MYSTERY OF HEART-BEATS EXPLAINED.

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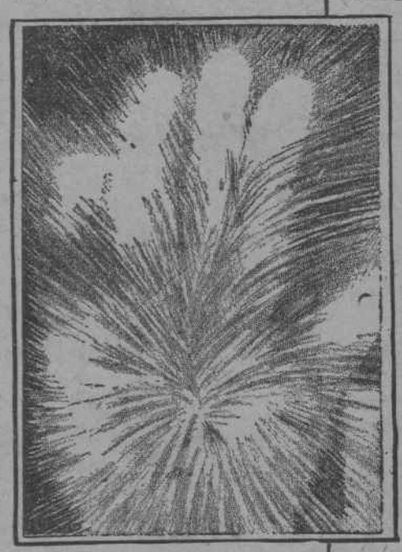
Prof. A. D. Waller, M. D., F. R. S., of London, finds that the heart is run by electricity generated in the body.

By Professor Augustus D. Waller, Physiologist of the Royal Institution of Great Britain.

I HAVE been able to show by laboratory experiments that the human heart has an electro-motive force, and electricity may be considered the cause of its beating. I have also traced the electric currents that are sent through the various parts of the body. In addition to muscular electricity I can proceed a step further and show that an electrical effect accompanies a natural discharge of nerve impulses. I have found that the galvanometer is a good indicator of physiological changes. To watch the alterations of physiological activity taking place in fatigue or under exercise or other influences, the electrical effect is an exact measure of the action in the muscles.



It is a by no means slight advantage that the photographic record of each and every observation can be easily taken and preserved for future reference and be as authoritative a century hence as to-day. The nerve will record its own series of answers during any treatment to which you see fit to subject it. It cannot give a false answer. So fine are the electric instruments that may be used that they can detect the difference in vibrations of muscles and of nerves. By this means fatigue of the muscles may be detected while the nerve continues unimpaired and vice versa. This introduces a new element in the diagnosing of disease.

WHAT makes the heart beat? is a question that has never been answered until now. But Professor Augustus D. Waller, the eminent physiologist, of London, now announces that heart beats are caused by electrical impulses.

How the heart is run by electricity and how the electric currents extend throughout the body is shown by a simple experiment.

A professor of the British Royal Institution a few weeks ago took up a vial of cow's blood, into which he put two wires connected with an electric bell. He then added some oxygen to the blood, and, behold! the bell began to ring.

The oxygen, when it came into contact with the carbon contained in the blood, had generated an electric current, such as is produced in any of the chemical batteries used in the telegraph and telephone offices.

The heart is divided into two sides—right and left. The blood makes its circuit from the right side of the heart to and through the lungs, to the left side of the heart; thence through all the arteries of the body, and returning by way of the veins to the right side of the heart.

When oxygen comes into contact with carbon at a varying temperature an electric current is produced. The blood which travels from the heart to the lungs contains large quantities of carbon, which is impregnated in the lungs by the oxygen contained in the air we breathe, and there is a constant generating of electric current in the lungs.

The heart valves offer a certain muscular resistance to the action of this current, and it is the periodical overcoming of this resistance by the electric stress which causes the "heart beat." Perhaps the electric current also, to a certain extent, carries the blood along with it by inductive influence. The lungs may be looked upon as the electric battery, and the heart as the relay or repeater.

In this way the electric current from the lungs runs the heart as it runs telegraph instruments, telephones and other every day things. And not only runs the heart, but the brain and the entire systems of thought, speech, hearing, sight, touch and smell as well, which are all connected by a most elaborate and perfect network of electric wires known as nerves.

In addition to the primary current of electricity generated in the lungs for the running of the heart, extra currents are generated as required at various remote parts of the body by the now very well known red-blood corpuscles.

Professor Waller, of London, points out that his discovery of the electrical currents of the human body may be turned to immediate practical use by physicians in diagnosing disease.

For this purpose he recommends a simple galvanometer. By the deflection of a needle on a dial may be shown the volume or strength of current that is passing through any portion of the body.

