

The electric light in medicine.

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poisoning, though my after-acquaintance with the patient and his symptoms was sufficient to convince me that his life had been assailed, and that in the subtlest way possible, by poisons such as only one skilled in medicine could administer. Stretton, in my mind, was doubtless the accomplice of the woman in this piece of villainy; but as the pair had by this time both got clear off to the continent, it was in vain to seek to bring them back. Nor, in truth, did Mr Meredith desire this.

After his release, the patient was taken to Manor End—there to struggle back through a painful convalescence into health again. For months and months, he wavered between life and death; but his naturally strong constitution asserted itself at last. He recovered—never to be quite the same man again, but strong enough to look forward to enjoying life once more. His first act was to free himself of all tie to his wife. And this, which to me might have been otherwise an unpleasant consequence of my interference between them, was rendered less unpleasant by the reflection that I had assisted in saving the husband's life, and prevented what might have resulted in a terrible crime on the part of his wife. Of the subsequent career of the guilty pair, no intelligence has ever reached me.

THE ELECTRIC LIGHT IN MEDICINE.

WE have by this time heard of the employment of the electric light in many and various ways. It has been used for boring tunnels, working mines, and photographing dark interiors, and at the siege of Paris it was thrown upon the enemy's works at night. Everybody almost is now acquainted with it as occasionally employed in our streets and in large buildings. We are going to describe a use of it which is probably not so familiar to our readers.

Perhaps none of the sciences has benefited more than medicine by the great advances of recent physical investigation, and by the perfection and accuracy with which delicate instruments of all kinds can now be constructed. The development of chemistry, physics, and physiology has in a great degree revolutionised the healing art. Formerly there was a great deal of empiricism, a great reliance upon formulae, and much semi-philosophic guesswork. With contemporary medicine, on the other hand, 'seeing is believing,' and many are the instruments for better seeing—that is, for better diagnosis of disease—which the recent inventions of science have made ready to the hand of the modern practitioner. Dissection and anatomy form of course a large part of the education of every student of medicine. But numerous instruments, such as ophthalmoscopes, laryngoscopes, &c. have been devised for viewing many interior parts of the living body.

The principle upon which these instruments are constructed is similar in all cases. Light, either daylight, or light from some artificial source, is collected and reflected upon the part to be examined. Who is not familiar with the primitive type of all these instruments, the bright silver spoon which the doctor put unpleasantly far into our mouth that time we had such a bad sore throat? Various and numerous are the degrees of medico-optical instruments, from this primitive reflector to the complex and ingenious appliances

which enable the man of medicine to see far into the throat, into the eye and the ear, and even into the stomach; in fact, wherever the interior parts of the human frame are accessible, ingenious instruments have been invented to make them visible. Sometimes light is thrown direct into the interior of the organism, at others it is introduced by means of reflection. To such perfection have these instruments been brought, that the various organs for which they are used can be seen almost as distinctly as if they were laid entirely open to view.

Ordinary oil lamps, candles, and gas have generally formed the sources of light used. In some cases, the brilliant light of the magnesium wire has been employed; but this is far too powerful a light for the human eye to support, though it can be used with advantage in diagnosing the throat, the ear, or indeed any part except the eye, the only organ sensitive to light. By the aid of the magnesium light and properly adopted lenses and mirrors, the interior of a rabbit's eye has been photographed, after the animal had been atrophied so as to be insensible to strong light. The magnesium light, however, in common with other sources of artificial light, has the inconvenience of considerable heat and smoke. The electric light, on the contrary, gives off no smoke, and the heat, though great at the luminous point, is confined to such a minute space that it is not practically inconvenient.

Many inventions, if not carried immediately into practice, get to be considered as useless or impracticable. This seems to have been the case with an invention for introducing the electric light into the human stomach for purposes of diagnosis. It is now many years ago since Bruck, a dentist at Breslau, was struck by the idea that it would be quite possible to illuminate the human stomach. An ingenious instrument-maker of Paris, M. Gustave Trouvé, took up the idea, and gave it tangible reality in the form of the very interesting but simple apparatus which we are about to describe, and which though constructed long ago, was only brought into general notice at the meeting of medical men and scientists at Baden-Baden in 1879. Hitherto, the reflected light of the sun or of lamps has been chiefly used to light up the accessible cavities of the body for diagnosis. Now, however, it is possible to light up these parts by the direct introduction of the electric light itself, which, with proper arrangements, gives intense light without an inconvenient degree of heat. A small piece of flattened platinum is welded on to the wires which convey the electric current; and whenever a strong and even current of electricity is made to pass along the wires and traverse the platinum, the metal glows into a white-heat of intense brilliance.

