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THE FUTURE OF THE NEW PHOTOGRAPHY.

METHOD of photographing unseen objects, such as coins in a purse, or the bones in a living body, which was accidentally discovered by Professor Röntgen of Würzburg, in following up the experiments of Lenard

with a Crookes vacuum tube, have impressed the popular imagination and given rise to a world-wide and lively interest. As our readers already know, when a vibratory current of electricity of sufficient strength, say from an induction coil or transformer, is sent through a glass bulb highly exhausted of air, after the manner of Crookes, the famous chemist, a diffused light appears in the tube. Certain dark or invisible rays also emanate from it, and these were found by Lenard to penetrate metal boxes and photograph objects in their dark interiors. Röntgen found that when sent through the body they passed more easily through the flesh than the bones, and thus a "shadow photograph" of the bones could be taken. Flesh, water, gases, wood, ebonite, carbon, and many other substances are very transparent to these mysterious rays, while some metals, such as gold and lead, and minerals, such as quartz and chalk, are very opaque to them. As the flesh consists mainly of gases and carbon, and the bones of lime and silica, the former is more or less transparent, and the latter more or less opaque. It was at once seen that the new discovery gave surgeons a means of examining at least the bones of the living body without dissection, and of localising the positions of bullets or other metal and mineral matters lodged in the body; and several successful operations in cases of malformed bones and bullets or splinters of metal in the flesh have been the consequence. Professor Salvioni of Perugia has further increased the value of the discovery by inventing an instrument called a "cryptoscope," for enabling us to see the "shadows" of the bones without having to wait until a photographic

plate is developed. The dark rays excite phosphorescence in glass, air, and many chemical salts, for example, sulphate of zinc and barium platino-cyanide. If, therefore, they are allowed to fall on a plate coated with these substances the shadows of the bones will be visible on the plate.

As the future applications of the new photography promise to be so important, especially in medicine and surgery, we have written to several eminent authorities for their views on the subject, and have much pleasure in laying them before the reader.

Sir Henry Thompson, the celebrated surgeon, does not consider that our present knowledge of the new photography and its results is quite sufficient to enable us to speculate as to its future value in surgery.

With reference to your

proposal I am of opinion that our present knowledge of what the "new photography" is capable of doing, & certainly what it has done, is quite insufficient to enable anyone to hazard an inference as to its value in surgery, present or future

*Yours faithfully,
Henry Thompson*

On the other hand, Dr. Dawson Turner, the well-known medical physicist, of Surgeons' Hall, Edinburgh, who was, perhaps, the first to practically apply the new method to surgery in this

To have *Roentgen's*
 discovery is fully perfected it
 will take rank as the third
 great advance made in
 this century in Surgery.
 The first was Chloroform,
 the next Lister's antiseptic
 Surgery, & lastly we have
 this method of making the
 skin transparent.
 Yours truly
 Dawson Turner

country, is hopeful, not to say sanguine, of its future value. He considers it one of the three greatest advances in surgery made during the present century, the others being the use of chloroform and the introduction of Lister's antiseptic treatment.

Mr. Van der Weyde, the well-known photographer, is of a similar mind, and judging from the pictures showing fractured bones which he has seen, considers that it is no longer a matter of question whether or not the new photography will be practically useful to surgeons; but he prefers to remain "awestruck and reverential" before the new world of science which has been opened to us, rather than to give an estimate as to its value.

Mean in the ^{scope} of ^{science} ^{and} I am
 truly awe struck and reverential
 by it

John Ward Richardson

Sir Benjamin Ward Richardson, F.R.S., informs us that he worked on the subject of examining the interior of the body by means of ordinary light sent through it some twenty-eight years ago, and in the current number of the "Asclepiad," his well-known magazine, he gives an account of his

researches, from which we learn that magnesium light proved to be the best, and enabled him to perform several interesting investigations and operations.