The degree in which that electric needle varies from the normal will show the relative weakness or strength of the person. Besides this the instrument can be so adjusted as to distinguish between the currents in the muscles, and in the nerves. This would show whether the disease or ailment of the person, if there be such, were nervous or muscular, and might even indicate the exact seat of the trouble.

In a healthy person the galvanometer merely measures the currents of electricity which are passing from one part to another. In a certain sense it also measures the personal magnetism of a person.

To test Professor Waller's discovery an interesting experiment was made by the Sunday Journal last week. Miss Lottie Alter, the petite comedienne of the Red, White and Blue Comedy Company, offered her pretty arm for the sake of science, and Mr. C. F. A. Boulton, electrician, conducted the electrical test.

While Miss Alter held the galvanometer in one hand Mr. Boulton held the electrodes to her other uplifted arm about six inches apart on the biceps. The galvanometer needle quivered, moved slowly around the dial and stopped at 27 degrees, as shown in the accompanying photograph.

This was the measure of Miss Alter's electrical circulation—or of her personal magnetism. She is the first actress who has ever had this subtle and bewitching quality actually measured in cold figures.

Another remarkable electrical quality of the human body has been discovered by Professor Adrien Majewski, of Paris, a scientific experimenter, who has found that the hand will photograph itself with its own light, which it throws off like an incandescent lamp.

The pictures which are made by this hitherto unknown electrical radiation from the human body are scarcely less wonderful than those which Professor Roentgen astonished the world with two years ago with his mysterious X rays.

The novel photographs of hands which are reproduced in the accompanying pictures show Majewski's left hand, from which the electrical rays branch out like the curving lines of iron filings arranging themselves around a magnet. The other photograph, in which the tips of the fingers of two hands are brought into opposition to each other, show a strange phenomenon.

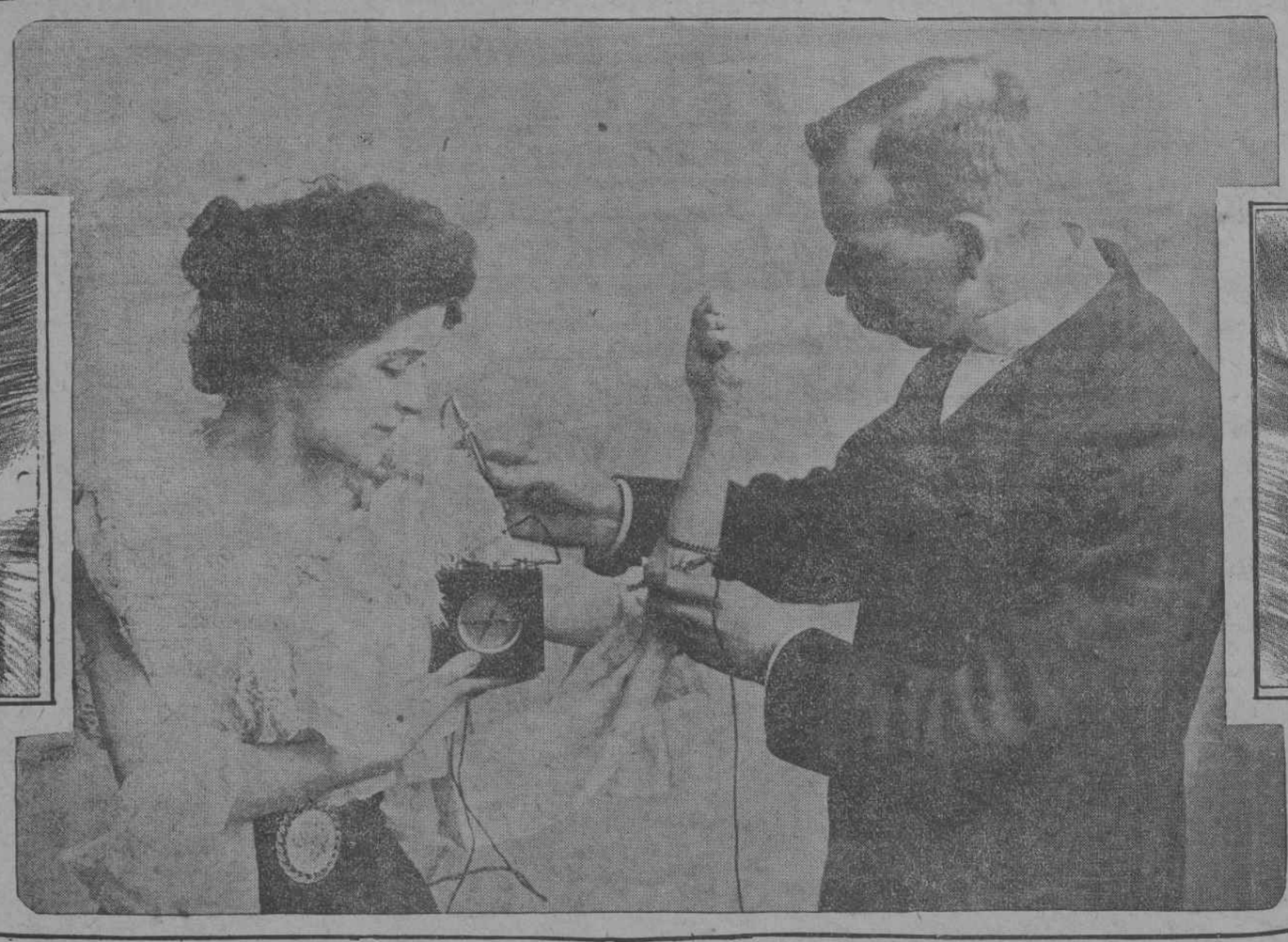
The radiations of light turn aside, indicating electrical repulsion. The hands are those of persons not in sympathy with one another. This is probably the first time that antipathy has ever been photographed. Other experiments in the case of persons of sympathetic natures revealed the electrical rays flowing from one hand directly to the other, showing magnetic attraction.

