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SOARING TESTS PREDICT LOW-POWERED AIRPLANE

Washington. Great interest has been aroused here in motorless aerial flight by the success of German soaring exhibitions in the Rhon Mountains.

The most promising possibility that can be foreseen as the result of further perfection of soaring flight is a low-powered airplane that will rival the vulture and the albatross.

Soaring that is being practiced in the German contests is true flight as contrasted with gliding, a mere dropping in altitude gradually with a horizontal movement. A glider may be compared with a flying squirrel using its tightly stretched skin between its front and hind legs to glide from a high tree to a lower one, while a "sailer" or a true soaring plane utilizes the same sort of upward air currents that support soaring birds which long ago instinctively mastered the secret of effortless flight. In addition to upward air currents, irregularities in the natural wind are available for motorless flight without loss of height. Such irregularities take two forms: Great fluctuations in the strength of the wind and rapid fluctuations in wind direction. But they are little utilized by birds or their mechanical imitators. Soaring birds and planes take advantage of rising air currents almost exclusively.

When a wind is blowing in uneven country, rising air currents can always be found due to the vertical component of the deflected wind. This is the case at the site of the German soaring exhibitions. But weather conditions instead of the lay of the land

can create upward breezes that will support a properly designed and manipulated bird or plane. Though the air is not warmed to any great extent by the passage of the sun's rays through it, the heat rays reflected from the earth do raise the lower air to higher temperature than that of upper levels. As hot air weighs less than cold, it must go up and create a rising current. Birds utilize this lifting power and man will in the future.

In soaring, a future low-powered airplane, using its motor as an auxiliary just as a sail-boat does, will probably utilize the meteorological upward currents rather than the less extensive and less reliable wind currents in rough country. Such soaring will be easier in hot weather, during the day, when clouds are absent, and over heat producing areas such as cities. True soarability will be found only in hot climates. The soaring airplane, to be practicable, experts believe, should be able to fly as slow as 20 miles per hour and should not be loaded over two pounds per square foot of wing surface. The heaviest birds, loaded one and a half pounds per square foot, can keep in the air at 16 miles per hour. With such an airplane, having a top speed of 60 miles per hour, it is believed that a gasoline consumption as low as that of a touring car could be obtained. It would be able to land and take off from an ordinary field. Under favorable circumstances, in hot countries, it may be even possible for it to fly without power once a certain height is gained.

When such an economical airplane is produced rivaling the seagull man will be able to claim the conquest of the air. Ocean liners may aerially tow such semi-soaring planes just as the upward wind they create in plowing through the sea carries along the motionless seagulls.

BLIGHT KILLED CHESTNUT
DURABLE AS SOUND WOOD

Madison, Wis. Chestnut posts, poles and ties cut from blight-infected trees are as durable in service as similar timbers cut from healthy trees, says the Forest Products Laboratory of the U.S. Forest Service as the result of an investigation. The blight fungus attacks living trees and grows in the bark, particularly in the cambium layer, but it does not penetrate deeply into the wood itself. The blight finally kills the tree, effectively girdling it by separating the bark from the wood. Blight-killed chestnut should be cut and utilized as soon as possible. Allowing dead trees to check and become infected with decay in the woods shortens the service life of timbers cut from the tree.

TAKES BITTERNESS
FROM SODA BREAD

Nashville, Tenn. The dark brown taste is to be taken out of the mouth of the soda biscuit eater. Miss Mary P. Wilson and Dr. H. A. Webb, of the George Peabody College of Teachers announce the discovery of a way to test sour milk so as to accurately gage the amount of soda which should be used in making sour milk and soda bread with a record for starting "not-like-mother-used-to-make" family rows.

The sourness of the buttermilk or clabber is tested by means of a paper soaked in alizarine dye. By making spots upon the paper with milk, the exact amount of soda required can be measured to an accuracy of one-eighth of a teaspoon. Less than a minute is required to apply the simple test which anyone can use. Complete results will be presented before the American Chemical Society meeting at Pittsburgh next week.

No recipe given in any cook book for soda and sour milk bread can be strictly followed with uniform results as sour milk varies greatly in acidity. Yet the neutralization of the acid in the milk must be accurate, or the bread will be yellow and alkaline with excess of soda, or heavy and scur because of deficiency. To carry out a determination of the exact acidity of the milk, and the strength of the soda, and calculate the comparison was formerly only within the ability of the trained chemist.

