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EDWIN E. SLOSSON, Director
WATSON DAVIS, Managing Editor

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LEARNING FROM BEES

By Dr. Edwin E. Slosson
Director, Science Service, Washington, D.C.

"Come into my office and see my beehive," said Professor Hover of Ypsilanti Normal.

"What do you have a beehive in your office for?" I asked.

"So I can tell what the bees are doing all day long."

I protested: "Your bees are not acquainted with me. They may not like me at first sight. Sometimes bees don't."

But he went on into the office and I cautiously followed. Then I saw it was safe, for the bees had been provided with a private side entrance like those in apartment houses marked "For Servants and Tradesmen". In the window was a little hole leading to the hive which was ingeniously balanced on a scale so that its weight was automatically recorded. The temperature, barometric pressure and percentage of sunshine, were recorded simultaneously. All these records were copied by the students in comparative graphs on a big chart covering one side of the classroom, so they could follow the movements of the bees and the changes of the weather from day to day and from month to month. And they had marked on the chart at points where the curve made a sudden jump such explanatory words as "white clover" or "alfalfa", indicating the date of a spring opening or midsummer bargain day. This experiment, you understand, was a "rural nature study course", one of those new fangled "project" schemes, that have made education so much harder than it was when I went to school. For now they use books less and brains more. They study the thing they are studying, instead of merely reading about it, as we used to in the good old days.

But it was more interesting to look at this chart than to read any book on the subject, even Maeterlinck's "Life of the Bee", or Dunsany's play "The Flight of the Queen". For the curve was a continuous census and balance of trade. We could count the bees by the pound as they entered and left, and measure their exports and imports.

On a sunny morning there is a drop in the weight of the hive of about two pounds between eight and eight-thirty. This means that some ten thousand bees have sallied forth on their first foraging expedition. A quarter or a third of the inhabitants of the hive have left for their distant field of labor. Soon they begin to return with their booty and the weight gradually gains five or six pounds during the day.

But in the middle of the afternoon when the sun shines there is a sudden slight

fall in the curve. This is due to the daily frolic of the debutantes. The young bees, some two thousand of them, go out for a trial flight. At first they keep close so as not to lose their way, heading in and hovering only a foot or two away from the door of the hive. After a half an hour of open air exercise they return to their domestic duties.

Another series of daily drops in the spring is of more sinister significance, for there is no recovery in this curve. It is due to the death of the old bees. The first warm days tempt them out, but they have not strength to make the trip so they die in the path of duty, five or six hundred a day.

At sunset the bees return and the hive is at its heaviest, for during the night it loses continuously due to the evaporation of the water from the nectar. This contains about seventy per cent. moisture as the bees bring it in, and this percentage has to be reduced to about fifteen for honey. So the bees fan the surplus water away with their wings, sometimes getting rid of two pounds of it in the course of the night by their very vigorous and efficient ventilating system.

One of the notches noticed on the chart remains a puzzle to me. About fifteen minutes before rain breaks the bees come homing to the hive. A pound and a half of them, over seven thousand bees, will pour into the hole in ten minutes, looking like a living funnel, a cyclone of insects, the swirling swarm getting thicker and narrower as the entrance is approached. Now, since this home run begins before the first raindrops, how do the bees know it is coming ? Is it the cooling of the air, the falling of the pressure or the shutting off of sunshine that warns them of the approaching storm? Even the professor did not profess to know, but he hoped he might if he kept on studying his office hive. That is one of the advantages of this new-fangled method of education, even the professors learn something.

CANCER SERUM TESTS MAKE ANIMALS IMMUNE

Cancer serum that has cured cancer in a number of laboratory rats and has rendered them immune to the disease over a long period of time, is the latest cancer news just reported by Dr. Thomas Lumsden, working at the Lister Institute, under a grant from the British Empire Cancer Campaign. Dr. Lumsden has been working for several years on the possibility of serum treatment.

