has just completed. When he attempted to accustom rabbits to the poison of the cobra by giving them successive doses of the venom which individually were too small to prove fatal, the animals died when the accumulated amount of the poison was equal to a lethal dose even though the amount administered just before death ensued would have no effect on a normal animal.

"Evidence of the persistence of the poison in the tissues could be obtained

in some cases a month after the injection," Professor Cushny said. "This gives rise to no symptoms but the animal succumbs to a subminimal additional dose." He also believes that it is probably held in the nerve ends since he could not find any trace of the toxin in the blood.

In the case of diphtheria toxin, the body can make a substance capable of destroying the poison if the doses of toxin administered are given in very small amounts at first and the dose is gradually increased. The subject finally becomes so immune to the toxin that a dose which would kill an individual who was not treated this way, has no effect on the person who has the abundance of antitoxin in his system.

The cumulative action of cobra toxin shows that an antitoxin is not produced to counteract this poison. Lead and mercury compounds produce a similar cumulative action in that fatalities are caused by an accumulation of either of these substances by continued small doses, each of which taken alone is harmless but when taken repeatedly become deadly.

READING REFERENCE- Croley, V. St. J. Cobra bite. British Medical Journal 1:951, June 17, 1922. Noguchi, Hideyo. Snake venoms an investigation of venomous snakes ... Wash. Carnegie Inst. of Washington, 1909. Whiting, E. B. Common snakes. Nature Study 16:385-7. Dec. 1920.

RHODODENDRON LEAVES CAUSE POISONING

Andrododotoxin, the poisonous principle contained in the leaves of the rhododendron, has just been studied pharmacologically by Dr. S. W. Hardikar of the University of Edinburgh. This substance when administered in large doses causes death by paralysis of the heart muscle while in smaller amounts its fatal action is due to the failure of breathing through its action on the nerves to the muscles of the chest which are concerned in the act of breathing, this investigator states.

A few years ago it was noticed that sheep in the neighborhood of Edinburgh showed toxic symptoms after eating rhododendron leaves with fatal results in some cases. Interest in such observations led Dr. Hardikar to study the poisonous substance which these leaves contained.

BLOND AND BRUNETTE ARE ALIKE

Have you accepted the statements that the blond is positive, driving, hopeful, loving, and the brunette negative, plodding, submissive, and static?

If so, you must revise your ideas according to a study made by Prof. Donald G. Patterson and Miss Katherine E. Ludgate, of the University of Minnesota. These investigators made up a mixed list of such so-called blond and brunette traits and gave this to ninety-four mature students of psychology, each of whom was requested to pick out from among his acquaintances two pronounced blonds and two pronounced brunettes, and to judge them with respect to each of the characteristics. These students were presumably not aware of any scheme of analysis based on sets of distinct traits for the blond and the brunette, and therefore were not prejudiced.

The results for the entire number of the three hundred and seventy-four individuals, half brunette and half blond show:

1. Brunettes were found to possess the blond traits to the same extent that blonds do.

2. Blonds were found to possess brunette traits to the same extent that brunettes do.

That is the whole story, and the results are scientific and not speculative.

SMALL CABLE TO CARRY HUNDREDS OF CONVERSATIONS

Three hundred telephone conversations and many telegraph messages will soon be sent simultaneously through a cable, 2 5/8 inches in diameter, stretching 900 miles from New York to Chicago, A. B. Clark of the American Telephone and Telegraph Company revealed recently to electrical engineers.

Transmitting the human voice over such long cables entails many engineering difficulties not encountered when each individual wire has its own place high on a pole, Mr. Clark explained in describing the new cable now being placed to handle future New York-Chicago long distance calls.

"Compressing the telephone circuits together into a cable has the effect of greatly retarding the flow of alternating currents", he said. "In passing through only one mile of a typical toll cable circuit the telephone currents encounter as much opposition, on the average, as they would in passing through an open-wire circuit ten miles long.

"To overcome the inherent difficulty of taling through cables the circuits are, in the first place, loaded by inserting inductance coils at intervals a little greater than a mile in the circuits. They have the effect of overcoming to a certain extent the harmful effects on the voice currents due to the fact that the circuits are compressed together. While loading alone applied to large copper conductors in cables can be used to give a grade of transmission satisfactory for toll circuits up to 300 miles in length, this is about the limit. In addition to this limitation of length, it is only possible to place about 60 circuits as large as this within a cable sheath.

"For longer distances up to 1,000 miles or more it is necessary to place amplifiers or telephone repeaters along the circuits at suitable intervals to reinforce the voice currents. These amplifiers not only make it possible to talk over distances as great as 1,000 miles, or even longer distances, through large gauge conductors, but also make it possible to very much reduce the size of the conductors without impairing the transmission result. The result of using small sized conductors is a cheaper, more flexible system.

"In these modern cables the longest circuits are worked on what is called a four-wire basis, a separate one-way circuit being provided to carry the voice currents in each direction. These circuits are joined together at the terminals to the usual type of two-wire telephone circuits by means of special apparatus in which the principle of electrical 'balance" as illustrated by the Wheatstone bridge is employed. The shorter circuits are operated on a two-wire basis in which the voice currents travel in both directions through the same circuits.