CHEMISTRY SYMBOLS
CAME FROM SKIES

Lexington, Va. To the uninitiated the system of one and two-letter abbreviations used in chemistry would seem to have been arbitrarily picked from thin air, but says Prof. James Lewis Howe of Washington and Lee University in a publication to be issued by the Engineering Foundation, these strange signs really came from the skies. The clear atmosphere on the plains at the head of the Persian Gulf, he claims, made star gazing easy and resulted in the birth of astrology among the ancient Chaldeans. Metals were associated with the planets and the planets with gods and goddesses. This three-fold linking of metals, planets, and divinities was revived by the alchemists and the names of the metals written with the astronomical symbol of the planet. From these symbols, after many changes, the present day chemical abbreviations developed. Other and more obscure symbols were later introduced by the alchemists, however, until in one manuscript of the early seventeenth century twenty-two symbols and thirty-three distinct names are used for mercury alone.

(A Chat On Science)

THE LITTLE ENEMIES OF MAN

By Dr. Edwin E. Slosson

Early in the history of the human race man learned how to conquer the mastodon. He has yet to learn how to master the microbe. Whales and elephants are now almost extinct, but mice and flies still increase and multiply, and the bacteria, smallest and most dangerous of all, find new ways of attacking us. It is only within the last few years that man has learned which his greatest enemies are, and he has not yet found weapons against them. The explorer in tropical jungles used to fear the lions, tigers and pythons; now he protects himself most carefully against the mosquitoes, and tsetse. Mars has afflicted the human race less than Beelzebub.

Although we theoretically accept the conclusion of science that a man's foes are those of his own household, we are not yet aroused to the necessity of waging war in earnest against them. We have a Secretary of Navy and we give him millions for defense, but we have no Secretary of Sanitation, though that is a more necessary office. It is quite improbable that any American will be killed by an invading army this year, but our land is invaded by millions of mosquitoes and flies armed with deadly weapons and certain to slaughter thousands. Years of study and experimentation will be necessary before we learn how to fight our insect foes, but already enough has been done to show what can be accomplished if we go about it in the right way. Many of the sanitary measures of the past we now know to be crude, clumsy and misdirected, yet they are fixed in the popular mind and remain on our statute books. People still talk about the dangers of miasma and sewer gas, and think a deodorizer is a disinfectant.

We are far from acting up to our lights. The housewife wages war against vermin, but she does not realize that they are more dangerous than trolley cars.

She gets more excited at the discovery of a moth than a fly, although the former only attacks clothing, not its contents. We have drain pipes in our walls to carry off disease, but beside them are conveniently arranged passages by which roaches can carry diseases from flat to flat, so that everybody has a fair chance to catch whatever is going. Our windows are hospitably open to the malarial mosquito and typhoid-bearing fly. Over our clothing on the street cars crawl unmentionable insects carrying unmentionable diseases. In the fashionable hotel and restaurant the napery and porcelain are immaculate and the waiters are scrupulous; what goes on behind the screen and in the market is another story. We have got past the days when we kept the pig in the parlor, but we still keep the dog in the parlor, which is quite as bad. On the street we see the pet dog gnawing a decaying bone and nosing the foulest spot to be found, and a moment later he is cuddled in the arms of his fair and fastidious mistress and licking her cheek. We have yet to realize that it is the dogs which are not mad that are the more dangerous. They injure more people by their kisses than their bites.

In primitive days man had to associate with the lower animals. He needed dogs and horses and he very properly made friends of them. He is now learning how to do without them, and he should, like a snob who has risen in the world, exclude them from his circle of intimates. The house is not intended as a zoological garden. Our cities will be truly habitable only when they contain no life but human life. Machinery may smash us, but it does not poison our blood, rot our bones and corrode our flesh. All creeping, crawling things are unclean. All our insects and animals are our enemies.

LAND HAS TIDES
JUST LIKE SEA

Washington.

The sea has no monopoly on the tide business.

Walter D. Lambert of the U. S. Coast and Geodetic Survey points out that the land rises and falls just like the waters in the big pond.

"The same attraction of the sun and moon which raises tides in the ocean," he says, "must also raise tides in the so-called solid earth itself, for an absolutely rigid and unyielding body is merely a mathematical fiction. In observing tides we necessarily refer them to the earth, so that what we get by observation is the difference between the tide in the water and the earth tide at the same point." "If we could determine from a rigorous mathematical theory what the water tide would be on the hypothesis of an absolutely unyielding earth, we could then compare the tide actually observed with the theoretical tide and the difference would represent the yielding of the earth or earth-tide. Only in a few simple cases can we predict the water tide by mathematical theory alone. One such case is that of the so-called long-period tides, tides whose periods are about a fortnight or a month. The observed long-period tides are found to have about two-thirds of their theoretical values, an indication that the earth yields somewhat more than a globe of steel would do."