The way in which these pictures of hands photographed by their own light were obtained was by placing the hands upon a sensitive photographic plate immersed in a developing bath of hydroquinone. The pictures thus obtained have been the wonder of the scientists of Paris during the past month. The conclusions which they draw from them are that rays of photogenic light, invisible to the human eye, come from the hand and make an impression on the photographic plate which, as is already known, is far more sensitive to light than the retina of the eye.

These new and strange qualities of the human body offer an explanation of hypnotism, mesmerism, mind-reading, telepathy and many other "isms" and "pathys" which come under the head at present of "occult" sciences.

Electricity is the most mighty, mysterious and uncertain power that man has thus far had any dealings with.

In the light of the present discoveries nothing is easier of belief than that a man of high electric force should be able to influence the thought or action of one of less electric force; or, by putting himself within the field of electrical influence of another person, realize that person's thoughts in his own brain.



LEFT HAND OF PROFESSOR MAJEWSKI, PHOTOGRAPHED BY THE INVISIBLE ELECTRIC LIGHT GENERATED IN IT.

Experiment to Measure Strength of Electrical Currents Passing Through the Body. By Miss Lottie Alter's Arm the Galvanometer Needle Was Moved 27 Degrees

Prof. Adrien Majewski, of Paris, discovers that the hand can be photographed by its own electric light.

By Professor Adrien Majewski, the Famous Parisian Scientist.

IT seems almost incredible that the human hand has such strong electrical qualities that it gives out an electric light like an incandescent lamp, but that is what is shown by the photographic plate. The pictures which I have obtained have been made by the simple process of placing my hand over a sensitive plate in a dark room. After fifteen or twenty minutes of contact the image which appeared on the plate was almost as distinct as if my hand had been photographed by sunlight.

Whether all persons' hands give out sufficient electrical rays to make a photographic impression I am unable to state. It is possible that only people with strong magnetic qualities can produce this effect.