To obtain this high degree of light from the platinum, however, requires a very strong electric current, and a very powerful battery, an apparatus which every medical man by no means possesses, and which, if he did, could hardly be transported to the houses of patients, often at a distance. To meet this difficulty, the French inventor whom we have mentioned, in collaboration with the physicist Planté, has hit upon a very ingenious contrivance. This is a small 'holder,' by means of which it is possible to store up a large quantity of electricity in such a portable form that it may

taking everything into consideration, we came to the determination that something must be done, and done quickly.

Of course, I did not accompany them to their solicitor's; but I heard his opinion was, that they were unnecessarily anxious, and he reminded Mrs Royston that, according to law, the wife was not to be lightly interfered with.

However, circumstances favoured us. I happened to be driving past Grosvenor Gardens, when at a crossing I caught sight of the housekeeper into whose hands I had intrusted Mr Meredith on the last occasion when I had seen him. Quick as thought, I pulled the check-string, and jumped out. Perhaps she owed a grudge to Mrs Meredith; perhaps she had a feeling of pity for her unfortunate master; perhaps the half-sovereign I slipped into her hand had a softening effect. I did not care what it was, so long as she *was* softened. I came to my point pretty quickly. I wanted to know where her master was.

'Well, sir, there's no doubt where he is, though we servants are not supposed to know. He is at H—; naming a private lunatic asylum. 'Poor gentleman, we all said it was a shame! But after you left, Mr Stretton he went off and brings in two doctors; and the thing was settled soon enough. My mistress saw them first; and then they went up-stairs to see the master; and then Robson and Jones—the two men you saw in the dressing-room—got their orders to dress Mr Meredith as well as they could; and he was driven away. They carried him into the carriage.'

'And did Mrs Meredith go with them?'

'O no, sir. She is off somewhere else. It was Robson let out to me where the master was going; and I'm sure I hope I won't get into trouble for telling you, sir. I hope it won't go no farther.'

'You need not be afraid,' I said. 'I will promise that Mrs Royston will hold you harmless. But in the cause of humanity, you must give us all the assistance you can in order to release Mr Meredith.'

'Release him, sir! We can't interfere. If his wife puts him in, no one can take him out. Robson told me that much.'

'I think Robson was wrong,' I replied. 'But tell me your name; and also promise you will find out at once for me where Mrs Meredith is.'

'Forrest is my name, sir—Mrs Forrest. And I may as well tell you where my mistress is. She went down to Brighton.'

'Well, good-day to you for the present, Mrs Forrest. Here is my direction. But you will probably hear from me shortly.' And I drove off, tingling all over with mingled anxiety and indignation.

As may be surmised, I lost not a moment in communicating my information to Mr Charles Royston, who, happily for his sister-in-law and Mr Meredith, was a man of energy and decision, as well as prudent and far-seeing. He soon settled upon a course of action. It was useless to go to the asylum and demand Mr Meredith; useless to apply to magistrates until another course had failed; and beyond all, it was useless to delay a day or an hour, when the sands of the unhappy patient's life were swiftly ebbing away. Accompanied by his solicitor, he went to Grosvenor

Gardens, and there summoned all the servants together and briefly stated his case.

Like most evil-doers, Mrs Meredith had betrayed herself; and at the first movement in favour of their master, the servants one after another gave testimony against her. Before he left the house, Mr Royston had amply sufficient grounds for believing that he would succeed in getting the guardianship of Mr Meredith taken out of her hands. The next morning, he started for Brighton, and surprised Mrs Meredith, not altogether pleasantly, in the middle of a sumptuous breakfast, to which she and Mr Stretton were apparently doing ample justice.

