ptoms. The long-continued administration of salicylic acid affects the nervous system, and the salicylate of bismuth is not sufficiently powerful unless given with betol.

As an intestinal disinfectant it is desirable to use some drug which is only sparingly soluble, so as to pass uninjured through the stomach and duodenum; or to have it made into pills specially coated to resist the action of first digestive juices. In that case it often resists also all other efforts to dissolve it, and the drug passes from the body with its coating intact.

Bouchard recommends large doses of iodoform mixed with charcoal; but the former is both unpleasant and toxic. I have found naphthaline much more useful and much less objectionable. It is not absorbed, and may be given in doses of from 4 to 8 grains in cachet. I consider it a most valuable intestinal antiseptic. Methylene blue is also of service in doses of 2 grains twice or three times daily; but the patient should be warned of the deep blue coloration of the secretions caused by it. Charcoal fixes the colouring matter of the bile, takes up gases, and prevents the absorption of some of the products of putrefaction. It is a remedy of great value, especially when given in cachets.

The needle, or circular spray bath, is most effective as a nerve tonic, as is also the double mustard pack. This is made of mustard bran, one portion being applied to the nape of the neck and down the spine, and the other over the stomach and liver, for from fifteen to twenty minutes every second day. It stimulates and strengthens the sympathetic nervous system, especially that portion connected with the process of digestion. The general faradisation of Rockwell is also useful, especially when the hand of the operator is used as the labile electrode. This method, which I consider has not received the attention it deserves, has a most helpful influence in cases of nerve failure. It is pleasant to the patient, and can be administered to the most delicate subject without causing weariness or exhaustion, and in most cases is followed by a feeling of greatly improved health. It may be conjoined with massage, which is indicated in many of these cases; for if we stimulate the nervous system by friction of its cutaneous branches, we obtain, in a reflex manner, quickening of the renal circulation, and, consequently, increased secretory activity of the kidneys.

Resisted Swedish exercises should not be lost sight of; for in the muscles the surrounding fascia forms a pumping arrangement; the two layers of which it consists are separated from each other at each muscular relaxation and pressed together at every contraction. The contained lymph and waste products are thus pumped out of the muscles at each contraction, and are sent into the large lymph spaces and lymph channels. The movements of the abdomen and thorax in the act of respiration form a similar pumping arrangement, by which any excess of the serous fluid which bathes the intestines and the lungs is pumped out of the peritoneal and pleural cavities. These movements also indirectly influence the removal of waste products from the brain and spinal cord. When the brain is overworked and the respiration and muscular movements are underworked the nutrition of the brain is diminished by the imperfect removal of waste products from its substance. Its cells and fibres may also be poisoned by the circulation within the blood vessels which supply them of noxious substances due to imperfect digestion and assimilation. The best remedy for this condition is to be found in bodily exercise; but no course requires so carefully prescribing in these cases as exercise. Excess in this particular at once causes a great increase in the amount of toxic products formed; and the difficulty is that so small an amount is in some cases excessive. Walking, cycling, and golf are all useful; but I have seen many patients (in whom all these caused increase of morbid conditions) completely cured by a course of saddle exercise.

Inhalation of compressed air or of oxygen decreases the toxicity of the urine, as does steady work or labour of any kind; while nothing is so bad as for a person to take little or no exercise for days, weeks, or months, and then suddenly to take violent or long-continued exertion for a short period. Such a course almost invariably causes great increase of toxins in the system.

In uræmia, baths of hot dry air are often of great use, given in

bed by means of Arnold's apparatus. I have often seen children rescued from the jaws of death by this means when constant vomiting, suppression of urine, and convulsions were present. Bleeding should not be lost sight of as a remedy in this complication, for we are told on good authority that we can remove from the system a greater proportion of extractives by bleeding than by any other channel, the renal tract excepted. We should also try to obtain intestinal antiseptics, should use inhalations of oxygen, and act freely upon the bowels.

The question of dietary in auto-intoxication is of the utmost importance. Excellent cures are reported where red meat has been absolutely forbidden, and equally excellent ones where nothing but red meat and hot water have been taken. In amyloseous dyspepsia, with or without gastric dilatation, a meat dietary is often efficacious.

When evident putrefaction is taking place lower down the alimentary canal, or where premonitory symptoms of uræmia are present, then a strict dietary of milk, koumiss, and farinaceous foods is indicated. Alcohol should be avoided as much as possible, especially in the form of spirits. When actually needed I find most useful (unorthodox as it is) a glass of sugarfree champagne, or one of port wine thoroughly matured in the wood, taken with food only. Above all the mixing of different classes of food at one meal should be avoided. In gastric dilatation the meals should neither be too frequent nor too bulky, and fluid should be taken in as small a quantity as possible with food, the necessary fluid being taken one hour before meals.

