

# SCIENCE NEWS - LETTER

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No. 67

(A Chat on Science)

## THE SCIENCE OF KEEPING COOL

By Dr. Edwin E. Slosson

The problem of hot weather is not, as some folks seem to think, how to keep the heat out.

It is how to get the heat out.

The body temperature sticks pretty close to the normal point of 98.6 degrees Fahrenheit and unless the air temperature gets above that we do not take on heat from the air.

For heat, like water, runs down hill. It passes from a higher to a lower temperature. The steeper the grade the faster the flow. That's where the difficulty comes in. For we have to keep our internal temperature at the normal point, whatever it may be outside, and there is only a thin skin and some clothes between. When the weather is cold we have no trouble in getting rid of the heat we produce from the food we eat for it runs off rapidly, so rapidly that we have to put on more clothes to ~~check~~ it. But as the air temperature rises nearer to that of our own the current of escaping heat slows up and finally sets back if the temperature goes over 99.

We shut down the furnace in our houses when winter goes. But we cannot shut down the furnace inside of us because the works would stop. Our internal furnace serves as a power-house as well as a heater. We have to keep the engine going night and day and that requires a certain amount of fuel, though of course we do not need so much in summer time as when we have the heating plant on too.

A man who is not doing much, "just up and about", will have to have 2400 calories



of food a day. If he is working, he will need 500 or 1000 more. So even if he lives in idleness he has to get rid of heat at the rate of 100 calories an hour on the average, which is about as much heat as is given off by four ordinary electric lights.

Now this heat can be got rid of in two ways.

It can run away or be carried away.

It will run away if the temperature of the surrounding air is enough lower than the body and there is enough, not too much, cloth between.

It can be carried away by water. Water can carry more heat without showing it than anything else in the world. A quart of water will take on a calorie of heat and only show a rise of less than two degrees Fahrenheit. When a quart of water evaporates it carries off about 500 calories. If, then, you sweat a quart this is the quantity of heat you are getting rid of, provided the perspiration evaporates from the skin. Here is the difficulty. If the air holds already all the water it can take up, then you cannot get the benefit of the absorption of heat through evaporation. So when the air is saturated with moisture, or, as the weather man puts it, when the humidity is 100, then you say "this is muggy weather" and you complain that the heat is intolerable even though the thermometer does not stand high.

Your own internal thermometer, your sense of temperature, only registers loss and gain. You feel warm when you are gaining heat. You feel cool when you are losing heat. You can only lose heat by radiation when the air is cooler than your skin. You can only lose heat by evaporation when the air is drier than your skin.

Remember, it is only the layer next to your skin that counts. If the air there has a temperature of 99 degrees and a humidity of 100 per cent, then you cannot get cool either way. In that case you must drive away the layer of hot moist air and let some that is drier and cooler get at your skin, which you can do by means of a breeze, or in default of that, a fan.

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RADIO NEWS OF THE WEEK**NEW CIRCUIT MAKES RADIO  
SIGNALS 10,000 TIMES GREATER**

Washington. By simply re-arranging his "hook-up", without the use of any new kind of apparatus, Maj. Edwin Howard Armstrong, inventor of the famous regenerative circuit, has created a new super-regenerative receiving circuit that produces signals 10,000 to 50,000 times greater than those ordinarily produced by the same apparatus.

The new method can be used to receive any kind of radio signals, telephony or telegraphy. It is particularly advantageous for receiving short radio waves and continuous waves are also received especially well.

Experts declare super-regeneration is an invention of tremendous importance to radio. Both experts and amateurs in all parts of the country are experimenting with the new hook-up and while Maj. Armstrong has not yet announced full information, he has given the main circuits and the principles of his invention. Those who attended his demonstrations before national societies in New York are convinced that this new step is fully as important as Armstrong's previous invention of the regenerative circuit.

