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CONCERNING THE X RAYS

AN INTERESTING ACCOUNT

How the Phenomena may be Produced—Instruments Required—Results of Experiments by our Students.

Since Roentgen's discovery of the possibility of photographing through opaque substances by means of a Crookes tube, a number of scientific men have been at work, some studying the process, others trying to get the same effects by other means. The following are some of the processes already used and are said to give the desired results.

The brush discharge which occurs between the two terminals of an induction coil when they are too far apart for a spark to pass between them. The brush appears as purple streamers shooting between the terminals.

Burned-out incadescent lamps having filament stubs for the anode and a piece of tin-foil attached to one side of the bulb for the cathode. An induction coil is used to operate the tube so made.

A photographic plate placed between two insulated metallic plates which are connected to the terminals of an induction coil. In one instance, these plates were about six inches apart.

An arc light has also given results

These methods have been varied somewhat in details, but as final results the photographs produced give the shadows of the objects placed upon or before the plate. The supporters of each particular method claim that the photographic effects are due to the production of x-rays, but whether the rays are produced remains to be seen, and there are some scientists who already doubt the similarity between the actions in the methods mentioned and the action in a Crookes tube.

The photographs produced by the x-rays show the shadows of objects, also any variation in structure. From the fact that the shadows of different substances, the metals for instance, have different intensities, it is naturally supposed that some are more easily traversed by the rays than others. Experiments thus far made seem to indicate that the more dense the substance the greater the resistance to the rays. Gases have been used to show this, varying the density by pressure.

The exposure of a plate to the effects of a Crookes tube is a comparatively simple process. Since glass acts as an opaque screen, and because there is no way of bending the rays out of their course by a lens or other means, a camera is of no service. All that is done in making an exposure is to place the objects to be photographed between the tube and the plate, the latter being held in an ordinary plate holder.

The tube is the most important part of the apparatus and must be made with care, owing to the high vacuum necessary for the production of the cathode rays. That great care is required in producing the vacuum can be readily understood when we compare the column of mercury which is sustained by the ordinary atmospheric pressure and the column which is sustained by the pressure within a Crookes tube. With the former, the column is about 760 millimeters in height, while the pressure of the gas which remains in the tube will only sustain about 1-1,000 of a millimeter of mercury. Edison claims to get the best results from a vacuum which is represented by a pressure of about 1-200 of a millimeter of mercury.

The tube as originally constructed by William Crookes, F. R. S., and later by other makers, had a rather thick glass wall, but by substituting a piece of aluminum to serve as a window, the effects produced by the x-rays were increased. Tubes are now made with a very thin glass wall and are entirely satisfactory in operation.

The cathode rays are electrified particles of the air which remains within the exhausted tube. The direction of vibration of these particles is parallel to the direction of the rays, differing in this respect from ordinary light which is produced by vibrations perpendicular to the direction of the rays. A peculiarity of the cathode rays is that they may be bent out of their course by means of a magnet held near the tube. On the outside of the glass at the efflorescent spot there is no light similar to that produced by the cathode rays and from the fact that the x-rays radiate in all directions from the spot and are not affected by a magnet, it seems natural to conclude that the x-rays are not cathode rays.

A number of scientists are inclined to believe that the x-ray is some sort of molecular action, perhaps of the ether, and that the vibrations are longitudinal as in the cathode ray. The action of the rays is opposite to that which would be noticed in the case of electrified particles. It is yet to be determined whether the wave length is very short or very long. A simple test seems to show that the nature of the x-rays is similar to that of the ultra-violet portion of the spectrum and this may also show that the wave length is very short.

A property of the x-ray is that of causing efflorescence of certain substances, barium platino-cyanide being, perhaps, the best for this purpose. By substituting a screen coated with this compound for the photographic plate, the portions not protected by hidden objects will give light and in this way the exact location of the objects can be seen directly by the eye. It is barely possible that the action upon a photographic plate is not due to any chemical action which these particular rays have upon the film, but is a secondary one due to the efflorescence of the salts in the film and it is this light which produces the chemical change. As a support of this theory, we have the report of an experiment made by Edison upon plates having different degrees of quickness. He found that the slow landscape plates were quickest for this new process. Is it not probable, then, that the salts in the slow plates give a stronger efflorescence than those in the quick or instantaneous plates and in this way produce an effect opposite to that which is observed with ordinary light?

