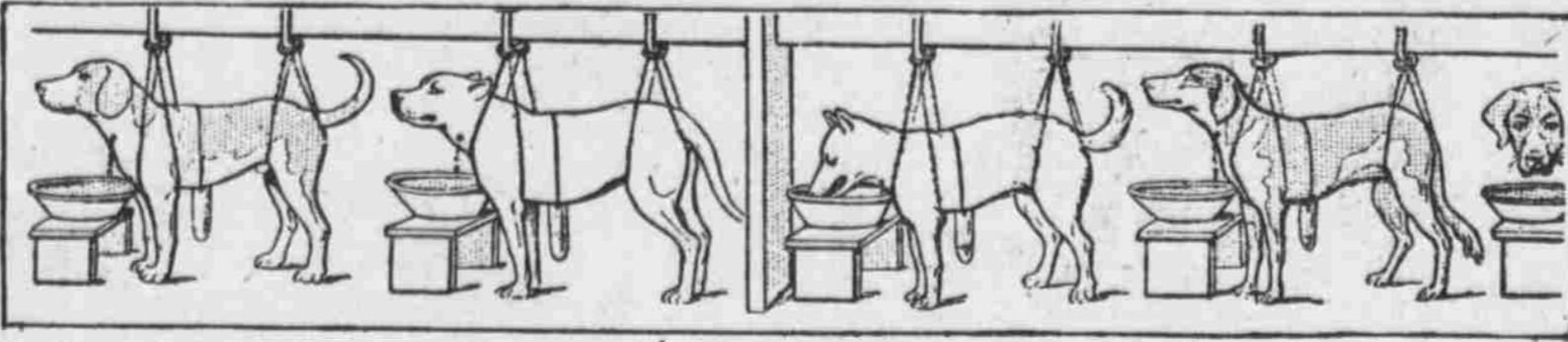


NEW DISCOVERIES ALL OVER THE EARTH

How Our MINDS Remarkable Experiments by a Russian Scientist Who Collects the STOMACH'S "PSYCHIC" JUICES from Dogs

DIGEST the Most Important Part of OUR FOOD



Row of Dogs at St. Petersburg Institute of Physiology with Permanent Openings in Their Stomachs Through Which the Gastric Juices Are Collected.

At the Institute of Physiology, at St. Petersburg, five hundred dogs are secreting in test tubes the so-called psychic juices of the digestive system for the benefit of science. These are the digestive juices which every animal, including man, begins to secrete at the mere sight, smell or anticipation of food before swallowing or even tasting any of it. The excitation of these juices is a most important part of the work of digestion. They were first discovered by the celebrated Professor J. P. Pavlov, the director of the St. Petersburg Institute, who has been studying their nature and uses ever since.

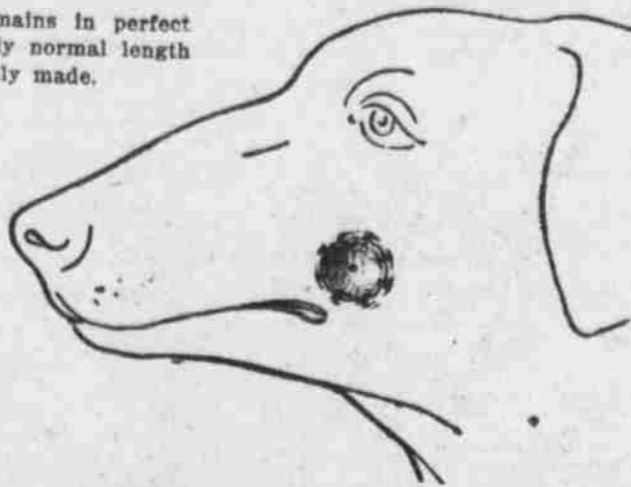
Pavlov is said to have been the first scientist to study in living animals the work of the digestive glands under strictly normal conditions. Professor Pavlov has made an opening in the throat of a dog so that the food may be allowed to fall out before reaching the stomach, or may be allowed to reach that organ through the closing of the artificial opening. When the food does not reach the stomach the "psychic" juice flows just the same, proving that it is excited through the nerves and not through mechanical contact with the food. So the professor has now practiced a series of openings into all the parts of the digestive system of the dog from which all the different types of digestive secretions can be collected.