The new method is an extension of the principle and the processes of regeneration. By regeneration the incoming current is made to amplify itself. The electron tube, a bulb containing filament, grid and plate, may act as a detector and an amplifier simultaneously. The current coming out of the detector tube, instead of being connected to a second tube, is connected back to the input of the detector tube itself. The current is amplified in the tube and the process repeats itself. These repetitions or feed-backs are made again and again but so quickly that they are simultaneous.

Dr. J. H. Dellinger, chief of the radio section of the Bureau of Standards, who has conferred with Maj. Armstrong on his method explains it as follows:

"Regeneration has previously been limited by the tube going into the generating condition when the feed-back was increased. Super-regeneration is a method of in-



creasing the feed-back beyond the point of self-generation with <sup>out</sup> self-generation actually taking place. This is accomplished by taking advantage of the fact that self-generation does not take place instantaneously, but time is required for the generated current to build up. With the feed-back great enough to cause self-generation the current is allowed to build up for a certain interval and then the amount of feed-back is diminished, thus stopping the building up of the current. This process is repeated periodically. Armstrong explains the principle in terms of the resistance in the tuned circuit. The effect of regeneration is equivalent to introducing a negative resistance in the circuit which neutralizes the positive resistance to a greater or less extent. Self-generation takes place when the net resistance is negative. Thus the process of super-regeneration consists of causing the effective resistance to alternate between positive and negative. This can be done either by varying the voltage in the plate circuit, which causes a variation of the negative resistance introduced in the grid circuit, or by varying the positive resistance of the grid circuit, or by a combination of both. Electron tubes are used to produce these variations. An auxiliary tube generating a frequency lower than that of the radio frequency which is being received is connected to the tube which is doing the amplifying. One or the other of these tubes, or else a separate tube is used as a detector. A great variety of circuit arrangements have been worked out. All three functions can, in fact, be combined in a single tube. The adjustment and operation is, however, complicated in this case.

In its present state the circuit is a little hard to adjust and operate, but it is expected that this will be overcome by future perfection. Maj. Armstrong spent six months enlarging the possible number of arrangements of circuits for his new method before he announced his results.

The principles of the method will be described in the Proceedings of the Institute of Radio Engineers, and practical data on operation will be given in future issues of QST, the organ of the American Radio Relay League. Apparatus embodying super-regeneration is not yet on the market commercially, and it is uncertain when the patent situation and commercial considerations will permit it to be available for purchase. Major Armstrong has given circuit details with great freedom, in the apparent effort to assist individuals to set up apparatus of this kind for their own use.

It is not only possible but desirable to use a coil antenna when super-regeneration is used. On account of the large amplification produced, an antenna of the elevated wire type would radiate strongly when receiving signals. In order to reduce re-radiation and prevent interference between neighboring antennas, the use of a coil antenna is therefore highly desirable.

#### CONGRESS TO CONSIDER RADIO BILLS

Washington.

The bills in Congress calling for the

appointment of an advisory body of twelve to aid in national radio regulation are scheduled for consideration shortly after the House reconvenes in August. Six of the committee would be appointed by the government. Revision of wave lengths and radio zones for the country will also be considered.



# FIRE EXTINGUISHER CREATES THREE POISON GASES

Washington, Dec. 20.- When a fire extinguisher containing the chemical, carbon tetrachloride, is used on a closely confined fire, at least three deadly gases are likely to be generated, according to Dr. C. J. West, chemist of the National Research Council and author, with General Amos A. Fries, of a book on chemical warfare. These are phosgene, the deadly war gas, chlorine, the war gas first used by the Germans, and hydrochloric acid. Dr. West believes that all of these were created in the recent subway fire in New York.

Warnings were recently issued by the Bureau of Mines against the use of the carbon tetrachloride extinguisher in close quarters following experiments.