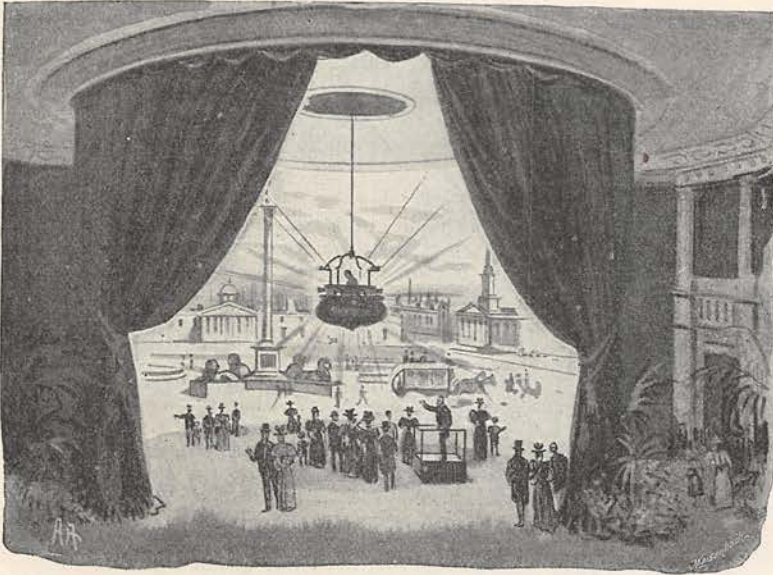
B.W. Richardson

Mr. W. Gregory, photographer to the Army and Navy, and philosophical instrument maker to the London County Council, while deeming it unsafe to hazard an opinion "in these days of wonders and surprises," is, nevertheless, persuaded that enough has been done to "warrant us in believing that this important discovery will be still further developed."

Mr. Alexander Bassano, the eminent photographer, also thinks that the new photography "has a great future before it: it is another tool by which we shall break entirely fresh ground and be able to explain many things at present obscure in science." The action of the "X" (or Röntgen) rays on a photographic plate, in his opinion, means that the impact of the vibrations has a power of decomposing the silver bromide similar to that of ordinary light. He considers that before long photographic plates more sensitive to these rays will be prepared, and enable surgeons not only to discover and examine foreign substances, like bullets in the body, but investigate the throat and brain, and "make such a revolution in the diagnosis of disease that we at present little dream of." Mr. Bassano reminds us, moreover, that the

Doubtless before long a plate will be prepared much more sensitive to these rays than the present photographic plate and then the surgeon may be not only able to examine and locate substances impacted in the flesh, fractures of bones, bullets &c. but will be able to inspect the interior of the throat - and also the structure of the brain, its diseases, tumours and alteration in structure being made apparent - in fact this new discovery may make such a revolution in the diagnosis of disease that we at present little dream of.

Yours faithfully
Alexander Bassano



A PHOTOGRAPHIC CYCLORAMA.

expression "new photography" is a misnomer, such as can only serve until a better term is found. The word "radiograph" has been suggested, and it is preferable to "electrograph." Radiograph, however, might be held to include photography, and it would, perhaps, be well if we had another word, say "cryptograph," to imply radiographs of hidden or unseen objects.

We may add that quite apart from medicine and surgery the new cryptography has already been applied successfully to tell real diamonds and pearls from imitation ones, the real diamonds being transparent to the rays and the mock ones opaque; while, on the other hand, the genuine pearls are opaque and the sham ones transparent.

A Photographic Cyclorama.

A few years ago Colonel Moëssard suggested that photography should be applied to the production of panoramas, and this has now been done by Mr. Chace, of Chicago, whose photographic cyclorama is shown in our illustration. The pictures are projected round a circular screen from optical lanterns suspended in a chariot from the ceiling of the hall. The lanterns are fitted with coloured glasses and other devices to produce the illusions of day-break, sunset, storms, moonlight, and so forth. One operator in the middle of the chariot is sufficient to manipulate the apparatus. By combining the kinetoscope of Edison or the cinematograph of Lumière with the cyclorama, an appearance of animation can be given to the figures in the streets, and processions or other demonstrations rendered lifelike.