These openings, strange to say, appear to cause no

inconvenience to the animal. It remains in perfect health and apparently enjoys a nearly normal length of life with the wound thus ingeniously made.

One of Pavlov's most recent operations was to make an opening into the pancreas of the dog so that the pancreatic juice whose digestive function is imperfectly understood, will flow outward. He has also separated the stomach of the dog into two portions, one of which, called the "large stomach," continues to perform the regular functions of that organ, while the other, called the "little stomach," is completely isolated, but continues to secrete gastric juice. The professor has also fixed in the salivary glands a permanent tube, which carries the saliva out of the mouth.

By these methods he has succeeded in obtaining pure digestive juices unmixed with food from animals in perfect health. His experiments have proved a vast amount of important facts concerning our digestion.



Dog at the St. Petersburg Institute with Permanent Opening Through Which the Digestive Saliva is Gathered.

For instance, he has proved that the stomach secretes a quantity of digestive juice in proportion to the amount of food taken in, but the composition of the

juices varies according to the composition of the food eaten. The secretion is not due to the mechanical action of the food on the walls of the stomach, and it is not caused solely or mainly by the chemical action of these substances.

Two factors intervene in the production of the gastric juice. One is chemical, but the other and the most important one is "psychic," or mental, as we might say. This is shown by the following experiment: A dog that receives an ordinary meal of ten ounces of meat secretes during the following hour about four-tenths of an ounce of very active gastric juice. On the other hand, a dog whose oesophagus has been opened and whose stomach receives directly the same amount of meat, secretes in the same time only one-tenth of an ounce of gastric juice showing that this amount is due to chemical action.

The dog who has received a "fictitious repast," that is to say, who has eaten meat which has not reached his stomach because it has fallen out through the hole in his throat secretes during the following hour three-tenths of an ounce of very active gastric juice. This latter is the psychic juice, also called appetite juice. It is the first of the two kinds to be secreted, and it is much the most important, both in quantity and in effect. The discovery of this juice has given us information not only about the animal's digestive apparatus, but also about his mental life, sensations, desires and nervous system.

The salivary glands, and especially the parotid gland in the throat, reveal even more than the stomach the relations between the digestive system and the mental life of the animal. When the professor threw little stones into the mouth of the dog, dropped in sand or

JUICES from Dogs

put anything unpleasant there, the mucous glands delivered a thin, weak, watery saliva. When he teased it with a piece of meat, a thick saliva flowed. When he showed the animal dry bread there was an abundance of saliva, although the animal had no great desire for this kind of food. When the dog was offered a moist food there was less saliva than in the last case, even when he had a great desire for this particular kind of food.

When the dog finds any substance whatever in its mouth, a certain amount of saliva is secreted by reflex action. That is called an unconditional mechanism. The permanent salivary outlet made by Pavlov enables him to gather this saliva and measure its quantity, to analyze it, to count the number of drops and to record its rate of flow.

Various associations of ideas are observed in the dog through these experiments. For example, the professor gives a dog his food several times to the accompaniment of a certain sound. After a time the dog will produce the psychic juice as soon as he hears this sound, without seeing or touching any food. That is what the professor calls a conditional reflex. These conditional reflexes have been obtained by means of lights, sounds and odors, heat and cold, mechanical irritations, etc.

The professor has proved a large number of facts about the mental abilities of the dog. He has shown that the dog can distinguish sounds separated by only one-eighth of a tone, especially if the two sounds are produced not more than ten or fifteen minutes apart from one another.

The dog, on the other hand, does not distinguish the different colors and gives up his saliva in equal quantity before a red, green, blue, violet, yellow or white light. The animal distinguishes very quickly the movement of objects and much more slowly their form. It localizes with great exactness tactile excitations, that is to say, spots where it is touched. It can associate various forms of excitations, such as several successive notes of music or a scratching and a cold sensation at the same time.

It is a very interesting sight to see rows of animals at the St. Petersburg institute, all fitted with apparatus to enable them to yield up their different kinds of digestive juices. They appear to be perfectly happy and many of them go voluntarily to the experimenter at the hour when he is accustomed to collect their juices.