In recent experiments he has fought cancer cells with a number of different anti-sera in an attempt to find out which would be the most effective against the malignant cells, and also in the hope of learning the mechanism by which immunity to cancer is acquired.

Fifty rats, all of them with a cancer in each hind foot, were used in one series of tests. Anti-serum of a rat or mouse cancer was injected in one foot of each rat. In every case the cancer of the treated foot was cured, and in addition the untreated tumor in the other foot also went away a few days later.

Dr. Lumsden had previously reported that rats treated in this way "were found to be absolutely immune to the tumor concerned."

"It is now possible to state," he says, "that this immunity is of long duration. A test inoculation was given to fifty rats six months after their recovery. Of these, only two developed progressive tumors. The other forty-eight were still

completely resistant to a cancer which grew rapidly in all of twelve normal animals inoculated with identical material at the same time."

Recent efforts to go further and use serum to fight human cancer are described in a report from Prof. Ferd. Blumenthal, of the University of Berlin.

Prof. Blumenthal long ago proposed that cancer patients might be injected with an extract of the tumor removed by operation, in order that they might become immunized. This method has lately been taken up with success by Dr. Thies, another German scientist, he reports. The chief drawback in this method is that a cancer used for this purpose must not be advanced in decomposition. This means, he says, that only a few operative cancers are adapted to this treatment.

INTERTRIBAL INDIAN TONGUE NOW DEAD LANGUAGE

Chinook, once a sort of Esperanto among the Indian tribes and the white traders in the Northwest, is now a dead language, according to Edward Harper Thomas, of Seattle, Wash.

Relatively few Americans know that this picturesque language was once spoken on this continent by more than a hundred thousand persons in their everyday relations and intercourse. Yet now, except for a few words and phrases, it is almost in the limbo of the lost. No one knows how far back this strange tongue goes for it was originally a trade language used by the native Americans in their tribal exchange and barter over a wide territory.

A few words of Chinook, such as "tillicum","Cheechaco","skookum", "tyee," are still found in the western type of story written by men and women who lay their scenes in the far Northwest and Alaska. Except for these half dozen or so words the jargon is rapidly falling into disuse and will soon be forgotten.

The diaries and journals of missionaries who went into the western country during the early days of settlement on the American continent are full of Chinook words and phrases. Services were often conducted in Chinook, Hymns and the Lord's Prayer and much of the service was translated into the Chinook. It was the common Language of the Indians and strange tribes might converse with one another through its medium.

The jargon is made up of many Indian words, Indian attempts to pronounce English, some Indian-French words, and still other words that are merely crude attempts to imitate natural sounds, like "hehe" for laughter.

That the jargon came to be called Chinook is natural. The first important white occupation was at the mouth of the Columbia River. This was the territory of the ancient Chinook tribe, the words of which constituted the largest part of the prehistoric jargon. There is not now a single pure-blood Chinook living, despite the fact that this was the great ruling tribe of the lower Columbia region little more than a century ago.

TENORS ARE BORN, NOT MADE, SCIENTIST FINDS

The shortage of tenors, which is always more or less acute in musical circles, may be averted in the future. Principles of heredity are being applied to voices, and scientists say that from the voice types of the parents it should be almost as easy to predict the kind of voices their children will have as it is to predict the coat color of rats or rabbits whose ancestry is known.

This question of what kind of voices run in families has just been probed by Prof. Felix Bernstein, of the University of Goettingen. Prof. Bernstein investigated the inheritance of vocal register in a number of families and also took a census of voices in various districts of Italy and Germany, from which many famous opera singers have come.

A basso has the same hereditary make-up as a soprano, he finds, which means that if a basso marries a soprano all of their children will inherit these same kinds of musical voices. A tenor husband and a contralto wife likewise are said to be alike in hereditary make-up, and their children will follow in their footsteps, musically. But marriages between a basso and a contralto, or between a tenor and a soprano, will produce boys who will inevitably be baritones, and girls who will be mezzo-sopranos, he says. These children, regardless of the musical voices of their husbands, will have "mixed" families, so far as vocal color is concerned.