Carbon tetrachloride consists of carbon and chlorine. Phosgene is composed of carbon, oxygen and chlorine. When the tetrachloride gets into contact with a hot flame or metal it exchanges part of its chlorine for oxygen and turns into phosgene. One Bureau of Mines test shows that 168 parts of phosgene per million were in the air of a test chamber, accompanied by 144 parts of hydrochloric acid and 4350 parts of the vaporized carbon tetrachloride, itself a substance that in this concentration promptly puts a victim to sleep. From any substance burning in a small amount of air, large quantities of carbon monoxide, the poisonous toxic gas that is commonly given off by automobile exhausts, are formed, and this adds to the danger.

The Bureau of Mines report declares that fire in ill-ventilated space, such as a mine, should not be fought with carbon tetrachloride extinguishers unless the individual is protected by gas mask. But no danger lies in using this type of extinguisher in the open air or in ordinary houses where the air flows freely, and that under those circumstances, it is extremely efficient. Under no other circumstances met with in ordinary life is there serious danger of the formation of deadly gas, except the ever-present menace of the carbon monoxide, partially-burned from auto exhausts and poorly adjusted gas heaters.

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OIL FOR STEAM MAKING  
CHEAPER THAN COAL

New Haven. Comparative tests of coal and oil for small boilers made at a pipe bending plant here show that under some circumstances oil is a more economical fuel for producing steam than coal, even though the oil costs more per pound. Careful engineering tests were carried out by the Sheffield Scientific School.

With oil 13.6 pounds of water were evaporated per pound of fuel used whereas with coal less than 8 pounds of water could be made into steam per pound of fuel. This lower evaporation with coal was caused only in part by the lower heating value of the coal per pound; it was really the result of more efficient burning of the oil than is possible with coal.

Under the conditions of this test the cost of the oil fuel was 52.1 cents per thousand pounds of steam made, whereas for coal the cost was 55.7 cents per thousand pounds of steam.

One of the important reasons that oil can be used more efficiently than coal is the fact that it can readily be turned off or on, thus giving quick change in rate of boiler heating. Coal cannot be burned at rapidly varying speeds, according to the need for steam, with anything like the same ease. If it were not for the greater ease in firing with oil no one would use this material for boiler fuel, and even with this advantage it is usually more expensive than coal for regular use.

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POLES TO ADOPT  
METRIC SYSTEM

Washington. bill abolishing conflicting weights and measures in re-  
tail and wholesale trade in Poland and placing the commerce of that country on a metric basis has been offered in the Polish parliament, according to information reaching here. Parts of Poland formerly under German and Austrian rule are now using the metric system, while the versts and poods of the Russian system are employed in what was formerly Russian Poland. Under the provisions of the proposed bill, the entire country will be placed on the more scientific weights and measures basis beginning January 1, 1923, for retail and January 1, 1924 for wholesale trade.

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USE OF X-RAY PERMITS  
REPRODUCTION RECESS FOR RAT

London. Predicting that methods applicable to the broad control of procreation in both men and women will some day be available, Dr. Donald R. Hooker, of Baltimore, Md., made what he termed a "preliminary" statement to the International Birth Control Congress in regard to his experiments in checking rat reproduction by means of X-rays.

By subjecting male rats to X-rays sufficient to cause a slight reddening of the skin twice within three or four days, he said that he had been able to temporarily stop their procreation without interfering with their normal sexual activity or without injury to their subsequent offspring.

Sex desire, he explained, is controlled by the interstitial cells in the reproductive gland. Sterilization by X-rays does not affect these cells, neither is it accompanied by the enlarged bodily growth which follows a removal of the glands.

The treatment, he claimed, was well within the margin of safety from X-ray burns. Just how long the sterility lasts he has not yet determined, but it is a matter of some weeks in a rat and twelve days of the rat's life corresponds to about one year in the life of a man.

"Both clinical observation and laboratory experiment," he said, "prove that this sterility is not permanent and my experiments indicate that the offspring are normal, but our data on this required question, as well as to the exact dosage, must be extended before unqualified conviction is attained, or the process applied to human beings."