Why CLARET Is Almost a TEMPERANCE DRINK

Many physicians think we would all enjoy better health if we followed the example of the French and drank good claret with our meals. Claret, they say, stimulates the appetite, is very agreeable to the palate and promotes digestion. And it contains such a small percentage of alcohol that it may almost be classed among the temperance beverages.

Of all the wines, claret contains the least amount of sugar, of alcohol and of acid. There is a widespread impression that white wines of the hook and mosselle type are more innocent than other wines in these three respects. That, however, is not the case.

To not a few people claret appears to be a sour-tasting wine simply because it contains no sugar to speak of, which in other wines masks the acidity present. Claret is practically a finished wine—that is to say, the original sugar of the grape is for all intents and purposes completely changed by fermentation, and the original strength of the Medoc grape juice as regards sugar is relatively weak, the amount of alcohol produced is correspondingly small.

The production of claret is perhaps the simplest example of wine-making. It is purely fermented grape juice with nothing added and nothing deducted. When, therefore, a wine becomes the subject of a prescription, it would appear that a physician in on safe grounds to recommend claret if qualities like freedom from sugar and from an excess of alcohol and acidity are characteristics to be sought for.

When a stimulant is ordered it has been customary for some time past to recommend weak whiskey and water as a safe beverage. The danger here, however, is that of overstepping the alcoholic allowance.

The simplicity of genuine claret is account-

able for its well-known sensitiveness, which, perhaps, has brought it into disfavor in some quarters. Its flavor is peculiarly evanescent and delicate, and is easily spoiled by careless management. But the fact that claret will not keep sound more than a few hours after opening precludes the suggestion of preservatives, including extraneous alcohol, being added.

As a rule, the best clarets are the most liable to become unsound. The coarse, fortified clarets keep longer for obvious reasons. Connoisseurs value sound claret for its exquisite flavor and delicacy of character.

Not so many years ago the fine wines of the Medoc, including all the superior classed growths but not them alone, commanded relatively high prices, but nowadays many excellent wines can be purchased showing all the pleasing qualities of the genuine high-class Medoc wines at a very reasonable figure. Excellent genuine wines, especially of the vintages 1907 and 1909, from the

best districts of Medoc and St. Emilion, and embracing such well-known growths as the Chateaux Giscours, Beychevelle, Leoville, Cos d'Estournel, L'Evangile and others are not at all high priced, while there is a large choice of wines of exceptional quality at considerably lower prices.

It is very doubtful, according to a writer in the *Lancet*, whether the supply of sound and really superior clarets was ever so good, so cheap and so plentiful as it is now.

From the point of view of alcohol, it is safe to say that if for beverage purposes at dinner or luncheon, claret were substituted for diluted spirits, liqueurs, and so forth, there would be much less alcohol consumed, to the unquestionable advantage of the consumer. Also the aesthetic palate would gain by those agreeable wholesome impressions which good Medoc wines are invariably capable of giving, and appetite is thus helped.

Why It May Be SAFE to EAT OYSTERS

In the minds of a great many people the oyster has for a long time run a close second to the house fly as a carrier of disease. Many who prefer it to almost any other articles of food have either banished it from their tables or eaten it very sparingly for fear it would make them ill.

Until recently this suspicion had the support of science, which attributed a large amount of the typhoid fever prevalent in certain localities during the winter to eating oysters and clams which had been polluted by sewage. Now, however, many scientists are beginning to wonder whether we have not been maligning the oyster, and some of them go so far as to say that our fears about it have no foundation in fact.

In the first place, the methods of raising and marketing oysters are so carefully regulated by law that the possibility of their carrying disease germs on a wholesale scale must be greatly lessened.

It is also claimed that the oyster's biological habits furnish pretty conclusive proof that it is not so dangerous as we have always thought.

During cold weather oysters rest or hibernate. All movement ceases, and no feeding occurs. During this hibernating period, even if oysters are lying in sewage-polluted beds, they will become practically free of the sewage organisms which cause disease.

Baltimore is the greatest oyster market in the country. For this reason Professor Joseph, of Johns Hopkins University, selected it as the place for an exhaustive bacteriological examination of all sorts and conditions of oysters.