At first, she treated Mr Royston very much as she had treated me, with arrogant insolence, in which Mr Stretton supported her; but they found that their visitor meant business. He was very quiet and very cool, and kept to his point with steady persistence. He began by asking her upon what grounds she had prevented Mrs Royston from seeing her brother; and Mrs Meredith, who did not dream how much was known, replied defiantly: 'Simply because I do not choose that she should see him.'

'And is it simply because you choose, that Montagu Meredith is now at H—, the sane inmate of a lunatic asylum? Now, we shall understand each other,' he continued. 'I have come here because I know *everything*—because I hold evidence that will take Mr Meredith out of your power for ever. Your servants have come forward—your secrets are known—and I hold a power over you both,' turning towards Mr Stretton, who paled visibly. 'But for Meredith's sake, we want no unnecessary disclosures in public. If he lives, you have less to fear. If he dies, the law will decide. In the meantime, before I leave this room, you must give me a written authority to authorise me to withdraw Mr Meredith from H—, and to place him under the care of his sister. That is all I ask at present.'

And he got it. He came back in triumph; and I accompanied Mrs Royston and himself down to H—, where we found Mr Meredith still alive, and keenly conscious of his terrible and, what he had fancied, hopeless situation.

He wept like a child in his sister's arms, clung to her in tremulous terror, and besought her never to leave him, not to let him die there. She was deeply affected, but restrained herself nobly, while we settled matters with the doctor there, who had received the patient at the request of his wife, and on the verdict of two other medical men. These signatures being sufficient to incarcerate the sanest, the asylum doctor was free from all blame in the matter, and Mr Meredith had been subjected to no unkind treatment at his hands. But in his enfeebled state—to be watched day and night by an attendant, treated as a lunatic, separated from all his friends, and feeling himself in an asylum, was enough—more than enough to drive him into actual madness.

Whether my suspicions relative to secret poisoning were correct or not, they were greatly strengthened and confirmed by the tidings that Mrs Meredith and her cousin had vanished, taking her jewel-case and a large sum of money with them. They had been careful, before leaving Grosvenor Gardens, to remove or destroy everything that might lead to detection on the score of

be carried about by a medical man on his visits, to be used not only for the purposes of diagnosis by internal illumination, but also for other uses which modern medicine has found for electricity, especially in numerous affections of the nerves.

The holder is very simple. It consists of a wooden case which incloses a hermetically sealed glass cylinder. In this glass vessel are two coils of thin lead laminae, which are kept separate from each other by small pieces of wood, and are immersed in water acidified with sulphuric acid, which almost fills the cylinder. An electric current is allowed to act upon the lead plates for several hours. This decomposes the acidified water into its components, hydrogen and oxygen. The first of these attaches itself to one of the lead plates, and the oxygen combines with the second lead plate, making a super-oxide of lead, the formation of which continues so long as the electric current plays. After several hours' action, if the current is interrupted, it is found that the lead plates have amassed an immense quantity of galvanic electricity. This convenient little apparatus may be carried to wherever a supply of electricity is wanted for medical or other purposes. A piece of platinum has only to be connected with wires coming from the lead plates to afford a light amply sufficient for the purpose of diagnosis. The holder has been named by its contriver the *Polyscope*. It is further furnished with a magnetic indicator for showing the strength of the current, and a regulator for raising or decreasing it.

The wires proceeding from the polyscope may be used in many ways where electricity is wanted. One of the most common is to pass them up through the handle of tiny concave mirrors; the platinum is placed in the focus of the mirror, so that when the platinum glows, a brilliant stream of light is thrown out, and can be turned by a person holding the mirror in any direction. These little mirrors are used to examine the mouth or other cavities of the body, where the daylight, however skilfully caught and reflected, is insufficient for complete illumination of the part. It is possible also to illuminate the stomach; and this has been done. A tube is let down the oesophagus; the positive and negative wires are introduced, connected by the platinum, which can be made to glow at pleasure by turning on the electric current. The tissues of the human body are comparatively translucent, and when thus lighted from within, in a dark room, the internal organisation, it is said, is distinctly visible. By means of this instrument, which is termed a *gastroscope*, the interior of the stomach itself may also be directly seen. At the extremity of the tube is fitted a glass receptacle, inside which glows the incandescent platinum, thus forming a diminutive lantern, which illuminates the walls of the stomach. From these the light is received back again through what we may call a window slightly higher up in the tube, and falling upon a prism or a mirror, is deflected vertically upwards along the tube, where it passes through several lenses until it reaches the bend at the throat. Here again, by means of prisms, it is refracted into the horizontal direction, and reaching the eye-piece, conveys a distinct image of a small portion of the surface of the stomach to the eye of the diagnoser. Any rise of temperature is prevented by constructing the glass end of the