The Sting of a Bee.

A few months ago a workman of the Jura, named Fritz Moser, father of a young family, was stung by a bee at Bienne while passing a hive, lost

consciousness in two minutes, and died in ten or fifteen minutes of paralysis of the heart. Moser, who was a bee-keeper, had been stung last year near his own hive, and fainted away. He was not a strong man, and his heart was weak. Two years ago a similar case of death from a bee occurred in Belgium, the victim being an agriculturist, and having also received a warning sting the year before. Such accidents are very rare, and due to some peculiarity of the individual rather than the venom of the insect. Hence, according to M. Bertrand, director of the *Revue internationale d'agriculture*, persons who have already been stung by bees without any

serious consequences need not be alarmed, as the first sting is a test of their resisting power. Those who have received a "warning" from a former sting cannot be too careful to guard themselves from another.

A Tea Measurer.

Housekeepers will welcome a tiny utensil which has just been introduced under the punning name of the "X-act" tea-measure. In appearance it somewhat resembles a telescopic drinking-cup, but in use the value of the different stages of the metal cup becomes apparent, for they serve to readily mark the exact quantity of tea required to give a "brew" of the proper strength for a given number of people. The measurer is made in plated metal and presents a pleasing appearance.

A Scar-Print.

Mr. Francis Galton, who showed that the prints of the fingers are an excellent test of identity, because they never vary throughout life, has recently published a curiosity of the kind, which is shown in our woodcut. It represents the print of a man's thumb, showing a graft of the flesh which had been wrongly placed. A piece of the thumb accidentally cut away was hastily replaced and bandaged up. The flesh grew into the



A SCAR-PRINT.

thumb again, but, having been replaced awry, the ridges and furrows of the skin can still be seen crossing each other after thirty years.

Cycle Novelties.

The "butterfly seat" or "sellette papillon" for cycles is shown in our illustration (Fig. 1), and has been modelled from experiments made to determine the best form to give it. The makers claim for this saddle that it is an easy and natural seat, permitting all the muscles to have free play.—A covered cycle resembling a Sedan chair on wheels has been introduced with success in France, and is illustrated in Fig. 2. It is useful in wet weather—above all in cities, where the splashes from vehicles are added to the onslaughts of the rain. Such a machine serves as a private hansom, and conveys a person through a crowded thoroughfare in spotless evening dress. The cover is made of aluminium tubes and impermeable cloth, and the whole machine does not weigh more than 35 lbs.—A new folding bicycle (Fig. 3), of a similar type to that recently described in THE GATHERER, but for ordinary use, as well as for military purposes, has also been brought out in Paris.



CYCLE NOVELTIES.—FIG. 1.

Blacklight.

Such is the name given by M. Gustave Le Bon to certain dark and mysterious rays which are capable of penetrating opaque bodies as do the "X rays" of Professor Röntgen's vacuum tube, but which are found in ordinary sunlight and lamp-light. M. Le Bon has no difficulty in taking photographs with these rays when the sensitive plate is covered by a metal plate, preferably of iron or copper, provided the exposure is sufficiently long—say, three hours. A better effect is got by placing the sensitive plate on a sheet of lead and putting the negative photograph to be copied over it, then laying an iron plate over all and bending up the edges of the lead plate so as to overlap the iron and form a closed box of iron on the top and lead on the bottom and sides. When this box with the sensitive plate inside is exposed for three hours to the light of a petroleum lamp or to sunlight, a distinct image of the negative will be found on the plate. M. Le Bon is of opinion that if our eyes were but slightly modified, we should be able to see through a brick wall. Let us hope they will not be modified. Something, however,

may be done with his discovery, which bears a certain analogy to that of Röntgen. Lord Kelvin and other physicists have supposed that "longitudinal" rays of light exist—in other words, rays in which the ether sways to and fro