I have long been aware that my hands gave out a strong magnetic influence. It was this which prompted me to see whether this electricity would make any impression on a photographic plate. To my surprise I found they did. I also found that these luminous jets or currents which radiate from the hand flow freely between hands of persons in sympathy with one another. But in the cases of persons not in sympathy the electrical currents as shown on a photographic plate are turned back and flow in opposite directions.

HANDS PHOTOGRAPHED BY THEIR OWN ELECTRIC LIGHT SHOWING HOW THE ELECTRIC WAVES ARE REPELLED BY PERSONS NOT IN SYMPATHY.

CURIOUS REVELATIONS OF THE SECRET HOPES AND AMBITIONS OF OUR PRIZE FIGHTERS.

(Copyright, 1898, by W. R. Hearst.)

EVERY prize fighter yearns after some ideal far removed from the ring. This will interest but not entirely console those who witnessed a recent fiasco.

Fitzsimmons, the champion; Corbett, the conqueror of the great John L.; McCoy, the enigma of the ring; Maher, the oft-defeated but ever popular Irishman, and Sharkey, the able seaman, who came from obscurity to prominence in eight short months, are all characters. Each has his little oddities, weaknesses and deeply buried ambitions.

Of them all James J. Corbett, who fought the queer fight with Sharkey on Tuesday, is by far the most intelligent and interesting. Having made a new standard for fighting men, he has made enemies. There are thousands who can never forgive him for having defeated Sullivan. There are thousands more who dislike this slender, well dressed fellow who makes his living as a fighter but has nothing in common with them outside the ring. Whether or not Corbett will ever be champion again is an open question, but there is no question as to his place among them as a man.

His great ambition is to be a gentleman and a society man. He believes himself one of the few men who can wear a dress suit with grace and ease.

FITZSIMMONS ALWAYS CAREFULLY BRUSHES HIS HAIR BEFORE ENTERING THE RING.

By the horde of hangers on who cling about every famous boxer like leeches he has been called a miser of the worst kind. Again, he is said to be arrogant, "stuck up," and altogether too good to speak to ordinary boxers. To his disadvantage he is compared to Sullivan as a man and a philanthropist. These critics are not altogether trustworthy.

One afternoon last week, while he was rubbing down after training, a strange man entered the room and asked if Corbett could give him the California address of a man whom Corbett had befriended again and again, and who in every instance had ill-treated his charity. Corbett, remembering the way in which the man had shown his gratitude, flew into a passion and declared he did not care where he lived, and did not want to hear his name. The stranger begged Corbett's pardon, saying he knew the circumstances and quite agreed with Corbett. "But," he continued, "the fellow is dying. He hasn't a friend on earth, and I thought if his folks knew they might bury him."

M'COY WOULD BE A SOCIETY ACTOR.

Corbett was dressing for the street as the remark was made. He stopped with his neck scarf half tied. The anger had gone from his eyes and voice.

"Where is he?" asked Jim, quietly.

The stranger told him.

"Will he live until to-morrow?"

"Perhaps."

"Well, I can't go to-night," said Corbett, "but I'll be up and see him to-morrow. You tell him that, will you? And his folks are not very well off, so you had better not say there is no one to bury him. I'll do that."

The man died an hour after Corbett had left, and the following day Corbett got enough men who knew him to fill four carriages, and acting as one of the pall-bearers saw the man put in a respectable grave.

Corbett, when an instructor of boxing, was known as the "Nimble Professor." It was in those days that Corbett was the humorist. A big, burly fellow once came to him for instruction, who, in spite of his size, could not hit hard enough to break an egg. The fellow believed he was a terrific hitter, and Corbett decided to let him think so. One day the big fellow happened to hit Jim in the body with his right hand. Corbett at once dropped to the floor groaning. The fellow apologized, and Jim arose and, after cautioning him, began again. The fellow feinted with the right again, and Corbett pulled off the gloves, saying he would not box if he had to be hit with that hand. The man promised not to use it, and went on. Finally everybody in the club realized the joke, and used to help Corbett carry it out. For five years the big fellow never used his right hand, believing he was liable to kill some one.