Prof. Bernstein concludes that the inheritance of vocal register follows strictly the Mendelian laws of heredity. His studies are being used, in connection with other studies of heredity, in an attempt to make a more scientific classification of the European races.

He has found that bassos and sopranos are on the whole more frequent in northern districts. And his work bears out the tradition that the best tenors usually come from southern countries such as the south of Italy.

INHALING COLLEGIANS MORE APT TO FLUNK

Don't inhale when you smoke if you want to get good grades, is the advice given to students by J. Rosslyn Earp, of Antioch College, who has just investigated the long-run effect of tobacco on college men. As a result of his research, he announces that those studnets who inhale the fumes of tobacco, regardless of whether they smoke much or little, have lower scholarship records than smoking students who do not inhale.

This fits in with the statement of a German scientist, who recently reported that inhalers take into their systems eight times as much nicotine as smokers who do not inhale, Mr. Earp says.

The effect of smoking is chiefly shown in mental fitness, the experiments at Antioch College indicate. When smokers and non-smokers were given physical tests Mr. Earp could discover no significant difference between the pulse rates, blood pressure, or heart efficiency of the two classes. But when he looked up scholarship records, covering a long period of time, he found a striking difference in his figures.

"Although the number of smokers and non-smokers in the college is practically the same, yet out of 23 students dismissed last year for low scholarship no less than 21 were smokers," he says. "As one ascends the scale of scholarship, the proportion of non-smokers grows steadily greater. And, in general, those who smoke much have lower scholarships than those who smoke little."

Significance of these findings is increased by the fact that they have been carefully subjected to mathematical processes to measure the reliability of the results. Mr. Earp believes that this is the first time that the effect of inhaling on scholarship has been measured, and he thinks that the figures may be "of some importance, since they indicate that the lowered mental efficiency is not just a coincidence but actually a consequence of smoking".

SKULL OPERATIONS FAIL AS CRIME CURE

Operations on the skull to remove the cause of crime are unwarranted medical practice, in the opinion of Dr. Shepherd I. Franz, psychologist in the University of California, Southern Branch, and expert in the re-education of the damaged brain.

The supposition that a bony protuberance of the cranium or some malformation due to accident may press on the brain and be the specific cause of wrong-doing is rejected by Dr. Franz and relegated to the limbo of phrenology or like pseudo-science. Surgeons of questionable ethical standards, with prospects of a high fee, have been willing to operate on a criminal, the purpose in part being to influence a trial court in the direction of leniency. In some cases of this sort the patient, profoundly influenced by so serious an operation on himself, has actually been led to believe that the treatment has cured him. Thus purely by suggestion he deserts the criminal life. To this extent only is the cranial operation of any value.

Extended experiments in brain operation have convinced Dr. Franz that the upper brain structure works generally as a whole, and not in specialized departments. Damage or pressure on one spot does not throw any one faculty alone out of commission, nor does any single faculty or sense belong solely to one unique location. Removal or destruction of a small special brain area will seriously upset the entire mental function, but the patient can be re-educated to perform all his duties with other cerebral material. Upon this assumption immorality or crime tendency is likely to be a feature of the entire cerebrum, and not amenable to surgical operation.

Eighty cents worth of poison gas killed 400 rats on one Midwestern farm.

Fast motor boat taxis are replacing gondolas on the canals of Venice.

Tigers have played a large part in the disappearance of lions in India.