"Another case where the tide may be predicted from theory alone is that of the diurnal or semi-diurnal tide in a small and not too shallow body of water. Such a body might be anything from a trough a hundred feet long or so up to a body of water like Lake Superior. The tidal forces cause small changes in the direction of the plumb line and the water surface adjusts itself so as to remain always perpendicular to the instantaneous direction of the plumb line directly. Its motion is very small and an apparatus called the horizontal pendulum has been used to render the motion accessible to observation. When a water surface is observed,

it is more satisfactory to use an artificial body of water than a natural one; this was done by Drs. Michelson and Gale who observed the minute tides in a partly filled horizontal pipe some 500 feet long. These tides were measured by a very delicate apparatus perfected by Prof. Michelson that depends on the interference of light waves from two different sources and is called the interferometer. The work of these two scientists represents the most accurate measurement of earth tides that has yet been made."

"There are difficulties in interpreting some of the results of observation on the diurnal or semi-diurnal earth tides as observed with a horizontal pendulum or in a horizontal pipe," says Mr. Lambert. Observations made at several places, not far from the Baltic Sea seemed to indicate that the earth is more rigid in an east-and-west than in a north-and-south direction. Many explanations have been given of this phenomenon, all but one of them more interesting than satisfying. The only good explanation is that the effect is due to the ocean tides even though the ocean may be many miles away. As the water in the ocean moves in response to the tidal forces, its attraction on the plumb line varies; furthermore the shifting load of water causes a variable tilt in the earth's crust and this too affects the plumb line by affecting the point of support.

The ocean tides are known only close to land; the tides in the open sea are matters of inference but calculations based on the best data obtainable indicate that the supposed difference between the east-west rigidity and the north-south rigidity noticed in Europe may be adequately explained as the effect of oceanic tides. Recent work on earth tides has tended towards higher values for the rigidity of the earth. One recent determination would make the effective rigidity of the earth as a whole about twice that of steel. The range of the semi-diurnal lunar earth tide would be about 10 inches at the equator; the minimum range of the diurnal earth tide, which occurs in latitude 45 degrees, would be about the same and the range of the solar tide at the equator would be about half as much.

CORRECT EAR TROUBLE AS OCULIST TREATS EYES

New York. Specialists in ear diseases and deafness may soon prescribe deaf sets for those afflicted with ear trouble with the same ease with which the oculist determines the type of glasses for the eye, says R. L. Wegel of the Research Laboratories of the American Telephone and Telegraph Company and the Western Electric Company.

"Many persons, now deaf, can be made to hear intelligently," he claims, "even though their hearing can never be made normal. The ear of the deaf man differs from a normal ear in its ability to react to the range of frequency and intensity of sound, or, if it has an equal receptive range and can actually hear the sound, it cannot intelligently understand it. The ears of some deaf persons do not react to high frequencies, some cut off low frequencies and others react abnormally in certain regions in such a way as to distort the quality of tone.

"An apparatus has been designed which shows the definite mechanical limits of the ear. By this means a curve is plotted which shows for various frequencies the vibration intensities at which sound waves overload the nerves of hearing and begin to become painful. The maximum point of audibility on this curve, beyond which sound cannot be heard by a normal ear corresponds to a pulsating pressure of about one-one hundredth of a pound and the smallest which can be heard by a normal ear corresponds to a pulsating pressure of about one-billionth of a pound. With this information it will be possible to construct deaf sets suited to meet the needs of each individual patient."

PRIZES TO PROMOTE BIRTHS

Washington. In order to combat the threatening race suicide, the French Alliance for Increasing the Population of France is offering forty-six prizes for the best works suitable as propaganda for more babies. The first prize will be 50,000 francs and the smallest prize 1000 francs. The contest will close Dec. 15.

NEWS OF THE STARSMeasuring the Heat of the Stars

By Isabel M. Lewis,
of the U. S. Naval Observatory

Measurements of the intensity of radiation of the three bright stars Aldebaran, Capella and Betelgeuse are being made at the Mt. Wilson Observatory of the Carnegie Institution by Dr. C. G. Abbot and L. D. Aldrich of the Smithsonian Institution with the aid of the 100-inch Hooker telescope. By means of the spectroscopic attachment the light of the star-image formed at the focus of the great reflector was separated into its spectral colors and the intensity of the radiation from different regions of the spectrum was then measured by means of the bolometer, an extremely sensitive device invented originally by Prof. Langley for measuring the radiation of all parts of the spectrum. The total intensity of the radiation of the star is then obtainable and also it is possible to make a comparison of the radiation intensity of different parts of the spectrum for stars of different types.