The investigation revealed in the oysters many minute organisms which are always present in water, but these were found to hold no danger for human beings. Practically all the oysters selected from the open market in Baltimore proved to be absolutely free from sewage contamination or anything which could make them harmful to us.

The few lots which the investigation showed to be dangerous for human consumption were all obtained at times of the year when the weather was quite warm. This fact emphasizes the advisability of not attempting to prolong the oyster-eating season beyond the limits of the colder months.

SCIENCE NOW KNOWS--

WHY CURRANTS ARE GOOD FOR US.
CURRANTS, in spite of their rather insignificant place on our bills of fare, are decidedly beneficial to humanity. For their chief constituents, potash, tartaric acid—which give them their sharpness—and grape sugar, all easily digested substances, all have value. English dietitians, especially, harp on the health-preserving qualities of this small fruit.

AN ELECTRIC NET FOR INSECTS.
An effective method of exterminating grasshoppers and other insect pests has been devised in the Argentine Republic. An alternating current generator operated by a gasoline motor, is mounted on a cart, which also carries about 200 yards of cable. Through the latter a current is transmitted to a metallic net, which is placed on the ground or in the branches of trees. In the centre of this net is a transformer, which raises the tension to 6,000 volts, sufficient to kill not only all the insects but all their eggs over a wide area.

A NEW CURE FOR LEAD POISONING.
By plunging the victim of lead poisoning into a bath similar to that used by printers for electrotyping plates, the poison is drawn from his system, and he is usually cured after two or three baths. The effectiveness of this method is shown by the fact that after a sufferer has been given the bath large deposits of lead are found both on the electrodes and in the water.

SHEEP WITHOUT TAILS.
A new breed of sheep without tails and bearing great lobes of fat on their rumps has been introduced into South Dakota from Siberia.

A NEW THERMOMETER.
PROFESSOR LEONARD HILL, the well-known scientist, has invented an instrument known as the kathermometer, which records the rate of cooling of the atmosphere both at foot level and head level. By its means the rate of cooling on an ideal Spring day can be discovered, forming a model for regulating the temperature of rooms.

Where It Was HOTTEST Last Year

The "hottest" spot in the United States during 1913 was the city of Columbus, Ga. This statement does not refer to the city's climate, but to the amount of property destroyed by fire there in proportion to the population. "Hot spots" is the term applied by underwriters and others interested in fire prevention to the places where the flames do the most damage.

In Columbus last year the fire loss averaged \$41 for every man, woman and child. If a similar amount of damage had been done throughout the country the nation's total loss for the year would have been nearly \$4,000,000,000.

The reason why Columbus was the hottest spot last year was its improper construction and insufficient protection against fire of a compressed warehouse of thousands of bales of cotton were stored.

Other cities which won the unpleasant distinction of being extremely "hot spots" last year were Cohoes, N. Y.; Gloversville, N. Y.; Ottumwa, Iowa; Savannah, Ga.; Port Huron, Mich.; Quincy, Ill.; Dayton, Ohio; Dubuque, Iowa; and East St. Louis, Ill.

In most of these cities the great damage was due to the same avoidable causes which prevailed in Columbus, with the addition, in one or two cases, of poor water pressure.

How BETTER ROADS Are To Be BUILT OF RUBBER

RUBBER roads, though they may not be immediately practicable, are almost certain of ultimate adoption. But before the rubber road "arrives" a great deal of "missionary" work has to be done.

At present engineers responsible for the upkeep of roads fight shy of the rubber road proposition. Though it may be possible to calculate what a rubber road will cost, there is no definite and authoritative information available as to how long such a road will last under varying climatic conditions. It is useless to expect a municipality to consent to the laying down of stretches of rubber road at \$25 per square yard unless they are quite convinced of the life that they may reasonably expect to get out of the road.

It is for the purpose of obtaining such information as will be required by road engineers that the Rubber Growers' Association of England has made a free grant of 1,000 tons of plantation rubber and has offered an additional 1,000 tons at the nominal price of

25 cents per pound during the next five years. The rubber will be used in the first instance on difficult English roads, in order definitely to ascertain its merits.