PARTIAL ANÆSTHESIA WITH CHLOROFORM.

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UNTIL two years ago the rule in the Afzulgunj Hospital was to produce complete anæsthesia with chloroform if the patient desired to have it, in every case, without exception, that was fit for an operation. In a large majority of the cases the operations were of a trifling description and of short or momentary duration, but the Edinburgh doctrine was almost invariably followed, and no operation, however trivial, was performed, or even commenced, before the patient was fully under the influence of the anæsthetic. In this way much valuable time was wasted, and patients who suffered from whitlows, abscesses, fistulae, hydroceles, and the thousand and one conditions which necessitate minor but painful surgical procedures were often incapacitated for a whole day or more afterwards by chloroform sickness or dyspepsia. However, as the Hyderabad Commission has proved that chloroform and shock are incompatibles, and that "primary chloroform syncope" is a myth, the old prejudice against beginning an operation before the patient is "over" was finally cast aside in 1895, and since then nearly all minor operations have been performed under partial anæsthesia with chloroform. In this method the chloroform is administered in drachm doses, poured on to the cap at minute intervals until the patient becomes unconscious. The moment consciousness is abolished the incision, or puncture, or whatever it may be, is made. The chloroform is then usually stopped, and the dressings are applied while consciousness is returning. Partial anæsthesia has been employed in this manner in more than 2,000 cases, and it is now established as a routine method of practice. It is of incalculable benefit in such conditions as hepatic abscess, which cannot be treated successfully in any other way but by aspiration.

Cases of liver abscess are constantly met with complicated by severe dysentery or malaria. At times a cutting operation is inadmissible, and it becomes a matter of almost life and death to the patient to avoid the shock of pain on the one hand, and the possibility of sickness from chloroform on the other. Unconsciousness to pain is easily obtained by partial anæsthesia with chloroform; it is attended with absolutely no risk, and is never followed by the discomfort and sickness which are so often inseparable from full chloroformisation. The only drawback to it is that reflex struggling

may be set up occasionally on the infliction of the wound, but this is merely a temporary inconvenience, which can be removed if necessary by pushing the chloroform until the struggling ceases, or until anaesthesia is complete.

The following case, taken from the anaesthesia notebook, illustrate the method of administration :

AFZULGUNJ HOSPITAL.

April 28th, 1897. Mir Soobhan Ali, aged 31, years, male, had food last at 7 o'clock to-day. Is very weak and emaciated, passing twelve to fourteen dysenteric stools a day. Operation, aspiration of liver abscess. Chloroformist, Miss Tendukey, fourth year student. Administration commenced in one drachm doses at :

H.	M.	S.	
8	50	30	Breathing naturally, quiet.
8	51	30	Chloroform added to the cap, one breath of air.
8	52	15	Unconscious. Aspirated in seventh space. Six ounces of serum evacuated.
8	53	31	Needle withdrawn.
8	55	0	Patient removed on a stretcher.

The entire operation, from the time the chloroform was begun till the patient was taken away, occupied $4\frac{1}{2}$ minutes, and there was no sickness or discomfort afterwards. A brief account of the case will show how important a part the partial anaesthesia played in the patient's recovery. He was admitted into the Afzulgunj Hospital on April 21st, 1897, suffering from dysentery and a large abscess of the liver. The dysentery was treated throughout with bismuth and Dover's powder, which he is still taking; and the aspirations were carried out as follows :

April 22nd. First aspiration under partial anaesthesia with chloroform. Thirty-five ounces of thick sterile pus were evacuated. The operation lasted 9 minutes and 45 seconds.

April 24th. Second aspiration under partial anaesthesia with chloroform. Fourteen ounces of pus were removed; and the operation lasted 5 minutes and 55 seconds.

April 25th. Third aspiration under partial anaesthesia. Eight ounces of pus and serum were evacuated, and the operation lasted 5 minutes and 25 seconds.

April 28th. Fourth aspiration under partial anaesthesia. Six ounces of sterile serum only were removed, and the operation lasted $4\frac{1}{2}$ minutes.

May 6th. Fifth aspiration under partial anaesthesia. The abscess cavity was found entirely empty. The exploratory operation lasted 5 minutes. Rapid improvement had taken place after the aspiration on April 28th, when nothing but serum was found, and the temperature remained normal. The patient passes from one to three stools, free from blood and mucus, in the twenty-four hours; he is free from pain and feels quite well.

One word of warning must be added with regard to the employment of partial anaesthesia. It demands precisely the same undivided care and attention on the part of the chloroformist as the production of full anaesthesia. It has happened rarely that, intending to produce only unconsciousness with the 1 or 2 drachm dose, complete anaesthesia has unexpectedly supervened. If on these occasions, the chloroformist had not been attending properly to his duty, accidental overdosing might unawares have taken place, and the case been cited to bolster up the waning belief in shock under chloroform and primary chloroform syncope.