Extensive researches in this same field of stellar radiometry have been made in recent years by Dr. W. W. Coblentz of the Bureau of Standards, though the method of investigation is entirely different from that employed by the Smithsonian observers. By means of transmission screens of red and yellow glass, water and plates of quartz, used singly or in combinations, wide spectral regions of the star are isolated. Vacuum thermocouples of various alloys of metals, such as gold-palladium, platinum-rhodium or bismuth-tin, are then used to measure radiation intensities of different portions of the spectrum and the total intensities of radiations of the stars.

Within the past year Dr. Coblentz has measured with the aid of the 40-inch reflector of the Lowell Observatory at Flagstaff, Ariz., the total radiation of thir-

teen bright stars thus completing a survey of all the brightest stars in the sky which was started a number of years ago. A total of thirty celestial objects have been measured including Venus and Mars. It is believed that this method could be employed in measuring the heat emissions of much fainter stars than those investigated if the light-gathering power of the largest reflectors could be utilized, as the light of the star-image would then be much more intense.

The results of Dr. Coblentz' measurements of the heat emitted by the stars show that the temperature of the radiating surfaces of the red stars is about 3,000 degrees Centigrade, of the yellow or solar type stars 6,000 degrees Centigrade, and of the blue-white stars 10,000 degrees Centigrade, or possibly more.

It was also found that the maximum radiation intensity lies in the ultra-violet for the bluish stars and in the infra-red for the red stars. A red star such as Betelgeuse, it was found, emits three or four times as much infra-red radiation as a blue star of the same magnitude. In the case of binary stars it was found that companion stars of low luminosity emit considerable radiation in the infra-red.

An advantage of the method of measurement employed by Dr. Coblentz lies in the fact that the use of transmission screens obviates the necessity of forming a spectrum of the star with the spectroscope which entails a considerable loss of light. The screens used singly or in combination cut off the light of all rays except the ones to be measured. As a result the method can be employed in measuring the heat emission of stars considerably fainter than those of the first magnitude with the aid of the more powerful telescopes.

CANADIAN RADIO AMATEURS
PLAN FIRST CONVENTION

Toronto, Canada. Canadian radio amateurs will meet in their first annual convention here on September 8 and 9. In addition to the full attendance of Canadian radio enthusiasts, many American amateurs, including Hiram Percy Maxim, president, K. B. Warner, secretary, and F. H. Schnell, traffic manager, of the American Radio Relay League will take part in the social and technical programs.

AMATEUR RADIO MESSAGE
REACHES HAWAII

Hartford, Conn. When Hiram Percy Maxim, president of the American Radio Relay League, operator of station LAW here, sent out a spontaneous summer trans-pacific radio test message one hot summer night recently he really did not expect Cliff Dow, 6ZAC, Wailuku, Maui, Hawaii, to whom it was addressed, to actually receive it. It did get across the continent but what amateur stations handled it across the continent officials do not yet know. They do know that 66EN in Los Angeles relayed it to Hawaii. Station 6ZAC now considers communication with California a matter of course and its antennae system is being rebuilt and its sending apparatus improved. This winter Operator Dow hopes to break amateur distance records.

MOTOR GAS SHOWS
QUALITY INCREASE

Washington. Gasoline is getting better instead of worse, U. S. Bureau of Mines tests show that this year's motor fuel is on the average much more volatile than that sold two years ago. A comparison for several years shows that it is also becoming more uniform in character. The large seasonal change is disappearing, but "winter gasoline" still has a lower initial boiling point than "summer gasoline". This difference in volatility is made intentionally to facilitate starting the motor in cold weather. Although the average for the whole country does not show much change from a year ago, some distinct changes have been found in samples from individual cities.

EDITORIAL

THE MAGICIAN'S HAT

A bill in Congress proposes that Uncle Sam offer a reward of \$1,000,000 to the discoverer of a permanent cure for tuberculosis, pneumonia, cancer, epilepsy, and dementia praecox.

The spirit of the bill is commendable. Merely posting a prize, however, will not produce sure cures quickly. Laboratories, universities, and individual physicians throughout the world are, and have been for years, working to combat these maladies.