Already the association has taken practical action by awarding its gold medal to M. M. Dessau for his successful piece of experimental rubber roadway as laid down in the Old Kent road, in London. In Mr. Dessau's system jarring wood blocks are used with a surface cushion of rubber, held rigid in position by dovetailing.

The blocks are readily movable, an advantage in these days of frequent subterranean excavations by electricity, gas, water, telephone, telegraph, hydraulic power, and other corporations. They interlock perfectly and give absolutely watertight joints, such as cannot conveniently be obtained in any other way. This prevents the ingress of moisture and the consequent damaging of the road foundations.

It is claimed that the latter do not require

to be nearly so strong in the case of rubber roads as with ordinary road blocks. The reason is that the vibration of the heavy traffic on the latter causes the concrete foundations to disintegrate, even if the thickness of the concrete is in excess of the now frequently adopted twelve-inch standard.

The fact that thinner foundations can be used with rubber roads can be set against the extra cost of the rubber blocks, though even then the costs will not be equal. But the life of the rubber road may be expected to be so much greater as to more than compensate for the extra cost, apart from the advantages of silence and the prevention of skidding and sideslip of vehicles.

The latter claim may at first sight appear a somewhat remarkable one, but it is a fact that the rubber road sections that have already been laid have proved to be most effective "non-skids." Even when covered with

oil, or when black-leaded, the rubber road does not appear to cause motor vehicles to slip. This was hardly expected when the first sections were laid down. In fact, so convinced were English insurance experts that the risk of disaster through side-slip on rubber roads was enormous that they quoted absolutely prohibitive rates when one section was being laid down, and a guarantee had to be given to the local authority. Now the premium is just the same as would be the case for any other road; in fact, it is no longer necessary to insure.

The section in the Old Kent road, after carrying for 295 days some of the heaviest traffic in London, amounting to ninety tons per square foot per hour for twenty-four hours, was not perceptibly worn, whereas an adjacent 4-inch wood block lost half an inch in thickness in the same time under the same load.

considerable extent. This fact has been proved by a series of experiments conducted by Professor David B. Cropp, director of physical training at Colorado University.

Professor Cropp used a squad of students and other men whose ages ranged from twenty to forty years. His method was to strap them upon a table, the leaves of which could be pulled out by turning a crank.

For two years these men were regularly stretched in this way. They gained in height more than two inches on the average. Since one inch makes a tremendous difference in the height of any one, it can readily be appreciated what such a large gain as two or more inches means.

The experimental table with improvised stretching

How You Can ADD TWO INCHES to Your HEIGHT

New Way to DETECT POISONS

CHEMISTS, police officials, coroners and physicians are intensely interested in the new discovery of J. J. Dobbie, F. R. S., the principal chemist of the English Government laboratories at London, who has concentrated public attention upon the great value of the spectroscopic as a means of detecting poisons such as strychnine, cocaine, morphine and similar dangerous drugs.

By throwing the ultra-violet part of the spectrum from such a source of light as is obtainable from sparking such a metal as iron, through the lens of a quartz spectroscopic, the lines of these drugs can be distinctly located. Each drug, it has been found, produces a characteristic kind of lines.

Hereafter when a person dies under circumstances suspicious of poison, the mixture of his or her stomach contents or other tissues will be taken to a physical laboratory and exposed to the quartz-lens spectroscopic with a sparking light from iron. If any of these fatal poisons are present their characteristic lines will show in the ultra-violet part of the spectrum and the exact cause of death will be revealed. A quartz-lens spectroscopic is used instead of glass, because glass cuts out the ultra-violet rays.

The most minute particle of poison can now be detected in this revolutionary fashion. Even as little as one five-hundredth of a grain of strychnine was thus found by Dr. Dobbie.

The South African pygmies are a powerful, useful little people. They are dwarfs that average about two and a half feet in height. Beside a native Kafir they look like toy dolls.

No American man or boy cares to resemble a toy doll. And every man who measures five feet six inches or less in height has hidden away in his heart a wish to be taller.

This desire to be tall has been all the more marked since anthropologists have begun to assert that the human race is growing smaller and smaller, and that all large animals, like the giraffe, the whale, hippopotamus, rhinoceros and elephant, are destined to be extinct within the next three generations.