CYCLE NOVELTIES.—FIG. 2.

along the direction of the ray, as in the case of sound waves, and not from side to side across it, as in the case of ordinary light. What if M. Le Bon or Herr Röntgen have discovered these rays or some varieties intermediate between the extreme longitudinal and transverse kinds? For no doubt all sorts of vibratory or wave motions exist in the ether, as in air and water, only we have not organs to see or hear them. All that would render our lives more complicated and confused is excluded



CYCLE NOVELTIES.—FIG. 3.

from our ken by direct sensation, but science can bring it before the mind. Perhaps there are animals which can see rays to which we are blind, as they can hear sounds to which we are deaf. Perhaps there are creatures which can see through rock or earth. A bird which feeds on insects

ladder descends into the interior. Strong glass windows or scuttles allow the daylight to penetrate, but artificial light is obtained from electric lamps. The screw propeller is worked by an electric motor, as shown in the illustration, which represents the after-part of the interior. The main use of the vessel is to discharge torpedoes; but, of course, it can be employed for exploring under water, or for cutting submarine cables, torpedo-moorings, sponges, and so on. M. Goubet even looks forward to the day when large vessels of the kind will convey passengers across the Channel, fifty feet under water, without the slightest seasickness.

The Force of the Jaw.

Dr. Black, of Jacksonville, Florida, has found by actual measurement with a spring balance that a girl of seven years can exert a force of 30 lbs. with her incisor teeth and 65 lbs. with her molars in simply closing the jaws. A man of thirty-five registered at least 270 lbs. with his molars—which was as far as the apparatus could go. Several persons exerted a pressure of 200 lbs. with their molars and 100 lbs. with their incisors. Dr. Black states that the physical condition of the person does not seem to affect the force of his jaws, and that the controlling factor is rather the state of the periodontal membrane than the muscular strength. He is of opinion that people habitually exert more power in chewing their food than is really necessary.

A Spring of Carbonic Acid.

At Sondra, near Gotha, in Germany, while boring for minerals, a couch of carbonic acid gas was tapped, and such was the pressure of the gas that the boring tools were ejected from the bore, and the workmen fled for their lives. In addition to the escaping gas, mineral water was ejected to a height of 100 feet. Steps have been taken to store up the gas, and also to utilise the water for medicinal purposes.

New Electric Railways.

The great Westinghouse Company of America have introduced a new form of electric railway which



THE GOUBET.—AN INTERIOR VIEW.

hiding under stocks and stones—a woodpecker, for example, would profit by such a sense. For aught we know, perhaps, the woodpecker actually sees his prey under the bark. The photographic plate is, of course, more sensitive than the human eye, and enables astronomers to discover stars otherwise invisible. It is reported that a case of undeveloped eczema was recently discovered by a photographer of Retford, Notts. Photographs taken of the child showed an eruption on the face, and were rejected by the friends of the child; but in a week or two an eruption of eczema appeared on the child's face, which closely resembled that of the photograph. Edison is understood to be attempting to photograph the living brain, and it is even stated that another American has accomplished it by a different means altogether.

The Goubet.

The "Goubet" submarine boat is familiar to our readers by report, and we are now able to give a picture of it. The vessel is about 25 feet long by 6 feet in diameter at its thickest part, and weighs some 10 tons. It is entered by the water-tight door seen on the top, from which an iron



THE GOUBET.—EXTERIOR VIEW.

is free from some objections to the older systems. In these the electric current which actuates the motor and drives the wheels of the cars is drawn from a copper conductor running along the line by means of a copper "brush" or rubbing contact. In the new system, however, the current is tapped from the conductor at regular intervals by means of spring contacts, A, B, Fig. 1, which are pressed down by the car as it passes along the line. The plan allows the conductors, C, to be buried underground in a conduit and thus properly insulated. The spring contacts or keys at regular intervals remain "open," that is to say, they do not touch the conductor until they are "closed" by a projecting piece on the bottom of the car, which we illustrate in Fig. 2, and thus the circuit of the current is established between the conductor and the motor. As in the old system, however, the rails serve for the return part of the circuit, the current passing from the generating dynamo along the conductor, then through the motor and back to the dynamo by the rails. We may also mention that the London, Tilbury and Southend Railway Company have adopted a new