The conductors of platinum wire are sealed into the glass wall of the tube at some distance apart and usually at right angles to each other. In order to prevent excessive heating of these conductors (due to the action within the tube) and consequent danger of the destruction of the vacuum, they are provided at the inner ends with knobs or discs of some metal, preferably of aluminum. These two terminals are known as the "anode" or "flowing-in" pole, the "cathode" or "flowing-out" pole.

When the discharge from an induction coil is passing through the tube, the whole interior is dark with the exception of the region of the cathode where the cathode rays have their origin and which pass from the terminal to the opposite wall of the tube in straight lines if no external influence is brought to bear upon them. Where the cathode rays strike upon the glass the phenomenon of efflorescence is produced and it is from this efflorescent spot that the x-rays are said to have their origin.

The possible uses have been much discussed in the various newspaers, so it is unnecessary to take up space with the long list. As to the value of the process both for scientific and for practical uses there can be no doubt, and not a few scientific facts are looked for as results of the exact determination of the nature and the action of the "X" or "unknown" ray.

A Sprengel pump has been constructed in the physics department of the university and within a short time some experiments will be made to investigate the action which takes place when a Crookes tube is in operation. Lack of proper apparatus has prevented anything definite being done during the past few weeks.

Word was received Friday by friends in the city of the death of Will C. Hall, a former student of the university, and in 1893-94 an assistant in the zoological department.

Mr. Hall was a close student, an accurate observer and a genial, companionable man, who seemed destined to do a good work in life. He was compelled to give up his school life on account of the appearance of Bright's disease. By living in the open air and by careful attention to his diet his physicians hoped to ward off fatal results, but a few months ago he was ordered to Arizona and told that he could not endure a northern winter. The telegram indicates that Mr. Hall died on the 26th at Temple, Ariz. The case is all the sadder from the fact that Mr. Hall's father is very ill with rheumatism at Hot Springs, Ark., while another member of the family is recovering from a serious illness at the family home at Creston, Ia.

THE SOMBRERO ELECTION

'98 ELECTS THEIR BOARD

A Harmless Rivalry for Offices—There Were too Many Good Men. Everybody is Satisfied

The wave of excitement which flows over each successive sophmore class about this time in the year struck the class of '98 a little earlier than it has some of the preceeding classes. As much as four weeks ago little groups of "sophs" might have been seen in the halls and on the campus (you could tell them by that wiseatmanintheworld look that they all wear) and the theme of every conversation was "The Junior Annual."

A week ago last Friday a meeting, which brought out a very large representation of the class, was held in room 3. The number of officers to be elected for the annual was determined upon at this meeting and the date of election set for last Friday at 1 o'clock.

Some lively caucusing was done during that week, but no one seemed to know how it would come out. Three officers were practically conceded by the leaders as being settled. They were McKay for one editor-in-chief and Pierson and Russell for business managers. The fight was evidently to be made on the other editor-in-chief. Yet up to the last day everybody seemed to think it would be a society man.

In fact a ticket was made out with Boomer of the Deltas in this place and a very fair division of the board among the fraternities, societies and outsiders. It seemed probable that this ticket would carry with little opposition till Friday morning. At that time the members of the class outside of both fraternities and sorieties came to an understanding among themselves and insisted that Barron should take Boomer's place upon the ticket.

With this idea in view a new ticket was printed with McKay and Barron as editors in chief and Pierson and Russell as business managers, and a board consisting of six fraternity people, four from the societies and four outsiders.

These two were practically the only tickets that came up when the meeting was called at 1 o'clock.

