

employment in the different business houses ; secretaryships ; censor work ; women are already employed in some of these branches but the work is not general enough. A great opportunity has arisen for European and Anglo-Indian women to prove their worth and there are many who will do so. There seems to be a waste of good material as far as the nursing profession is concerned in keeping so many trained nurses for military duty in India when there is such a lack of patients in the military hospitals and the need so great in other places.

CONTRIBUTED ARTICLES.

IONIC MEDICATION.

By DR. M. O'BRIEN.

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I HAVE been working at this treatment for such a short time that I feel very diffident about reading a paper on it, but it has proved so useful to me that I venture to in the hope that it will induce others, to whom the subject is strange, to take it up.

Electricity is being used in many ways in the treatment of disease in Europe, and one can scarcely take up any medical journal without finding some reference to high frequency or galvanic or some other method of electrical treatment. It appears to me that it is not used sufficiently, at least in Women's Hospitals out here ; and I think that is possibly because it is thought that every electric battery to be of any use must necessarily be extremely expensive or complicated. Of course an electric installation suitable for giving electric baths, high frequency currents and so on, is undoubtedly fairly expensive. Pre-war prices were Rs. 750, a price which should not be beyond the reach of a well set-up hospital, and again, in many Indian towns, especially in the mofussil, there is no main electric supply, and most of the medical installations sent out are designed for attachment to the town mains. These two reasons are enough to account for the neglect of this remedial agent. But if it were known that it is possible to procure an electric apparatus which is not very expensive and at the same time is self-contained, I think that many medical women would be eager to add electrical treatment to their armamentarium.

In ionic treatment the amount of current used is not very great, 12-16 cells, each having a voltage of 1.5, is about the average strength required. It is nowadays possible to get these cells together in a case with a cell collector, i.e., a special adjustment by which the current can be raised gradually by the addition of only one cell at a time, and a galvanometer to register the amount of current passing through the skin. The current is generated by dry cells and is therefore independent of outside electric supplies.

Ionic medication is a method of treatment in which electric currents are used for their power of setting the constituents of a saline solution in orderly motion in a definite direction.

From the point of view of electrical conductivity the tissues of the body may be regarded as a saline solution, and the laws of the conduction of electricity in solutions may be applied to the interpretation of the effects of currents traversing the tissues. Ionic medication is used for the introduction of drugs into superficial parts of the body through the surface, and also for modifying the chemical constitution of parts of the body such as joints, fibrous tissue or nerves, by setting up of chemical changes throughout their substance.

An electrolyte is a chemical substance soluble in water which when dissolved forms a solution which is a good conductor of electricity. All substances which dissolve in water to form conducting solutions undergo a chemical decomposition when a current of electricity traverses their solutions, and their constituents migrate according to fixed laws in definite directions to one or other pole, and in quantities which bear a proportion to the amount of electricity which traverses the solution; *e.g.*, if nitrate of silver be dissolved in water and a current of electricity passed through its solutions, the silver will migrate to the kathode and in time will all be deposited there while the acid will migrate to the positive pole and become concentrated in the solution around that pole.

Faraday made use of the word "ion", which means a moving particle to explain the phenomena observed during the passage of electrical currents through conducting solutions, and particularly the migration of the chemical products of decomposition towards the poles. An "ion" moves towards one or other pole because it possesses an electric charge, and therefore moves to the pole charged oppositely on the principle that like charges repel another. An "anion" therefore moves to the anode because it is negatively charged, and a "kathion" is repelled from the anode and is attracted to the kathode because it has a positive charge. In an electrolyte through which no current is passing the ions are in perpetual motion, but the movement is not a movement in any definite direction. When a current is sent through an electrolyte the movement becomes orderly and is directed towards the poles. The penetration of ions through parchment paper can be demonstrated by passing a current from an iron or copper anode into a paper wetted with sodium sulphate solution. Their presence is clearly revealed by soaking the strip in ferrieyanide of potassium for the iron and ferrocyanide of potassium for the copper. In medical practice the best proof of penetration of ions is to be found in the results obtained from treatment.

The source of current must be one which can furnish a steady current without irregularities, because the currents employed are often of considerable magnitude, and if irregular, they cause the patient to receive a disagreeable shock. Electrodes are best considered in two parts, the metallic part and electrolytic part. Aluminium is about the most suitable metal to use. It should be covered by a layer of felt, and beneath the felt covered electrode is placed the electrolytic layer proper, composed of a cotton cloth or table napkin folded in four and again in four to give sixteen layers. It covers a larger area than the felt but diffuses the current evenly.