As the X-rays must penetrate deeper in the case of the female, sterility is harder to produce. Dr. Hooker also expressed a belief that similar measures may possibly be worked out for increasing the efficiency of women aside from the question of childbirth.

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DECLARES WAR INEVITABLE  
IF BIRTH RATE NOT CONTROLLED

London. "As long as births exceed deaths, just so long will war be inevitable in the long run; for grim necessity will compel men to fight for food or die of starvation," declared Herbert M. Mogoun, of Cambridge, Mass., in an address to the International Birth Control Congress in session here.

Calculating that the population doubles every fifty years, he showed that starting with a single human pair today in two thousand years there would be at least 2,048,009,000,000 people on earth. The only reasons that there has not been such an increase in the past, he claimed, were war, pestilence, famine and earthquake.

"And you would blithely abolish war and pestilence, leaving to earthquakes and famine the task of keeping the population within bounds that the earth can feed", he said. "That means famine for all mankind, unless births are kept on a par with deaths by means of birth control. Without it you cannot abolish war or banish disease without producing something far worse."

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CONSCIOUS DIRECTION  
COULD SPEED FINER RACE

London. That natural selection, the tendency of the more fit to survive, can be speeded up under conscious direction so as to produce a better race, was emphasized by P. W. Whiting, research associate professor of eugenics, of Iowa State University, in outlining recent advances in genetics before birth control advocates assembled in international convention here.

"Were it possible," he said, "for all the freaks and abnormalities which are produced to survive and procreate equally with the best, there would be a very rapid racial deterioration. While natural selection may be slow to effect improvement, it is all important in preventing extreme degeneracy. Conscious artificial selection, on the other hand, can very rapidly attain a desired end provided only the genetic factors



are present in the race.

"Various domestic animals and plants have been obtained in a short time compared to that required by blind, unconscious nature.

"Factors making for fine physique, keen intellect, and emotional stability are present in the human race, as well as factors for all sorts of defects," he continued. "Is it not a cause of regret that the latter should be continued when the world might be filled instead with healthy and happy people? Is it right that women who are to bear and care for children, should be denied the privilege of determining the hereditary character of their offspring?"

Prof. Whiting declared that man is able by conscious direction to change his hereditary nature as well as his environmental conditions.

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#### NEWS OF THE STARS

##### The Brightest Star in the Northern Hemisphere

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

A little to the east of the meridian in the early evening hours of July one may see the magnificent sapphire-hued Vega, whose name is derived from the Arabic for "falling eagle". It is in the constellation of Lyra, the brightest star north of the celestial equator. Vega is exactly equal in brightness to Alpha Centauri which is invisible in our latitudes and next to Sirius and Canopus these two stars are the brightest stars in the heavens.

Vega is a star of unusual interest for several reasons in addition to its being of exceptional brightness. It lies close to the "Apex of the Sun's Way" which is the point in the heavens toward which the solar system is moving. It is also one of the nearest stars in the heavens. The most reliable determinations of its parallax indicate that its light takes only about thirty-eight years to travel to the earth. The only bright stars that lie nearer to us than Vega are Alpha Centauri, Sirius, Procyon,



Altair and Fomalhaut at distances of 4.3, 8.7, 11, 15 and 23 light years respectively.

The procession of the equinoxes which causes the pole of the equator to describe a circle of  $23\frac{1}{2}$  degrees radius about the pole of the ecliptic in a period of about 25,800 years will bring Vega close to the north pole of the heavens about 12,000 years from now when it will be a most magnificent pole-star.

The position of Vega in the heavens is such that it is carried by its diurnal motion nearly through the zenith of Washington and all places in the same latitude. As it transits the meridian, then, it passes almost directly overhead for those who live close to the thirty-ninth parallel of latitude.