This hope of man to grow tall has until lately been denied him by science. It has always been maintained that after the bones have hardened at twenty years of age or thereabout, there would no longer be any chance to reach the giant class.

Many physical culturists and directors of gymnastics refused to remain satisfied with this "so-be-it" attitude of medical men. They, like Edison, Pasteur, Ehrlich and other non-medically trained persons, determined to ignore as theoretical the "impossibility" of making grown men tall and to try to devise something that would accomplish the desired end.

Happily for all short men this "something" has been found. The discovery was aided by the finding by zoologists that the soft, rubberlike tissue called cartilage begins slowly to take on a new growth and to spread in the direction in which it is relieved from bony pressure.

Bones, thus enough, do not grow much during and past middle life, if, however, the bones are pulled apart and kept free from pressing upon the intervening cartilages, these will gradually grow and expand to the bone pressure.

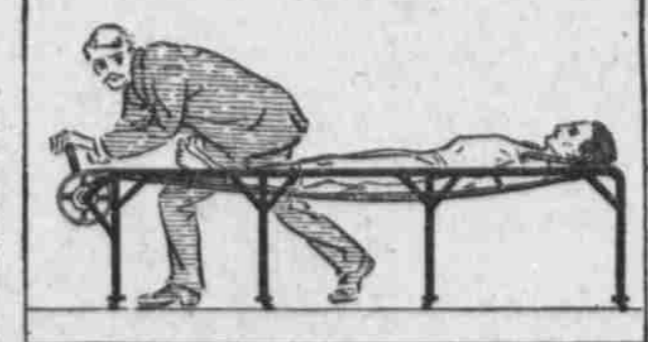
leaves has been developed into a simple framework of telescopic-like pipes fitted with straps. A bit of carpet or hammock-like material is swung between the pipes, and the one who wishes to be made tall rests upon this every day for two years.

If you are a bit bent, if you are round-shouldered, if your work has given you a habitual stoop or if you are not tall enough, this device of Professor Cropp's will not only lengthen and straighten you, but strengthen you as well.

While the cartilages are thickening to increase the length of the spinal column and therefore the height, they are also increasing their effectiveness in other directions. They protect the spinal cord from any jar which might otherwise result from having the bony vertebrae too close together. They also protect the numerous nerves and blood vessels which pass through the cartilage on their way to other parts of the body.

Any shrinkage of the cartilage results in harm. The chances of a serious shock to the spinal cord are greatly multiplied, and the constriction of the spaces, by increasing the pressure on issuing nerves and blood vessels, reduces the capacity of these channels. The extent of damage which ensues depends, of course, upon the amount of shrinkage. Very often it is so pronounced that practically all the blood supply is shut off from some portion or portions of the body. Often a nerve is killed, or so irritated by the vertebral pressure as to become useless, and partial paralysis results in the part it supplied.

The tone of the muscles must vanish before decrease of the nourishing blood and nerve supply. The stoop so often apparent even in middle age, is nine times out of ten the result of an unconscious attempt to relieve pinched nerves somewhere along the spine, and to guard against the nervous shock which any jar of the body produces upon the flattened cushions.



The Stretching Device Which is Now Being Successfully Used to Increase a Person's Height.

How Far House FLIES TRAVEL

R. J. T. NASH, an English physician, who has devoted much attention to the spread of disease by flies, finds that the common house fly does not readily leave a house in which it finds protection, warmth and food. Such houses situated near places where flies breed—where garbage is deposited, or refuse from stables is kept unduly long—suffer from a plague of flies not found in houses in the next street further away.

These nearer houses effect a considerable arrestment of the spread of flies. In these in-

fested houses, although fly-paper may kill hundreds, just as many are found twenty-four hours later if the windows are left open and the weather is warm.

Where flies are numerous, they decrease in numbers, in different houses, in inverse ratio to the distance from the breeding ground. Flies fly farther when places of arrestment, in the shape of houses, are few or far off.

Where houses are few, more flies will be found in houses half a mile from the breeding place than where houses are many. Where houses are numerous, few flies will travel more than a quarter of a mile.

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