DEEP TISSUE TRAUMATISM FROM ROENTGEN RAY EXPOSURE.

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MANY instances have now been recorded of injury to the superficial structures of the human body, such as skin, hair, and conjunctivæ, by the process of skiagraphy. It has been generally assumed, however, that no harm has been done to the deeper structures by the passage through the body of rays from the focus tube. So far from that view representing the exact state of affairs, it seems to the present writer that the method of Roentgen ray diagnosis may exert a definite harmful action upon some of the deeper tissues of the human body. The facts that have suggested that opinion may be gathered from the following briefly noted cases :

Professor Waymouth Reid,¹ of Dundee, experienced a severe dermatitis and loss of hair after four exposures, from twenty to forty minutes each, within a period of four days. The focus tube was placed over the front of the body, and on the evening of each exposure marked erythema of the chest and belly was noticed, as well as slight redness of the back. This interesting observation seems to point to a kind of selec-

tive action traumatism of the deeper epidermis and dermis by rays capable of passing through the substance of the body.

The only recorded instance, so far as the writer knows, of apparent injury to deep structures by the Roentgen methods is one given by an American surgeon, Mr. Gilchrist.² It was that of a demonstrator, aged 32 years, affected by a severe dermatitis after frequent and prolonged exposures. At the same time the bones of the hand became tender on pressure. A skiagraph showed the presence of a distinct osteoplastic periostitis, and probably an osteitis of the first and second phalanges of the index and second fingers, and also of the heads of the corresponding metacarpal bones.

A remarkable instance of apparent injury to brain structures by the rays of the focus tube has come under the notice of the present writer. The sufferer, a man 49 years of age, had demonstrated the rays for some months, and had suffered from several slight attacks of dermatitis. At length he experienced a severe illness after a week's prolonged demonstration, during which the tube was constantly near his head, although separated by a wooden screen. The main features of his attack were giddiness, slight headache, vomiting, diarrhoea, high temperature, and prostration. He was under the care of Dr. Murray, of Clacton-upon-Sea, who has kindly furnished the following note. When the patient came under observation his temperature was 103.5°, pupils sluggish, frequent diarrhoea and vomiting, great languor and debility. Dr. Murray regarded the attack as in some way due to Roentgen ray exposure, and compared it at the time with the symptoms of "sunstroke." The giddiness persisted for a couple of months. On the whole the facts of this illness appear to be consistent with a theory of gastric and cerebral irritation set up by focus-tube exposure in a subject proved to be susceptible by previous dermatitis from a similar cause.

Another case has come under the writer's notice. A practical worker, Mr. Greenhill, was carrying out a series of experiments involving exposure of the region of the stomach for a period of about two hours daily. After some weeks he complained of gastric symptoms, such as pain, tenderness on pressure, flatulency, colic, and diarrhoea. He went away into the country for a fortnight and got well. On his return he resumed his experiments, and after a fortnight experienced a similar attack. He subsequently shielded his stomach with a thin sheet of lead, and his symptoms finally disappeared. This history certainly suggests that in his case the rays of the focus tube caused a direct inflammation of the gastrointestinal mucous membranes.

Other facts pointing to deep action of the focus tube rays are the local tremors often set up by exposure, and the apparent shrinking of the heart noticed in several instances by Dr. Bezly Thorne.³ Lastly, there is the action, noted by Despeigne⁴ and others, of these rays in the relief of the pain of cancer.

If from the foregoing grounds we may assume that focus-tube traumatism of the deeper structures of the human body occurs, then we have at once a remarkable analogy with the results of exposure to the sun. Severe resulting rashes are common to both agencies, and may follow a single exposure. Pigmentation of skin is another common effect. In the case above mentioned Despeigne used the rays to relieve the pain of cancer; he reported that after the eightieth sitting the skin of the patient's neck became as black as that of a negro. Then in the case of Dr. Murray we have a perfect mimicry of mild-heat apoplexy. So far as any ill-effect of the sun on gastro-intestinal mucous membranes is concerned, the writer knows of no direct evidence; on the other hand, however, obstinate constipation is the rule, together with what is usually regarded as cerebral vomiting. From the inherent conditions of the exposure, the brunt of the sun's rays would naturally fall upon the head, and it is commonly supposed by anatomists that the thickness of the negro skull is an acquired character due to prolonged exposure to the rays of a tropical sun. We know that sunlight has a powerful influence upon the general health, and it seems quite possible that the sun may have a much greater and more direct effect upon the deeper structures of the human body than has been hitherto imagined.

Three chief theories have been mentioned by Gilchrist, in the paper already alluded to, as the cause of focus tube dermatitis :