Vega is one of the most easily recognized stars in the heavens not only because of its superior brilliancy and distinctive bluish color but also because it is closely followed on the east by two small stars of the fourth magnitude which form with it a small equilateral triangle with sides about two degrees in extent. The northern of these two stars is a quadruple or double-double star known as Epsilon Lyrae which a sharp eye can split into two stars without telescopic aid. A small telescope shows that each of these two stars is also double. The four stars form a connected system in which the two close pairs revolve about a common center of gravity of themselves with the more distant pair. Vega also has a small faint companion which is not physically connected with it but chances to lie nearly in the same line of sight. Such a pair is called an optically connected double. That the two stars do not form a connected system is shown by the fact that they are not moving in the same direction through space. In actual distance one is probably many light years beyond the other.

Though exact measurements of brightness show that Vega is the brightest star of the northern hemisphere it is very closely rivalled by Capella, the golden-hued star in Auriga, now invisible in the evening, and by the orange-colored Arcturus in Bootes which may now be seen a little to the west of the meridian. Capella and Arcturus are exactly equal in brightness and are only one-tenth of a magnitude fainter than Vega.

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MOST PRIMITIVE INSECT  
FOUND AGAIN IN FLORIDA

Washington. A colony of protura, the most primitive of all insects, has recently been found in Florida, according to Dr. H. E. Ewing, of the U. S. National Museum, who is himself responsible for the identification of several species of this mysterious creature about which scientists hold a wide range of opinion. Some consider that it is not really an insect but a sort of link between the insect and earlier forms.

The protura has no eyes and no feelers. However, he uses the first pair of his six legs for reaching and grasping and the other four for walking. This menacing attitude of the front legs is taken to mean that they prey on other forms but just what they feed on, their habits, how they reproduce, whether they lay eggs or not, are unknown.

"The one I have here," said Dr. Ewing, indicating an object under his microscope, "is among the smallest insects known, but the largest grow to be as much as one tenth of an inch long. The body grows out in telescope like segments, this being the only insect known which increases the number of segments with age. Usually the process is reversed."

The first of the species discovered by F. Silvestri in Italy in 1907 had no breathing tubes but more recent finds have these tubes so characteristic of true insects. The protura is fairly plentiful in this country, having been found in ten localities under bark and in dead leaves and twigs. The original European find was in dead moss.

## AMERICAN HEADS ASTRONOMERS

Washington. Prof. W. W. Campbell, director of the Lick Observatory, Mt. Hamilton, California, was elected president of the International Astronomical Union at its Rome meeting. He will head this organization which coordinates the astronomical work of the world until its next meeting at Cambridge, England, in 1925.



NEW SOUNDING DEVICE FOR  
OCEAN SURVEY SHIP

Washington. .- As soon as the Navy's oceanographic ship, Hannibal, comes in from its present sounding expedition, it will be equipped with the hydrophone recently perfected by the Navy. Officials of the U. S. Hydrographic Office state that the new device will revolutionize their work of surveying the sea bottom by permitting the taking of soundings in a few minutes which under present methods require hours.

The depth of the ocean is obtained instantly, by this device which depends upon the time it takes for a sound to travel from a sound-creating oscillator located in the aft portion of the ship to the sea floor and be reflected back to the receiver located in line with the transmitter but in the forward part of the boat. The hydrophone receives only the reflected sound. The time determines the angle and the apparatus automatically computes the depth.

The new device necessarily has a high degree of accuracy as the velocity of sound in sea water is roughly 4,400 feet per second, a velocity too great to be measured accurately by stop-watch methods. An error of one-fifth second results in a discrepancy of over 70 fathoms in the determining of depth.

Besides making more rapid, detailed and accurate hydrographic surveys of the ocean bottom, the new device would also be used in locating vessels at sea and supplement the radio compass. Powerful sound sources may be installed off capes and harbors. By sending radio signals and the underwater sound signals at the same instant, the difference in the time of reception will give the distance the vessels are apart when the depth of the ocean is known.

The inventor, Dr. Harvey C. Hayes, physicist for the Navy, believes that the new device will be able to detect the presence of icebergs by the sound reflected from the berg and avert such disasters as befell the Titanic.