Business managers were voted on first, J. E. Pierson and Phil. Russell getting all but a few straggling votes.

For editors in chief Will L. McKay was upported by both tickets and received practically the unanimous vote, while P. J. Barron was elected over Boomer by a two-thirds majority.

As members of the board the ten named below were elected, receiving pluralities in the order named: John Tuttle, George Burgert, T. D. Lunn, Ellen Gere, Lisle Wilkinson, Charles Morrison, E. A. Wiggenhorn, C. H. True, W. Axling, L. J. Belknap.

A staff of artists was elected consisting of Jessie Lansing Vergil Barber, Pearl Wycoff, Miss Lytle, C. C. Culver, May Wilson.

Thus it was started. During the past week the business managers have received several bids for printing and in time will be able to report to the editors and the class the prospects for the annual.

Regardless of the tussle for the officers the class is a unit in its desire for the success of the Annual and every member will work hard for its good. If '98 don't have an Annual it will not be for want of ability and push.

FOR 16 TO 1.

About fifty free silver men met in Union hall Tuesday morning at chapel time and took steps to organize a permanent free silver club. C. M. Barr was made temporary chairman and J. H. Lien, secretary. A committee consisting of R. H. Graham, O. H. Allen and Eugene Pace was appointed to get permission for the use of the chapel and obtain a speaker. The use of the chapel has been granted, and the probability is that W. J. Bryan will deliver an address soon. A committee was appointed to draught a constitution and to take the proper steps to affect a permanent organization.

A PARABLE.

Once upon a time there was an old man and he had one son and it came to pass that when the old man had husked his pumpkins and harrowed his peach orchard and threshed his gooseberries, he decided to send his promising son to get an education according to the fashion of his people. So he hied him about and packed up the carpet bag with a hickory shirt and a hymn book and a paper collar and a boot-jack and sent him on to college.

Now, when the son had got him into the city and began to look around him he nearly dropped dead. His knowledge of the deceitful and designing female sex had been limited to old maid school teachers and cross-eyed farm girls and he marvelled exceeding much at the frat girls with their Henry VIII. plumes and dotted veils and Trilby walks and he said unto himself, "Forsooth this is right in my line," and he telegraphed home for some shekels.

And it came to pass that the son got the regulation four second introduction to one of the girls and he straightway began to do the right thing. Moreover, he was a young and callow youth who did not understand the noble and popular art of limb jerking, so when the girl began to throw around broad hints about oysters and theatre tickets, he bit even as the sucker biteth, and stood off his board bill. But it eventually came to pass that he broke the family bank and on a certain night he spent his last round samoleon for flowers for his charmer and it chanced that about this time the girl got onto the state of affairs and decided that she must look for another fellow, so she put an extra curl on her forelock and powdered her nose and throat and sailed out for a new victim—and she didn't have to sail long, either. And it came to pass that when the farmer's son come to look for her on the dancing floor that night he found her in the corner with another fellow. And behold, she had given the other fellow one of his roses to wear. And the farmer boy wist not why it was so. And he waxed exceeding wroth and grew warm beneath the collar and he pranced up to where the pair were chinning each other and said: "O, faithless maiden, is this your gratitude? Methinks this is a rather raw deal. You give this duffer the roses that I paid for and he gets your smiles and pleasant looks. Now what forsooth do I get?"

And the fair maid looked up and said, "You get nit!"

And it dawned upon the farmer boy that he was getting it in the neck and he sneaked out, and in the morning he had to pawn the family watch to get him a meal ticket.

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Now this is not only a true story, but a common one, and if I should tell who I have in mind there are half a dozen other fellows who have been through the same mill that would feel slighted.

H. S.

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Wednesday morning between the hours of eight and a quarter after a man with a cadet cap and questionable actions, bounded with three leaps in the Co-Op. He was attired in a military overcoat, buckskin leggins, cartridge belt and two horse pistols. When he arrived at the center of the room, brandishing a pistol in one hand and the cavalry saber, which had been strapped across his back, in the other, and while the members of the Co. Op. hastened off to find McDowell, and while the editor, in his official seat was reaching calmly for his six-shooter, the gentlemen burst forth with, "We will be free!" "On to Cuba." Don't shoot till you see the whites of their eyes," and "If anyone attempts to pull down the American flag spot him on the snout!!"