Once a man with long, flowing chop whiskers came to Corbett for instruction. He wanted a lesson each day. He was awkward, and Corbett knew the fellow would never learn to box. But the man persisted, and Corbett used to set him punching at the wall for a half hour each day while he instructed others. Now and then he would go to the man and tell him to shift one foot or the other a trifle. Then Corbett would go to lunch or to a matinee, but the fellow was always there on his return. He stuck to that wall, and Corbett says he believes he would be at it yet if he had not married.

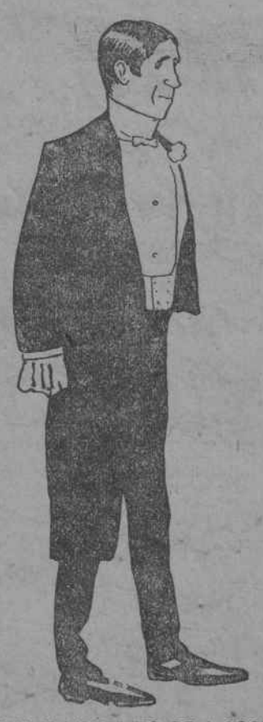
Fitzsimmons is a strange mixture. His one consuming ambition is to be a great tenor singer, and he leans a little bit toward choir work. Another vanity is his feet. He wants them to appear small and always wears a shoe two sizes too small. Barring the tenor ambition, he believes if he had a hotel near a race track, a horse-shoeing shop in connection, ten healthy children and a dancing master to instruct him in all the latest steps, he would be quite content. He is a first class cook, a crack shot with either pistol or rifle, can run a hundred yards close to eleven seconds and is a heel and toe walker of a rare variety. Further, he can out-wrestle any man in the fighting business and has wrestled for $1,000 aside. He was a professional oarsman in Australia, and can tame any animal that is tamable.

MR. PETER MAHER PINES TO BE AN IRISH LANDLORD.

FITZSIMMONS WOULD SHINE AS AN OPERATIC STAR.

He is the most domestic man of ring history and has theories on heredity that are worth consideration. His last act before entering a ring is to brush his hair, of which he has none.

Peter Maher has an ambition to be an Irish landlord. He worked in a brewery in Ireland when this desire got hold of him. It got him into professional football, and then boxing. He is now an Irish landlord and also owns property in Philadelphia. He is exceedingly fond of race horses, and now wants a racing stable. He is a quiet, kind-hearted man, married, but as shy of women as a Hottentot is of civilization. An exceedingly rough fighter, with the most dangerous right hand straight punch of any man of history. He would rather fight a clever man than a rough one, and dislikes to punish anybody unless angered. Maher is in fairly good circumstances in spite of the fact that he is always at a race track and forever betting.



CORBETT HOPES TO BE A SOCIETY LEADER.

"Kid McCoy" will be recognized as the name by which a notorious safe cracker was once known. Norman Selby took that name, together with the prefix Charles, and became a boxer.

His one great ambition was to outshine Corbett as an actor, but stage fright settled that dream. He would like to be the champion of the world, but realizes that his physique is against him. He pads his shoulders and does the best he can to make look the part, at least.

McCoy trusts no man on earth and is beyond argument the most treacherous man with whom boxers have ever tried to deal. He is cold, calculating and one of the best readers of human nature the ring has ever known. Never in his life has he got the worst of a business deal, and a certain life insurance company claims that Kid McCoy taught them things about writing endowment policies of which they never dreamed. He has considerable money and knows as well how to keep it as any human being. He is subtle, tricky and as devoid of gratitude as a pagan idol.

FITZSIMMONS AS A FAMILY MAN.

Thomas Sharkey, able seaman, who met Corbett on Tuesday, is the queerest character of them all. Fully nine-tenths of his life from the age of nine to twenty-four were spent at sea. He was a fighting sailor of the rough and tumble school and beat every man who ever put up his hands to him for years.