"In actual experiment it has been determined that the navigator, cruising at full speed through the fog and darkness, was certain of his position at all times and proceeded with complete confidence," said Dr. Hayes in describing one of the earlier trips with a less perfect apparatus than that which is now being used.

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EDITORIAL

## COMING - A NEW RADIO EPOCH

The ordinary person whose father was greatly astonished when Dr. Bell announced that he could talk over a wire has probably experienced the same feeling as his parent during the past year's expansion of radio. But he has more surprises in store for him.

Maj. Armstrong, already famous for a superior circuit, calmly announces that he can make his radio signals 10,000 times stronger by simply rearranging the wires. The General Electric has made a small tube that will replace the large alternator machines that are used in large sending stations. A new wire antenna system is being perfected. Marconi predicts a bright future for extremely short waves. Radio frequency amplification is being refined and improved.

A leading amateur says: "Amateur radio is on the eve of the greatest inventions and advancement. We expect great strides forward." "It is hard to predict just where our receiving range will end and the distance which even a very small amount of power may transmit."

Summer static hampers receiving but spurs on the inventor. He has visions of a future that the world has not dreamed of.

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HALE, AMERICAN ASTRONOMER, JOINS  
WORLD INTELLECTUAL COMMITTEE

Geneva,

Dr. George Ellery Hale, director of the Mount Wilson Observatory and chairman of the National Research Council of the United States, has accepted the invitation of the Council of the League of Nations to serve as a member of the Committee on Intellectual Cooperation which was recently formed to promote research throughout the world and facilitate the interchange of scientific information. Dr. Hale has been a leader in the formation of the International Research Council and coordination of scientific societies in the United States. Among the other members of the new committee are Albert Einstein, propounder of the theory of relativity, Mme. Curie, discoverer of radium, Henri Bergson, the French philosopher, and Gilbert Murray, Oxford professor.

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DO YOU KNOW THAT -

The standing army maintained by the white-ants of Ceylon practices a sort of chemical warfare against its insect enemies. They squirt drops of a secretion in the faces of other ants which are said to drive them almost crazy.

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Fifty-nine varieties of vitrified paving brick have been eliminated, and the styles and sizes in use reduced from sixty-six to seven.

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The ancient palaces of Rome show traces of elevators - vertical passages - the stones on the landings worn deep by the ropes which were used to hoist the primitive elevators of those days.

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Fully \$46,000,000 worth of wheat, corn, oats, grain, sorgums and broom corn is destroyed annually by chinch bugs, which can withstand most climatic conditions, fungous diseases and parasitic enemies.

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DO YOU KNOW THAT -

Development of the radio compass for the first time made possible the taking of accurate bearings effectively at a considerable distance during a fog, but guns, fired occasionally, were the first fog signals used in this country.

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The Bhandardara irrigation dam, near Nasik, India, which will soon be completed, will be 270 feet high; storing the greatest depth of water of any dam in the world.

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Reports from Germany indicate that a great development has taken place in recent years in the utilization of compressed air locomotives in mines.

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The number of rats can be more effectively reduced by catching the animals alive, killing the females, and releasing the males than by indiscriminate shooting or poisoning of both sexes.

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DO YOU KNOW THAT -

The sun, moon, and stars are seen to rise before they are up above the horizon and to set after they go down.

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The maintenance of the lighthouse system begun in 1789 was the first work of a technical character undertaken by the United States Government.

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Four thousand pounds of rose petals yields only about twenty ounces of attar of roses.

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Logwood, the timber which is exported from Haiti all over the world, was introduced into that island in 1730 for the purpose of furnishing blossoms which would yield a superior nectar for bees.

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DO YOU KNOW THAT -

The large robber-crab, found in certain of the Pacific islands, starts life in the water like other crabs, but later takes to climbing coco palms and picking the coco-nuts for food.

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10,731 passengers were carried to and from England last year by flying machines.  
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Only about two or three per cent of the world's potential water power has been developed. Forty-one per cent of the developed power is in the United States, but over fifty per cent of the potential water power of the world is in Africa.