apparatus double, and keeping the space between the two glasses filled with a constant supply of fresh cold water, by means of two very small caoutchouc pipes inclosed in the main tube. A further improvement should also be mentioned. By the agency of a tiny wheel with teeth playing into a notched ring round the interior of the tube, and moved by a fine silk cord, the lower part of the apparatus may be turned round in such a way as to bring different parts of the stomach successively into view, without the necessity of withdrawing the instrument for readjustment each time.

Though as yet but little known, these instruments have been put to the test of practical use, and have been patented by Herr Leiter, of Vienna, by whom their construction has recently been brought to great perfection. After the care, ingenuity, and expense which have been lavished upon their elaboration, we can scarcely doubt that they will come in time to form part of the recognised stock of medical and surgical instruments.

A NIGHT IN THE FORE-TOP.

THE loss of the *Indian Chief* on the Long Sand, at the beginning of the present year, and the sufferings of her crew, created a large amount of interest throughout the length and breadth of the land. The following narrative of the incidents as they occurred, is no fiction, but has been derived chiefly from the account given to the writer by one of the most intelligent of the seamen who survived.

'You want me to tell you how we got wrecked on the Long Sand?' said my narrator. 'Well, sir, I'll try. I shipped as able seaman for a voyage to Yokohama; and I joined my ship at Middlesborough. The *Indian Chief* was a full-rigged ship of nearly thirteen hundred tons. A better manned craft never sailed; there were twenty-eight hands all told. The captain was a good man, a seaman and a gentleman; and my shipmates were as steady a lot of fellows and as good seamen as I ever came across. The two mates were fine men and good officers; and altogether things looked well for a pleasant and a prosperous voyage. We sailed from the Tees on Sunday morning; and all went well with us till the middle watch on Wednesday night. It is true that some of the gear worked heavily, and having a large quantity of iron on board, the ship was not very lively in stays; but for all that, she was a fine craft, and if she had had fair-play, she would never have served us the trick she did. I was in the starboard or second-mate's watch; and on the night in question, we came on deck at twelve o'clock. It had been a tolerably fine night when we went below at eight o'clock; but in the meantime, the weather had altered considerably for the worse; the wind, which was north-east, had increased, and was blowing a stiff breeze; the sky looked black and angry; and there was a good deal of mist about. We were under easy canvas, three topsails, top-gallant-sails, spanker, and forecourse; the mainsail was not stowed, but hung in the buntlines.

'The captain kept the deck; I fancy he had not much confidence in the pilot, who, let it be understood, had command of the ship for the

time-being; and before Mr Lloyd, the mate, went below, a long consultation was held. The upshot of this seemed to be that the pilot was advised to shorten sail and make everything snug. However, he did not seem to agree with this. When we had been on deck about an hour, several lights hove in sight; and I could see that the captain was very anxious about the ship's position. I heard him caution the pilot about the set of the tide, saying, that the flood would be sure to suck us in towards the mouth of the Thames. As the night grew, the wind drew more to the eastward, and we had to brace up the yards a little; but the wind was still free, and she laid her course south-south-west. About four bells we clewed up the top-gallant-sails; and the hands were just going aloft to stow them, when a squall struck us, and we were all aback. All hands were called, and the port-watch came tumbling up, some of them only half-dressed. We tried to box her off; but it was too late; and we had to shiver the cross-jack yards, and let her go off on the other tack.

'We were now on the starboard tack, heading for the Knock—so the pilot said; but she did not seem to make much of a lay of it, for I could see by our wake that she was bagging bodily to leeward. The pilot saw this too, for we had not been long on this tack when he sang out, "Ready about!"

