The series of discoveries which, in its application to surgery, has brought about the present antiseptic and aseptic methods of opera­tion, is concerned both with the shape or use of the instruments of surgery and with their prepara­tion for use. The mere steriliza­tion, by boiling or by steaming, of all instruments and dressings, is enough to ensure their freedom from the ordinary micro-organ­isms of suppuration; but the surgeon cannot boil, or steam either himself or his patient. The preparation, therefore, of the surgeon’s hands, and of the skin over the area of operation, is made not only by scrubbing with soap and hot water,, but, by careful use of antiseptic lotions. Again, ligatures and sutures, which must be kept in stock ready for use, are kept,, after careful sterilization, in antiseptic lotion, or are again sterilized immediately before an operation. Again, all towels used at an operation must be prepared, either by, sterilization or, by im­mersion in antiseptic lotion.

The sterilization of, all instruments and dressings is a simple matter: the usual sterilizer is a vessel like a fish-kettle, with a per­forated metal tray in it, so that the instruments can be immersed in boiling water, and can be lifted on the tray and transferred straight from the sterilizer into vessels containing sterilized water or antiseptic lotion. For, the sterilization of dressings an upper vessel is fitted to, the sterilizer, so that the steam may permeate the dressings placed in it. In hospital practice it is used also to sterilize all towels, aprons and the like in a large cylindrical vessel. Steriliza­tion by boiling or steaming, together with the use, of antiseptic lotions, or of water that has been boiled, for all such things as cannot be boiled or steamed, is the essential principle of the surgery of the present day; and practically the antiseptic method and the aseptic method have become one, varying a little this way or that according to the nature and circumstances of the ease.

Beside anaesthetics and antiseptics, there is a third series of discoveries that has profoundly influenced surgery—the use of the forces of electricity. The uses of electricity are fivefold.

1. *The Galvano-Cautery.—*The original form of the cautery, the *fer ardent* of Paré’s time, for the arrest of haemorrhage after amputa­tion, was a terrible affair. Happily for mankind, his invention of the liçature put an end to this use of the cautery, but it was still used in a small number, of other eases. Subsequently Claude André Paquelin (b. 1836) invented a very ingenious form of cautery, a series of metal blades or points of, different shapes and sizes, that could be fitted to a handle: these points were hollow inside, and were filled with fine platinum gauze, and, by means of a bottle and hand­bellows, they could be kept heated with benzene-vapour. Thus, when they had once been raised to a glowing heat by holding them over a spirit-lamp, they could be kept at any desired heat. This instrument is still in use for a few cases where very rapid and exten­sive cauterization is necessary. But for all finer use of actual heat the galvano-cautery alone is used—a series of very minute points of platinum, with a suitable trigger-handle, connected with a battery or (by means of a converter) with the ordinary house supply of electri­city. In this way it is possible to apply a glowing point with a fineness and accuracy of adjustment that were wholly impossible with Paquelin's cautery.

2. *Electrolysis.—*This method is of great value, in suitable eases, for the arrest or obliteration of small growths. The passage of the electric cur­rent between needles intro­duced into or under the skin brings about a gradual shrinking or cicatrization of the tissues subjected, to it, without the production of any unsightly scar.

3. *Electro-Motor Power.—* During recent years the use of a small electro-motor machine has come into the, practice of surgery for certain operations on the bones; especially for the operation for disease involving the mastoid bone. It is, of course, a better method for the use of a fine drill or burr, for example, than the “dental engine," where the power is generated by a pedal turning a wheel, and it will probably come into wide use both for dental surgery and for those operations of general surgery that require very gradual and delicate removal of small circumscribed areas of bone, especially of the cranial bones.

4. *The X-Rays.—*This the most unexpected and, as it were, the most sensational discovery that has been bestowed on physicians and surgeons since the discovery of anaesthetics, is now used over a very wide and varied field of practice. Its value does not stop at the detection and localization of foreign bodies; indeed, this is but a small part of its work. It is used constantly for eases of actual or suspected fracture or dislocation; for cases of congenital or acquired deformity; for cases involving difficulties of diagnosis between a swelling of the bone due to inflammation and a swelling due to a tumour; and for obscure cases of spinal disease, hip disease and the like. Moreover, it has been found possible, by Dr Hugh Walsham, and others to obtain pictures of the thoracic organs that are a very valuable guide in many obscure cases of disease of the lungs or of the pleura, and in many cases of thoracic aneurism or of intra-thoracic tumour. Every year the number and the range of the eases where the X-rays are helpful for diagnosis and for treatment become greater; and it is impos­sible to say at what point the surgical value of this discovery will find its limits., , Beyond these uses, it is probable that the X-rays will maintain and extend the import­ance that they already have in the direct treat­ment of certain cases of disease of the skin (see X-RAY TREATMENT).

5. *The Electric Light.—*

Beside the general superiority of this light to other lights for the routine work of surgery, there are several special uses for it. Of these, the most important is the *cystoscope,* a long narrow tube, shaped and curved somewhat like a catheter, and having at its end a very minute glow-lamp and re­flector, and a small window. Its other end is fitted with a lens, and is connected by a switch with the main cur­rent. , With this instrument, in skilled hands, it is possible to inspect the interior of the bladder, and in many cases to make, an exact diagnosis under circumstances where otherwise it would be im­possible. Another instance of the value of the electric lamp in diagnosis is given by the trans-illumination of the facial bones in cases of sus­pected disease of the central cavity of the superior max­illary bone. A small glow- lamp is held in the closed mouth, in a darkened room, and by a comparison of the shadows on the two sides of the face, thus trans-illuminated, an exact diagnosis can often be obtained as to the presence or absence of pus in this central cavity. Again,, , a small glow-lamp, duly, sterilized, is often of great value in deep operations on the abdominal cavity.

The bactericidal properties of, light, have long been demonstrated by Bie and others. Professor Niels Finsen of Copenhagen first used the ultra-violet rays of solar light in the treatment of skin diseases.