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Einstein, the discoverer of the principle of relativity, likes poetry and plays a violin.

DO YOU KNOW THAT -

Honey bees and plant lice have evolved methods of controlling sex.

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Starch made from cull potatoes is used in the manufacture of dextrin for gumming types and stamps.

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Compressed air was used in the reduction of metals from their ores and the forging of iron and steel 2000 years before Christ.

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The aerial mail route established between Cairo and Bagdad has been extended to include Palestine. A regular fortnightly service will be maintained in each direction.

DO YOU KNOW THAT -

Smugglers are being caught on the border trying to bring in Mexican alligator-pears or avocados, a fruit which has been shut out to save this country from the introduction of another insect pest, the avocado weevil.

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The treatment of disease by sunlight was systematically practiced by Hippocrates, the father of medicine, but it was not until 1903 that the first clinic of helio-therapy of surgical tuberculosis was opened by A. Rollier.

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Astronomers consider our sun is now a "dwarf star" but that formerly its light was 100 times greater than at present.

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The fusee still used in clocks in its original form was invented by Jacob Zech of Prague in 1525.  
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READING REFERENCES TO NEWS-LETTER ARTICLES

THE SCIENCE OF KEEPING COOL, page 1.

Hill, L. Ventilation and human efficiency. Min. & Sci. p. 124:259-63, February 25, 1922. How hot can we live. Literary Digest, 73:29, May 6, 1922.  
Macleod, A. R. Effects of hot and cold applications on the superficial and deep temperatures. Toronto, University library, 1921.

FIRE EXTINGUISHER CREATES THREE POISON GASES, page 5.

Fries, Amos Alfred and West, Clarence J. Chemical warfare, 1921.  
West, Clarence J. Chemical warfare. Special libraries, November, 1919.

OIL FOR STEAM MAKING CHEAPER THAN COAL, page 6.

Billings, E. J. Why fuel oil must continue to compete with coal. Power 55:417-19, March 14, 1922. Best, W.N. Burning liquid fuel. New York, U/P.C. Book Co., 1922.

POLES TO ADOPT METRIC SYSTEM, page 6.

Conferences on weights and measures of the United States. See their reports (13th 1920 U.S. Bureau of Standards, Washington, D.C.)

CONSCIOUS DIRECTION COULD SPEED FINER RACE, page 8.  
DECLARES WAR INEVITABLE IF BIRTH RATE NOT CONTROLLED, page 8.

Marchant, James. ed. The control of parenthood. New York, G.P. Putnam's Sons, 1920. (Compiled by various well known people.) Robinson, Victor. Pioneers of birth control in England and America. New York, Voluntary parenthood league, 1919. Smith, William H. Children by chance or by choice. Boston, Richard G. Badger, 1920.

MOST PRIMITIVE INSECT FOUND AGAIN IN FLORIDA, page 11.

Comstock, J. Henry. An introduction to entomology. Ed. 2. New York, Ithaca, Comstock Publishing Co., 1920.

NEW SOUNDING DEVICE FOR OCEAN SURVEY SHIP, page 12.

New process of piloting ships by sound. Sci. Am. 126:101, February 19, 1922.  
Wilson, H. W. Hush; or the hydrophone service. London, Mills & Brown, 1920.

FRAGMENTS OF SCIENCE

During the late war Uncle Sam was actively engaged in planning playgrounds for the soldier boys during their hours of relaxation. The armistice came, and these playgrounds were not created. The need of a place and opportunity to play, not only for soldier boys, but for the entire mature population is quite as important during peace times as during war times. - Dr. James M. Anders.

Intelligence is the ability to solve a new problem. An unsurmounted difficulty is a new problem so long as its solution is unknown. It is easy enough to cut the Gordian knot, or to stand an egg on end, after one has learned how these historic intelligence tests were solved. - Prof. Lightner Witmer.