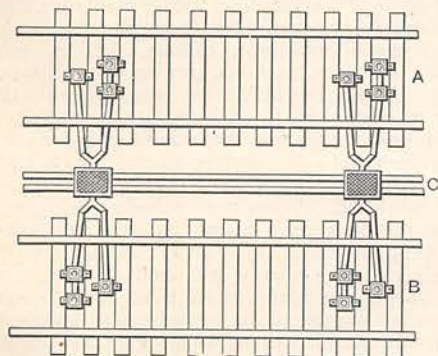
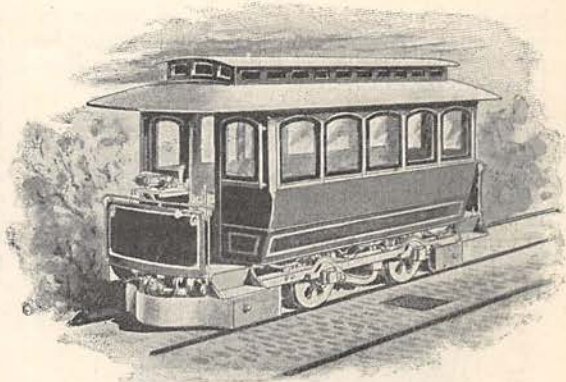


FIG. 1.

system of lighting railway carriages by electricity which has many advantages over those in use elsewhere. In particular it allows each carriage to be lighted separately, so that a train can be coupled and uncoupled without any trouble in making or unmaking the connections for electric lighting. Fig. 3 will give the reader a fair idea of the arrangement. First of all there is a dynamo for generating the electric current which is driven from the axle of the carriage by means of a flanged pulley and belt. The current from this dynamo is stored in the accumulator shown, so that when the carriage stops the lamps will still keep alight. The dynamo produces 25 amperes at a pressure of 18 volts and is stored in eight "E. P. S." accumulators, which feed ten 8-candle lamps. The cost of installation is about £50 per carriage, but the cost of maintenance is much less than that of oil or gas, because the power is derived from the locomotive through the axles.

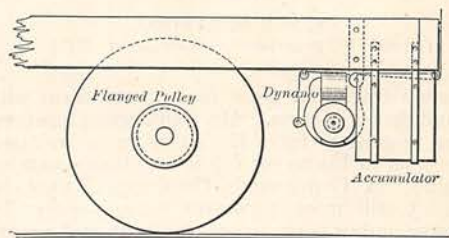
Double Action of the Brain.

Mr. L. C. Bruce has given an account of a curious case of double personality like that which forms the motive of Mr. R. L. Stevenson's well-



NEW ELECTRIC RAILWAYS.—FIG. 2.

known tale. This Dr. Jekyll and Mr. Hyde of real life is a fairly intelligent man; but sometimes he can only speak English, and at other times only Welsh. When he is an "Englishman," he remembers what he did in his former English intervals, but forgets all his proceedings during his Welsh ones; and he is subject to attacks of chronic mania. He is also right-handed, writing from left to right; but when asked, he will write with the left hand, from right to left. As a "Welshman," again, he has no idea of his English intervals, and is also subject to attacks of dementia. He is left-handed, and indeed his mental and physical conditions are "the reverse of what they were during his English periods." The change from one state to the other seems to occur spontaneously, a fact which shows that Mr. Stevenson's artificial expedient of inducing such a change by means of a drug, was not absolutely necessary, and may in fact be an impossibility. Mr. Bruce explains the dual condition of the patient by supposing that the two hemispheres of the brain can act individually, and that



NEW ELECTRIC RAILWAYS.—FIG. 3.

the more active one has a preponderating influence on the control of the motor functions; the person living two separate existences during the two stages through which he passes. The mental impressions received during each of these separate existences are, he thinks, recorded only in one cerebral hemisphere. This hypothesis, we may remark, also throws light on the singular feeling that some persons occasionally have of their present experience being a repetition of a former one—in other words, a momentary consciousness that they

have been in precisely the same circumstances once before. Apparently, such a delusion might be produced by one half of the brain acting a little later than the other.