HENS BECOME ROOSTERS, BUT BLOOD STAYS FEMALE

It is possible for a hen to become a rooster, and to be the father of chicks by another hen as mother; and yet his (or her) veins will still be filled with female blood. This paradoxical phenomenon has just been reported to "Nature" by F. A. E. Crew of the University of Edinburgh. He had seven hens, indubitable females that laid eggs and hatched them. He tested their blood by means of a chemical color reaction devised by Dr. E. O. Manoilov, a Russian scientist, and it showed the female color, as was expected. Then for some unknown reason the hens all became males, took unto themselves harems of wives, and to all physiological intents and purposes were valid roosters. But when the chemical test was applied it showed that their blood was still female. It looks like a case of what was bred in the bone not coming out in the flesh.

COLOR CHANGING PAINTS SHOW TEMPERATURE CHANGES

Chameleon-like paints that change color when heated, only to return to their original color when cooled again, are the interesting products described by W. S. Andrews, of the General Electric Company's engineering laboratory.

Such paints are made either of the double iodide of copper and mercury, or the double iodide of silver and mercury, says Mr. Andrews. The former is bright red at ordinary temperatures, but when heated to about 160 degrees Fahrenheit changes to a dark chocolate brown which becomes black at boiling temperatures. As soon as it is cooled, it becomes red again. The silver and mercury salt is ordinarily yellow, and becomes a dark orange or brick red at 160 degrees.

Among the uses suggested for these paints by Mr. Andrews are for the casings of bearings and other parts of machinery which are apt to become overheated, with disastrous effects; and forindicating the level of the liquid in a hot water tank. In the latter case, a vertical stripe is painted on the outside of the tank, and the height of the part where the color has changed indicates the water level.

WALNUT ROOTS CONTAIN POISON FOR OTHER PLANTS

The roots of walnut and butternut trees are poisonous to other plants whose roots are so luckless as to come in contact with them, Prof. A. B. Massey of the Virginia Agricultural Experiment Station has discovered.

It is a matter of common observation among market gardeners that tomatoes and potatoes will not grow in the vicinity of walnut and butternut trees. In the shrubby cinquefoil area of Vermont, the refusal of this virile weed to grow near butternuts is very striking, while in southern Indiana the old settlers declare that newly cleared walnut land would not grow good crops for several seasons. In various parts of the country the death of certain weeds and even young apple trees in the vicinity of walnut and butternut has frequently been observed. In Indiana, the leading tomato state in the union, the harmful effects of these two trees growing in fencerows or in the fields, is frequently of economic importance to growers of tomatoes.

Prof. Massey has concluded that the poisonous property of the walnut root is due

to a specific toxin, which he has called "juglone", from "Juglans", the scientific name of the walnut genus. The toxic substance, which is contained in the root bark, is not generally distributed in the soil and the evidence indicated that injury to surrounding plants usually takes place after contact with the offending walnut roots.

TAUNGS APE DECLARED DANIEL BOONE OF PREHISTORY

The prehistoric ape-child whose skull was discovered by Prof. Raymond A. Dart in a cave at Taungs, South Africa, represents a race of man-apes who were hardy and progressive pioneers, is the announcement just made by Prof. Dart to the American Museum of Natural History. Prof. Dart has spent some time studying the skull and the African surroundings in which it was found, and his latest conclusions reveal a strange story of early ape struggles toward human intelligence.

The Taungs region is a vast open tract, almost treeless, and much of it barren desert. He believes that some of the apes in the jungle north of this arid country came out from among the trees and ventured into the great open spaces. Instead of being swiftly wiped off the earth by wild beasts and starvation and exposure, some of these Daniel Boones of the ape tribe somehow survived.

They learned to kill and eat meat to eke out the slim amount of plant food. They could no longer avoid their enemies by darting up a tree, because trees were scarce, so they began to run more and more swiftly and expertly on two legs to escape danger or to capture food.

In order for the brain to expand and for these anthropoids to place reliance entirely on the feet, as Prof. Dart says the Taungs man-like apes did, it was essential that a large territory should be available, which would make it impossible for them to return to the trees, and just such an environment was made to order in the South African plains.