Some folks seem to think that scientific discoveries are made by some mysterious sleight-of-hand, like that of a magician drawing rabbits out of a hat. But even the magician's tricks require much practice and behind-the-scenes preparation.

Medical or any other scientific discovery is generally the result of many little discoveries by many men during long periods of time. It is built up like the minute polyp builds up the coral island.

There is a possibility that a specific for one of the above diseases will be found. Years will be required, however, to thoroughly test its effectiveness. The successful scientist would probably have to be young indeed to live to collect that \$1,000,000.

Would it not be better to invest that million in research rather than hold it out as a reward? If the bill passes, let us hope that while the reward is awaiting a claimant, at least the interest it draws will be used to finance investigation that will hurry its disposal.

RAISING FISHES
AGAIN IN RUSSIA

Washington. Fish are again being artificially hatched in Russia. Last autumn 11,000,000 eggs were successfully incubated in the long inactive fish-culture apparatus at the All-Russian Agricultural Museum at Petrograd. More eggs will be saved this season, says a communication from M. Novorusski, director.

DO YOU KNOW THAT -

The hundreds of millions of bushels of Marquis wheat produced in this country and Canada annually all originated from a single grain planted by a scientist at Ottawa in 1903.

The first Roman aqueduct was built about the time the Appian Way was begun in 312 B. C.

It is estimated that nine hundred million people live in countries where hook-worm infection is a serious menace to health and working efficiency.

There were more than 50,000 students of engineering in the technical schools of this country last year.

DO YOU KNOW THAT -

Fish, which devour mosquito eggs and larvae, were successfully used to suppress a yellow fever epidemic in Peru when all other methods had failed.

Some evolutionists think that ape men began to walk on earth when forced out of the trees by the dwindling of the forests when Asia went dry.

The archaeopteryx, the oldest known bird, was about the size of a crow, had teeth in both jaws, a lizard-like tail, and claws on its wings.

A one-seated one-half horsepower electric cyclecar, which can be charged by ordinary electric current through a transformer, is being made in Japan.

DO YOU KNOW THAT -

The war-like Amazon ants have slaves to wait on them which they capture in raids on Brown ant colonies.

Helium, the non-explosive gas used in the new U. S. airships, exists in the air you breathe in the proportion of one part by volume in 185,000.

Systematic agricultural drainage is bringing about the decline of malaria in southwestern Missouri.

A 70,000,000 bushel wheat shortage in France is causing that country to go back to war-time bread.

DO YOU KNOW THAT -

The age and growth of fish can be reckoned from the rings on their scales just as the life of trees can be read from the record in their annual rings.

The United States which produces more radium than all the rest of the world has in eight years produced less than one fourth of a pound.

All the blood in the human body, about 14 pints, passes twice through the left ventricle of the heart and all around the body in a single minute.

The main ingredient in the shoe polishes used on brown and tan shoes is candelilla wax which is obtained from a Mexican weed.

DO YOU KNOW THAT -

On account of the standstill of the flax industry in Ireland, an investigation is being made with a view to growing flax in Canada.

The game and fur-bearing animals of New York State are worth not less than \$53,000,000.

To any body at equal distance from the sun and earth the sun would be 1,500,000,000 times as bright as the earth.

The first wheat harvest was made fifteen to ten thousand years ago.

DO YOU KNOW THAT -

The hardened glue-like nest of the edible swift of Borneo is made of that bird's saliva and from it is produced the "bird's nest soup" considered a delicacy in China.

A rope is stronger when wet than dry. A new rope which has absorbed 50 per cent of its own weight in water will be increased in strength 10 percent.

It is estimated that about one fortieth of the body weight of a human adult is nervous tissue.

Italian artificial silk is produced from a fibre made from wood pulp.

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FRAGMENTS OF SCIENCE

Sir David Gill, the great Scotch astronomer who spent the larger part of his life measuring the distances to the stars, was accustomed to describe the difficulties of determining that distance by saying that it was like trying to measure the size of a 3-penny bit two miles off; and we remember his delight when his chairman, on one occasion asked, "Who but a Scotsman would care about a 3-penny bit two miles away?" - Prof. H. H. Turner.

On the basis of some impressive though fragmentary evidence then we are justified in assuming - at least as an attractive and perhaps stimulating working hypothesis - that intimately interwoven with the life histories of thousands of animal species of past ages and many species of the present day there is an active sense which may be called occult simply because it is hidden from the experience and understanding of man. This occult sense, involving direction, has taken three phases as developed by the prime necessities of life - food, mate, and home in their relations to space. - Herbert H. Beck.