These cloths serve as reservoirs of the electrolyte from which the ions are introduced into the skin, and they hold an ample quantity for the longest application. Instead of folded cloths one may use Gamgee tissue, and for the ionization of joints this is very suitable, because it can be cut in a long strip and used as a bandage wrapped round the joint.

The Choice of Pole.—It is almost unnecessary to insist that continuous current must be used, as induction-coil currents being alternating in direction do not cause any steady migration of ions to either pole. It must also be remembered that the anions attracted by the anode are repelled by the kathode and are therefore driven in from the kathode so their solutions are to be applied at the negative pole. The anions chiefly used are salicylic acid, chlorine and iodine. The kathoins introduced from the positive pole are zinc, copper, magnesium, lithium, and the alkaloids, cocaine, quinine and adrenaline.

Practical Details.—The skin of the part to which the electrodes are to be applied should be washed beforehand with soap and water to free it from grease, and well rinsed. Any abrasion or open spot is covered with adhesive plaster or collodion. The surface must be thoroughly wetted with the solution applied in good uniform contact, the felt-covered metal electrode also well moistened with the solution is laid over it and the whole should be bandaged on with firm pressure. No metal of the conductor should touch the skin anywhere as it may cause a deep and intractable burn. Ionic medication may be used in any condition in which the diseased part is easily reached by the electrode, such conditions are trachoma, rodent or other skin ulceration, arthritis, sciatica and vaginitis and endometritis. In trachoma ionization is about the most useful treatment there is. I have used it in cases which have defied all other methods of treatment and have had most gratifying results.

For this treatment the eye must be very thoroughly cocainized and a copper rod in a U-shaped loop is fixed to the handle (the thick copper wire used for wiring the sparking plug of a motor answers the purpose admirably). The lids are averted and the current is then turned on and the loop is gently drawn to and fro across the lid, each lid is treated in turn and is given 2-3 milliamperes of current for two to three minutes. Care must be taken not to rest the wire on any part of the lid for any length of time as it would adhere and form a small ulcer. The treatment is followed by considerable reaction for a few hours, but the disease is very quickly cured after 4 to 6 applications given every fourth day. In one case trachoma was complicated by a small abscess opening on the inner margin of the lid. I had twice incised the abscess but had not cured the patient. Finally I passed a platinum-iridium wire (it was a platino-iridium hypodermic needle which had broken off its carrier) into the opening of the abscess and sent a current through of $1\frac{1}{2}$ milliamperes for two minutes. The abscess healed soundly, and I could find no trace of it in one week. This needed only one application.

I have tried it for leucoma of the cornea following small-pox. The leucoma was of very long standing and very unsightly, but in this case the first

application was followed by such a violent reaction that I could not persist with the treatment.

I have also used it in the treatment of small sinuses but not with very marked success.

One case of acute laryngitis showed the most surprising results. The patient before the treatment was hoarse and in much pain on deglutition. After the first ionization the pain disappeared, the patient seemed to think it magic, and the voice was very quickly restored. In that case I used a solution of potassium iodide.

Another case of malignant ulceration of the larynx was temporarily benefited, the cough and dysphagia were lessened but of course no permanent benefit could be hoped for.

The most striking success I have had so far is in a lady suffering from intermittent claudication since an abdominal operation seventeen months ago. She has been subject to attacks of cramp beginning in the scar and extending under Poupart's ligament along the course of the femoral vessels. The pain was excruciating and was followed by coldness and numbness of the limb; the attacks were becoming more frequent and severe. I applied salicylic ions over the scar and along Poupart's ligament with great relief, but the patient noticed that for some hours after the application there was great discomfort in the leg just as in a leg that has gone to sleep and is recovering. I then passed the current from Poupart's ligament to the foot and since then the cramps have quite disappeared and the pain, coldness and numbness in the leg is gone. The patient says that the leg now feels normal for the first time since her operation. I might mention that this lady's husband had ionic treatment for severe sciatica about two years ago and has been free from sciatica since.

Another example of the usefulness of ionic medication is a patient with an extensive superficial ulceration. This extended from the left acromial process down and forward like a necklace, over the sternum and on to the right side of the neck; there was also a second ulceration in a scar over the right sternomastoid, where she said glands had been removed about 18 months previously. The ulceration appeared to be a tuberculide, though V. Pirquet's reaction was negative, and had lasted with considerable pain for two years. On admission to hospital I immediately began to treat her with ionic medication using zinc ions. She is free of pain and now after six weeks treatment the ulceration is apparently healing soundly.

I think I have said enough to demonstrate the usefulness of this method of treatment and I hope others will take it up and extend it widely.

We regret that the article on "The Accouchement Outfit for Indian Women" which appeared in our March number is wrongly ascribed to Dr. Ruth Wilson as Dr. Balfour is the author.