"Because the cable circuits are electrically very long, a number of peculiar effects are encountered. One of these is the 'echo' effect. Echoes may be produced in long circuits which are very similar in effect to echoes of sound. For a circuit of 1,000 miles long in cable, the voice currents require five hundredths of a second to travel from one end of the circuit to the other. If a man speaks into one end of such a circuit and the repeaters on this circuit are adjusted so as to annul practically all of the losses in the circuit, unless special precautions are taken, he will hear his own words returned to him as an echo reflected from the distant end of the circuit. This echo will arrive one tenth of a second after the speech current leaves. Some of this echo may, under certain conditions, be reflected again at the near end of the circuit so that the man at the far end will experience the effect of hearing first the direct transmission and then one tenth second later an echo of this direct transmission. In long telephone circuits of the two-wire type, complicated echo effects occur due to reflections of the voice currents at a number of intermediate points in the circuit. To minimize these echo effects the unbalances in the circuits must be kept small, while at the same time the velocity with which the voice waves travel must be kept as high as possible.

"In cable circuits employing small conductors the voice currents would die out very rapidly so that they would become inappreciably small a comparatively shor t distance from the sending end if amplifiers were not inserted to supply fresh energy. The total amount of amplification applied to such circuits is enormous. In order to obtain an idea of how vast the amplification ratio is, it is necessary to conceive of astronomical dimensions as compared to atomic dimensions. This amplification must, of course, be applied to the circuit in limited amounts at different points so that on the one hand the telephone currents will not be made so strong as to seriously interfere with neighboring circuits and on the other hand they will not become so weak that extraneous noise currents will drown them out.

"It is evident that with such tremendous amplifications balancing almost equal losses, a very small percentage change in the cable constants or the amplifiers will result in large changes in the circuit efficiency. The amplifiers must therefore be designed and operated to maintain amplifications of unusual constancy. This is very different from the proposition of operating a radio receiving set in which only a comparatively tiny amount of amplification is required, which is kept adjusted by the operator.

"If the losses in the cable circuits remained absolutely constant, the maintaining of a constant amount of amplification in each repeater would be sufficient. However, the cable losses vary enormously due to the changes which take place in the resistance of the conductors when the temperature varies. In an aerial cable circuit of the type which will be used between New York and Chicago the amount of power received on a cold day in the winter would be more than one billion times greater than that received on a hot day in the summer if no corrective means were applied. To overcome this source of variation, automatic regulating apparatus actuated by the resistance changes are applied at intervals of 100 or 200 miles. These automatic devices raise and lower the repeater gains automatically so as to compensate for these variations."

Armbrust, G. M.
READING REFERENCE-/Carrier-current communication through cable. Electrical World 80:129. July 15, 1922. McMeen, S. G. and Miller, K. B. Telephony, Chicago Am. Technical Society, 1922. Bell and his telephone. Scientific American 127-232, October, 1922.

TO STANDARDIZE RADIO SETS BY RADIO

Regulation of your radio set as well as your watch by radio will be possible when the National Bureau of Standards radio laboratory beginning on March 6 transmits standard radio wave signals. These can be received by the large transmitting stations and the small home crystal set alike and used to regulate the wave lengths broadcasted and the tuning while receiving concerts.

The first transmission of standard wave length signals will be made March 6 from 11 p.m. to 1:15 a.m. Eastern Standard Time, and will include wave lengths from 550 to 1500 meters. In April and May, two evenings for transmitting wave lengths from 300 to 600 meters and from 125 to 300 meters will be selected. The standard wave broadcasts will be made from the Bureau of Standards station, WWV.

In preliminary tests of transmitting standard wave signals, cooperating observers as far away from Washington as 1000 miles, in Louisiana and Minnesota, were able to calibrate their wavemeters used in standardizing the radio signals sent out. In some cases differences as large as seven per cent were found. As the pending radio bill now in Congress when enacted will compel the Secretary of Commerce to assign closely spaced and carefully selected wave lengths, differences so large will cause serious interference unless uniformity is obtained through standard wave broadcasting, officials of the Bureau declare.

READING REFERENCE- Hoover, H. C. Urgent need for radio legislation. Radio Broadcast 2:2-7-11, January, 1923.

TABLOID BOOK REVIEW

THE BIOLOGY OF DEATH.- By Dr. Raymond Pearl, professor of biometry and vital statistics, Johns Hopkins University. J. B. Lippincott and Co., Philadelphia. $2.50.

Why do we die? Just what are the biological conditions under which we live that bring about an end to this living, and determine this ending to be usually within one hundred years? Can these conditions be modified by human action so that we can postpone by some years this inevitable death, and are they now being so changed? Such are the questions, with others more or less like them, that Dr. Pearl seeks to answer in his interesting book, on a basis of careful consideration of the biological and statistical data about disease and death which are now available. His answers show that there has been a steady decrease in the death rate all over the civilized world since the beginning of this century (making allowance for the abnormal conditions of war), and that this decrease has been about the same in countries backward in public health and sanitation as in countries well advanced in this preventive measure. Which causes Dr. Pearl to conclude that there are other important factors in causing death besides carlessness about sanitation and public health measures. In fact, his most important conclusion is that heredity does more to determine the age of normal (not accidental) death for any individual than environmental influences.

Breeding stock is being selected in Europe for a model poultry farm to be established in Palestine in an effort to build up a poultry industry in the Holy Land.

Main-springs of watches break more frequently in summer than in winter, but experiments indicate that breakage is due to moisture rather than heat.

Guinea pigs normally produce about seven percent more males than females.