The process of development was a slow one, he explains, saying: "The factors which evoked the thinking and planning powers of the anthropoid, and with these powers caused the transformation from anthropoid to man, are to be sought, not in any cataclysmal upheavals of nature, or fortuitous saltations of the germ plasm, but rather in steadily and continuously operating environmental conditions, which constantly and increasingly demanded the operation of choice and cunning."

That these apes, or man-apes, lived in caves, like the cave men of prehistoric times, is the opinion of Prof. Dart. Other bones found in the cave with the skull are mostly the remains of turtles, birds, rodents, and other small animals, and are regarded by the anthropologist as the food of the cave ape.

The possibility of human beings having occupied the caverns of South Africa in an extremely remote period is suggested by Prof. Dart, judging from signs of human habitation in the caves of the district. But he says that until positive evidence of this type is forthcoming, it is logical to assume that the age of the Taungs skull antedates the human period.

The Taungs skull is regarded by most anthropologists as being more ancient than the remains of Pithecanthropus, the so-called ape man of Java, which is dated at about 500,000 years.

TORNADOES STARTED BY OIL FIRE

Tornadoes, smaller than the twisters that often work havoc in the Middle West, but true tornadoes just the same, were one of the effects of a great oil fire at San Luis Obispo, California, recently, according to a report to the U.S. Weather Bureau by J. E. Hissong, of the local weather bureau of the California city.

The fire was started by lightning and burned for five days, destroying nearly six million barrels of oil. Two persons were killed and the total property loss was estimated at $15,000,000. However, the unique feature of the fire was the great number of tornadoes which it started, one of which was responsible for the two deaths.

Before these whirls started, says Mr. Hissong, strong southerly winds prevailed, which shifted to west and then to northwest. Then four tanks, each containing 750,000 barrels of oil, "boiled over".

"They threw out an immense quantity of hot, burning oil," he says, "which spread with remarkable rapidity over an area estimated by the engineers present at about 900 acres. The flames leaped seemingly a thousand feet into the air. At the same time violent whirlwinds began to form over the fire.

"From the time the wind veered into the northwest and the large reservoirs boiled over, hundreds of whirlwinds formed in and around the edges of the fire until the last tank boiled over. During the period when the large reservoirs were burning and the temperature over the fire was probably at its highest point, and consequently the vertical convection was strongest, the whirls appear to have been most numerous and violent.

"Many of them had all the characteristics of true tornadoes. The gyrating, writhing, funnel-shaped clouds with the white condensing vapor in the vortices were plainly visible against the background of black smoke. Some of the funnels appeared to be not more than one foot in diameter at the smallest part, and some were reported as giving the impression of ropes dangling from the clouds of smoke."

It was one of these twisters that caused the casualties, for it left the fire, travelling east-northeast to a cottage about a thousand yards away. It picked up the cottage, lifting it several feet in the air and carrying it about 150 feet north. There the cottage was dropped in a field, a total wreck, and the owner and his son, who had been in it at the time, were killed. A few minutes later a whirl, which Mr. Hissong believes might have been the same one, unroofed a house about a quarter of a mile northeast of its first victim. Debris, evidently carried by other whirlwinds, was found as far as three miles from the fire.

Since the whirlwinds started just after the wind veered, Mr. Hissong suggests that they may have been caused by the convectional currents over the fire being started rotating by the northwest wind.

The ruddy kingfisher, a bird found in Borneo, makes its nest in the hive of a vicious kind of bee.

ADRENAL GLAND SECRETION FOUND CAUSE OF BODY HEAT

The mechanism by which the body keeps warm has received a new scientific explanation. Dr. Charles E. de M. Sajous, professor of endrocrinology at the University of Pennsylvania, thinks that adrenin, the substance secreted by the adrenal glands, small organs just above the kidneys, plays an important part in the production of body heat.

Physicians and biologists have known vaguely for years that heat is released by some process of union of the body cells with the oxygen of the air through the action of the blood in the tissues, but just what chemical changes are involved has remained a mystery.