His one wild ambition is to be considered as good a dresser as Tod Sloane. He has more clothes than most second-hand stores carry in stock and has been known to wear fancy double-breasted checked vests with evening clothes. There is nothing pleases him better than to be told he is a loud dresser. One of his particular weaknesses is his love for socks of wondrous hues. Once in San Francisco Sharkey found that a certain artist had "socks" which outdid his. It was a terrible blow, but the seaman went on a still hunt and finding some in which green, red, yellow and blue took alternate trips across the instep, went after his rival, the artist. He found him in one of the most fashionable restaurants in San Francisco, dining with two ladies. Pleased at the opportunity of showing the ladies that their escort was not the "whole thing in socks," Sharkey walked up to him, tapped him on the shoulder and lifted his trousers that a good six inches of the socks might be seen and turning said: "Oh, I don't know!" and left the restaurant. It need not be added that there was considerable confusion, explanation and humiliation.

Sharkey's first photograph after he had decided to be a Beau Brummel is really worth going a distance to see. Thomas wore a light overcoat that was made to order. In one of the top pockets a red silk handkerchief could be plainly seen. In the pocket on the opposite side a pair of gloves were tucked, the fingers sticking out. The picture was taken full face, or, as the able seaman would put it, "head on." Thomas stood holding his hat as undertakers do, but he held it well off to port that it might not prevent the camera from taking those gloves. The pictures are now at a premium, and going up.

Sharkey wants to second John L. Sullivan. The man from Boston is to him the greatest man of history. If Thomas Sharkey could become the champion of the world the world wouldn't hold him. He is a very bad diplomat, has a low order of cunning, but, taken all in all, is quite a good fellow if left alone. He makes some awful blunders trying to be what his manager wishes him. Sharkey, as the big, good-natured fellow who came East looking for fight, would make friends. He should remain natural if he wishes to be popular. Although not clever or in any way scientific, he is a natural fighter. He is exceedingly strong and tireless as machinery. He never drinks or dissipates in any way, and that virtue alone may some day be instrumental in making him a success as a boxer.

RIGHT CROSS.

TOM SHARKEY DESIRES TO BE AS WELL DRESSED AS TOD SLOANE.

Beautiful New Fashions in Furs.

See Page Three, Photographic Supplement.

THERE was a time when fine furs unadorned were adorned the most in the eyes of the fashionable woman. A plain sealskin jacket, loosely hanging on the figure, was all that the most fastidious woman could desire.

But this year the new furs tell a very different story. Like the gowns of the day they are all much trimmed.

They gleam with jewelled buttons. They are softened with frills of lace. They are made with embroidered silk vests. They are adorned with big and little velvet bows and in their combinations they are curiously novel.

The newest, most approved fur coat of the season is shown in the centre photograph on Page 3 of the Photographic Supplement. It is a three-quarter length coat of Persian lamb, cut in the prevailing mode. The large revers roll back to display a gorgeous vest of white silk embroidered in a conventional floral design with violet, pink and gold threads.

Four large amethysts in rims of gold trim the coat as buttons. The storm collar, the cuffs and revers are unusually deep. The coat is lined with violet peau de soie.

For carriage and theatre wear capes are high in favor. They also are three-quarter length and have many novel features. One of the most effective is pictured in to-day's photographic supplement of the Journal. It is a costly wrap of sable, made with a double ruffle down the front. The ruffle is faced with silvery green satin, and it is always arranged so that its satin lining shows.

Capes which are but little longer than collarettes are much worn for certain occasions. Though their foundation is fur, they are oftentimes so overtrimmed that but little of the fur is visible. A shoulder cape of this description, pictured on the same page with the sable cape, is made of automobile red velvet shirred, black Persian lamb, mink, and a frill of chiffon the same shade as the velvet. It is extremely effective and is sold with a fancy muff to match.

Collarettes are seen in an endless variety. They are simply bewitching. One of the newest is made of chinchilla, with an extremely high collar. The collarette falls over the shoulders back and front in tabs. At the back there is a big butterfly velvet bow of violet velvet caught in the centre, with a jewelled buckle.

Collarettes of fur tails and a ruche of chiffon are all the vogue among women who aim to be novel in their dress.

Some of these fanciful neck affairs are wonderfully soft and pretty, but they are not to be bought for a song by any means.