Corporal Hinds hearing the disturbance hastily called together a small volunteer company and marched with regular steps to the rescue. Arriving at the Co.-Op. the little corporal commanded by the "right flank march!" and filed his army into the room.

Already a few snap shots had been exchanged between the man of such questionable designs and Cornell. But soon by the aid of the Hinds volunteers the editor was able to overpower the demon and we soon discovered what we had done. For it was no one but Gen. Bill Grant, P. B. D. C., calling the attention to the expected and hoped for war with Spain.

Professor in English (becoming angered at the inattention in class): "This is an outrage. I dislike to insult the literature by reading it to such a class! It looks like a lot of Philistines had strayed in." "Then (smiling) I wish the class would elect a Sampson."

Student (in back seat): "I'll act professor if you will lend me your jawbone."

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THEY WILL TALK A BRACE

PERSHING RIFLES WARE UP

Will go After Some Good Men and Weed out the Poor Ones—They Will Give a Hop Soon.

The Pershing Rifles company thus far this year has hardly realized the expectations of last spring. The election of John Dixon to the captaincy was surely a wise and valuable step. Previous to Mr. Dixon's acceptance the members of the company had lost nearly all interest; a few enthusiasts alone attended the regular drills.

Dixon saw what was needed and went to work at once. The splendid drill on charter day is one of the results of his work. From this drill interest has awakened in the company to an intense degree, not only in the members, but also in the friends outside.

Thursday night very important action was taken toward partially reorganizing the company.

It was decided that the officers and non-commissioned officers would remain the same, but the roll of privates would be materially changed. A committee, consisting of Parmelee, Gage, Saxton, Reed, Sedgwick, Pulis and Schwarz was selected to hunt out and bring in the best men of the battalion, also to cull out the poorer members of the company. In this way only the very best men will become members and such men as can always be depended upon.

A fine of 25 cents is to be imposed upon all absentees. The non-payment of which within one month is to be considered ample cause for expulsion.

Along the social line which is the policy of the company the pursue, a committee was selected to look into the matter of getting up a Rifle's hop.

Already such actions as above are having the desired effect.

Men are trying hard for the positions, and the Pershings are nearer the centre of interest in the university now than any other student organization.

Guy Howard was visited by his father Thursday.

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Professor Swezey lectures at Exter this, Friday, evening.

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The art rooms are becoming a popular resort for the young men.

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The baseball club is taking a lay off until the snow leaves the ground.

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Chancellor McLean addressed the students of the Peru normal Friday night.

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Dr. Ward entertained the zoological club at his home on Wednesday evening.

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Professor Card was unable to meet his classes Monday on account of a sprained ankle.

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The Kappa Alpha Pheta's give a party Friday evening at the home of Miss Miller.

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S. B. Harris notices the literary magazine very favorably in last week's Courier.

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Misses Smith and Gray entertained a few of their friends on last Saturday evening.

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Ernest Waggenhorn and George Shead will spend Sunday at their homes in Ashland.

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Allen Sedgwick, who has been visiting his brother, returned to his home in York this week.

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The Phi Kappa Psi fraternity call on Chancellor and Mrs. McLean in a body Saturday night.

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The Y. W. C. A. Sunday afternoon will be led by Miss Wheeler. Subject, "The Great Invitation."

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WHO?

Who is that Prof. that in the class
Makes us believe we cannot pass,
But when by chance we hap to meet
In some swell place, or on the street,
Sticks out to us a hearty hand,
No better friend in all this land.

?

Who is that Prof. that in his class
Has no regard for boys, alas,
But on the girls sheds beaming looks
Not of the kind you read in books,
But of that sweet, most heavenly kind
Enjoyed by few and hard to find.

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