Dr. Sajous believes that adrenin is carried to the lungs where it takes up oxygen and is then absorbed by the red corpuscles of the blood and transported to the tissue cells. Here the complex chemical compounds that originate in the glands react with the partially digested food products to produce heat. This enables the enzymes or ferments present which are very sensitive to heat to complete the digestion of the food products, rendering them available for the work each tissue carries on.

This heat action must be so controlled, says Dr. Sajous, as to avoid excess heat, since any rise above 98.5 degrees Fahrenheit, the normal temperature of the body, means fever. Any excess is normally prevented by the glandular substance cholesterol, while adequate production is assured by thyroxin, from the thyroid gland of the neck, which also acts as a stimulus to the gland product lecithin, the heat producer.

The beneficial effects of light and heat treatments, such as ultra-violet and Roentgen rays, are due to their speeding up of this physiological process, says Dr. Sajous. This heat energy, by increasing the activity of the enzymes present in the tissue cells, enables them to break down the disease-causing germs and the toxins they produce. Treatments with light and heat radiation are beneficial up to a certain limit, but care must be exercised that they do not increase the body temperature beyond this point, Dr. Sajous declares.

WOMEN WORKERS NOT TEMPERAMENTAL

The business executive who says that women do not stick to their jobs is not up-to-date on his facts, according to a survey just made by H. B. Bergen of New York City. Records of 400 white collar workers who resigned from a large financial house during the past three years show that women in offices now cling to their jobs more steadily than men.

Mr. Bergen set out to discover whether there is real foundation for the prevailing belief among business men that women are temperamental, leave their jobs to marry, and become easily discouraged when they do not receive as high pay as men. His records were obtained from office messengers, clerks, bookkeepers, correspondents, typists, stenographers, and secretaries.

Results of the survey, which have just been reported to the Journal of Personnel Research, show an increasing steadiness on the part of women office workers, until in 1925 there were proportionately fewer resignations among the women than among the

men, the ratio being 68 to 100. He suggests that this increase in the steadiness of the women may be accounted for partly by the fact that personnel method improvements bettered the conditions among the women so that they are placed in positions best suited for them and are given definite opportunities for advancement.

One interesting fact verified by the investigation was that women nowadays may leave to be married, but they do not necessarily resign afterward; on the other hand, they most frequently return to their jobs.

TABLOID BOOK REVIEW

GREAT MOMENTS IN SCIENCE, by Marion Florence Lansing. Garden City, N.Y., 1926, Doubleday, Page and Co. 265 pp., $2.50.

Though addressed primarily to boys and girls , this is a book which the adult reader will find of absorbing interest, for the author has, as the title indicates, taken a number of "great moments in science" and told their story, stories which concern every one now alive, for from these moments have come the very inventions and discoveries that make our civilization possible. The development of fuel, with the steam engine and the many things it has developed into; how weaving has evolved from its first crude beginnings; a "food cycle" leading up to modern canning methods; new sources of power; all these and others are discussed.

ELEMENTS OF PHYSICAL BIOLOGY. By Alfred J. Lotka, Baltimore, Williams and Wilkins, 1925. 460 pp. $5.00.

This book is a much needed gathering together of material on an aspect of a subject that is beginning to receive much attention from workers in the field of biological research. Analysis of Growth, Function, Inter-Species Equilibrium, the Circulation of the Elements, and Energy Transformers of Nature are some of the high spots of what Dr. Lotka calls a "systematization of a new subject". Copious footnotes giving source material will be appreciated by the students of biology for whom the book will prove of greatest interest. On the other hand, even though some chapters may bristle with mathematical formulae, the philosophical conclusions of Dr. Lotka on life in general will appeal to many readers whose biological background is, ----merely background.

Malay natives sometimes train monkeys to work for them at gathering coconuts from the trees.

Louis Pasteur was rated first among 12 world heroes chosen by over 6,000 school children.