'She did not come to very quickly; and when she got head to the wind, she came to a dead stop, and then began to fall off; so we had to put the helm up, and board the fore-tack again. After letting her get good head-way, we tried her again; but it was no use, and we had to wear her. We made two more tacks after this; in short, no sooner had we belayed the braces, than it was "Ready about!" again. The last time, as soon as we had braced up and trimmed the head-sheet, the foresail began thundering and flapping in a way that threatened to take the mast out of her.

"Board that fore-tack!" shouted the pilot.

"Fore-tack unhooked, sir," was answered back from the fore-castle.

"Clew up the sail then, and see if you can hook it again."

'Before we could accomplish this somewhat difficult operation, the pilot again hailed us.

"Are you ready with that foresail?" he sang out.

"No, sir," answered the mate.

"Well, then, let them lay down sharply; we must try her without it."

'Almost before we could get down on deck, it was "Helm's a-lee!" and the ship luffed up into the wind. I think she would have come round this time; but when we came to "Mainsail haul!" when the yards were nearly square, we could not get them to move another inch.

"What's the matter there, Mr Fraser?" asked the pilot.

"Main-topsail brace foul of the cross-jack yard," called out a hand.

"Up there, and clear it."

'By this time the ship had got stern-way on her, and there was nothing left but to wear her. We brailed up the spanker, shivered the mizzen-topsail, and put up the helm.

"Main-topsail brace all clear," sang out a hand from aloft.

'By this time we had squared the fore-yard, and

hauled down the jib; and as the wind came on the other quarter, we hauled out the spanker.

"Port!" roared the pilot.

"Spanker-sheet foul of the tiller-ropes!" called out the man at the wheel.

'Two or three hands rushed aft, and got the tiller-ropes cleared. The yards were braced, and she luffed up close to the wind; but it was too late; there was a cry of "Breakers ahead!" the ship was caught up by a big sea, and after grating two or three times, went broadside on to the sands!

'All was now noise and confusion. Everything was let go, sheets, halyards, and braces. After some little time, order was restored; the captain took the command, and ordered us to clew up the sails; as to stowing them, that was out of the question. Every time the sea lifted her, the ship bumped back on the sand with a force that made every timber in her crack, and nearly knocked us off our legs. Every two or three minutes, the seas broke over us, and swept the decks fore and aft. At these times, the poor ship rolled over almost on her beam-ends, every timber groaning and creaking like a thing in agony. Every spar buckled, every rope strained, and every minute we expected that the masts and yards would come rattling down upon our heads.

'The night was gloomy and dark, and the north-east wind was piercingly cold. After a time, we got a flare under-weigh, and sent up rockets; and our signals were answered by the light-ships. Apart from our being in such danger, the sight was a grand one. The red light of a tar-barrel illuminated the sea and the heavy clouds above with a crimson glare, the tall masts cutting out black and distinct against the red clouds. We kept the rockets going, and every now and then the light-ships answered. We all sheltered ourselves as well as we could, and waited for daylight. It was somewhere about high-water when the ship struck, and now the tide was ebbing fast; but the vessel still bumped violently. Nevertheless, we all took it to some extent easily. At this time, I do not believe there was a man on board but what thought we should get the ship off at daylight.

'The time passed heavily, four or five hours of anxious suspense, and then the daylight began to appear in the east. As soon as it was fairly light, we eagerly scanned the horizon, to see if assistance was coming; but the morning mists limited our view. There was nothing to be seen but a cold hard sky above, and an angry sea below. We got our breakfast, such as it was, for there was no chance of lighting a fire in the galley. By this time it was dead low-water, and the ship lay easier. It was evident, however, now that we could see the hull of the poor *Indian Chief*, that if the gale continued, she would have to leave her bones in the sand. As soon as the flood began to make, the wind freshened; and from the look of the sky to windward, it was evident that we were in for more than an ordinary gale.

'After breakfast, I went up into the rigging; the morning had now cleared, and I could see the low land trending to leeward, and away to windward a light-ship. As I was looking at her, she fired a gun. I wondered what it was for; and at last I saw a smack running before the wind; she luffed up under the lee of the light-ship and spoke