Mr. Max Pemberton.

Ever since Mr. Max Pemberton's famous story of marvels, "The Impregnable City," opened a new path in the literature of adventure, numbers of writers, old and new, have flung themselves into

together with the history of Parson Ford, his tutor, and of Lady Marjory, the daughter of John, Earl of Quinton, so far as her story is, in a manner, his own. All of which is duly recorded, and to be read, in the great Library at Warboys, as it has been by this present writer, who now for the first time publishes his account thereof."

The first instalment of this strange web of love and adventure will appear in our next issue. The illustrations have been entrusted to Mr. Sidney Paget, now famous as the illustrator of "Sherlock Holmes."



AMONGST FLOWERS AND POULTRY.

MAY.

MAY is a month of flowers and sunshine. Each day reveals a richer floral store, and it is a month, too, of hard work in the garden.

Amongst flowers, one of the chief things will be "bedding out," as planting tender plants is called in gardeners' language. Anything almost may be put out now—geraniums, cannas, dahlias, sub-tropicals, tuberous begonias, zinnias, and balsams, besides others. But before they are exposed to the tender mercies of an English climate, harden them off in frames to prepare them thoroughly for a life in the open air. Far better to wait until early June before planting if the various subjects are not in condition. When put out before being well hardened they receive an unfortunate and sometimes fatal check.

Dahlias require a very rich soil and plenty of water during the summer. I think these flowers of the sun, sumptuous in colouring and stately in aspect, are a mistake in small gardens. They occupy too much space and encourage earwigs. All seedlings should be well thinned out and many are now in their infancy. Unless each seedling receives sufficient to develop its characteristic habit it will never reveal its true beauty. I write of every annual and every vegetable.

Amongst vegetables, sow seed of those kinds that should have received attention last month. Thin out asparagus seedlings and cut all shoots in the beds when of suitable size. Sow kidney beans, one of the most useful of vegetables, beet, and plant out cabbages from the seed beds. Prepare celery trenches, and get out late in the month vegetable marrows and cucumbers on ridges. Towards the end of the month well harden off the tomatoes for the open, as early in June they may be planted against the sunniest wall in the garden. Insect pests on fruit trees and in the greenhouse are troublesome in May and must be watched for.

Always think of the future in the management of the poultry yard. I tendered this advice in March last to my readers, and there is another season of the year when it must be repeated, in May and June, as at this time the early-hatched chickens are ready to sell. Never sell all the pullets, but as few of them as possible. A common practice is to first get these into the market, as they are ready before the cockerels; but if pullets are sacrificed now, where are the fresh eggs to come from in autumn and winter?



MR. MAX PEMBERTON.

(Photo.: W. Bradshaw, Newgate Street, E.C.)

the same track, the great majority of them with but indifferent success. Mr. Pemberton, however, seems content to leave his imitators to their own devices, as in his recent volume of stories, bearing the title "A Gentleman's Gentleman," may be seen. A still more important story, however, by the same author is yet to see the light, and we are happy to be able to announce that arrangements have been made for the first appearance of the new work in serial form in this MAGAZINE. It will bear the title of

A PURITAN'S WIFE,

which purports, in Mr. Pemberton's own words, to be "The story of Hugh Peters, the son of Jonathan Peters, of Warboys, in the County of Huntingdon, and the nephew of that Hugh Peters who was chaplain to the Lord-General Cromwell. On which account, and by reason of the part he was said to have played at the Court of the French king, after the coming of Charles Stuart to his own again, many evils befell him, as are hereinafter set out,