and tannic acid with the vegetable preparations that contain it, such as catechu, kino, hamamelis, &c. Any of them are extremely useful if they can be applied directly to the bleeding vessel—e.g., in gastric or intestinal hæmorrhage, but as indirect—i.e., after absorption—controllers of bleeding I believe them to be as useless or even harmful as ergot itself. Turpentine, too, must not be omitted, as from its volatility it may reach the affected area by inhalation, while iodide of potassium and purgatives are very useful adjuvants. Accepting this list as fairly representative of our armamentarium I will bring this paper to a close by a very brief sketch of the means I would propose to adopt in treating the individual cases of Group 2, mentioning the reasons deducted from post-mortem experience.

Cerebral hæmorrhage is almost invariably arterial, consequently I believe that ergot and its allies are contraindicated, rest is strongly indicated, and possibly purgatives and iodide of potassium may be given if further treatment seems desirable. The epistaxis of youth rarely requires more than the application of cold to the nose or sniffing up of powdered alum; that of age should not be too early interfered with as it forms a safety valve against intracranial arterial rupture; should it be too prolonged the local measures will again be useful, if also the patient be placed sitting upright with the feet and legs in very hot water, then plugging of the nares will be but rarely required. Pharyngeal hæmorrhage rarely requires any treatment, but the electric cautery may be applied if necessary. In hæmorrhage from the lung I believe that all our active efforts will have but little real effect. In bronchitis, pneumonia, and in the early stages of phthisis, the bleeding is rarely more than slight and will usually stop by itself if the patient be kept quiet in bed and his mind put at rest as to his danger; should it prove more profuse, in my opinion, opium must be pushed and iodide of potassium freely administered. It is in rare cases of emphysema and in the advanced cases of phthisis that we feel so anxious to employ more active measures. But post mortem we find that in such cases the bleeding is almost invariably arterial, and I must confess myself feeling very sceptical as to the value of any more active treatment which has been hitherto advocated. I feel that to bring and keep the patient well under the influence of opium with perhaps the inhalation of turpentine is as much as we can do, however distressing it may be to us to stand by and feel so helpless. I wonder whether artificial pneumothorax would be of any use.

In hæmatemesis we are more favourably situated and can adopt measures more actively and with greater hope because our drugs can reach the bleeding spot. In the young an ulceration into an artery is the almost universal causation of such trouble, and here the swallowing of ice or ice-cold water in small quantities or per contra (and better, I believe) hot water at 110° F. is very likely to be of use, while bismuth, chalk or strong solutions of tannin will very rapidly cause the formation of a plugging clot. Ergot in such cases I think worse than useless. In the hæmatemeses of older people there are two probable or possible sources for free bleeding: (1) an ulcer, chronic or malignant, in which the treatment just suggested is the best; and (2) a ruptured vein or capillary oozing from a cirrhotic liver. Here, in addition to the foregoing, ergot may perhaps be useful, though I would prefer to try free purgation.

In the hæmorrhages of typhoid fever, if profuse and accompanied by collapse and subnormal temperature, morbid anatomy has shown that an artery has always been ruptured. Such are I fear almost invariably fatal, but I believe that even here opium freely administered may save some lives. I would also give bismuth and liquid preparations of lead, though I doubt if they can reach the spot in time; ergot I feel sure must make bad worse. Slight hæmorrhage in typhoid fever I have been led to look upon as a favourable sign and one that does not require any active treatment beyond a little extra care in withholding food and seeing that the bowel is kept open. It is in all forms of uterine hæmorrhage that ergot finds its best and most correct application. On the grounds, firstly, that such hæmorrhage is almost invariably venous or capillary; secondly, that the mass of unstriated muscle in the organ is so large relatively to that in an arteriole as easily to overcome any extra arterial blood pressure.

To conclude a somewhat rambling and yet very condensed article, I would make four propositions for discussion:—1. That most cases of medical hæmorrhage cease spontaneously and are essentially not dangerous to life from loss of blood. 2. That active treatment by ice-bags and ergot

frequently defeats its own purpose; if the bleeding ceases it does so in spite of treatment. 3. That where experience of morbid anatomy or the profuseness of the blood loss makes an arterial source certain ergot is distinctly contraindicated. 4. That complete rest, opium, and iodide of potassium are our most powerful and most trustworthy agents for the emergency, except in certain special cases—e.g., from stomach—where additional treatment by astringents should be applied.

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CONCERNING THE ACTION OF X RAYS ON CULTIVATIONS OF TUBERCLE BACILLUS.¹

By FRANCIS POTT, M.D. BRUX.

THE treatment of pulmonary tuberculosis in man by means of x rays has been described by several experimentalists.² In the cases thus treated improvement in the state of the patient was ascribed to the curative agency of the x rays, but no sufficient proof of this action has been given, nor is there any indication of the manne in which the rays affect either the tubercle bacilli or the surrounding tissues. The experiments detailed below were undertaken with a view to ascertaining whether x rays inhibit the growth of or kill the tubercle bacillus. Preliminary experiments with x rays and glass test-tubes showed that different makes of glass were opaque to x rays in very different degrees. Soda-glass test-tubes with sensitive paper beneath them were exposed to x rays of the same intensity as those used in the subsequent experiments. Objects such as pins, keys, and chains were placed inside and underneath the test-tubes. The resulting skiagrams gave perfect pictures of those objects opaque to the rays which were inside and underneath the test-tubes, whilst the soda-glass test-tubes themselves were but faintly outlined at those points where the x rays had had to pass through the greatest thickness of glass. The slight resistance offered to x rays by thin soda-glass test-tubes was not considered to be sufficient to mar the value of the inference drawn from the following experiments.

Into twenty-five sterilised test-tubes glycerine agar-agar peptone was run and allowed to solidify in the position used for streak culture, so as to give a large flat surface. On April 21st, 1897, the agar in the tubes was sown with tubercle bacilli taken from a cultivation belonging to Dr. Arthur Ransome which had been obtained from University College Hospital and been shown to be pure and vigorous. The laboratory work was carried out by Mr. F. J. Tanner at Bournemouth. The twenty-five inoculated test-tubes were incubated at 37° C. for a month. By this time characteristic colonies of tubercle bacillus had developed in each of the tubes either as films, small colonies, or heaped-up masses. No growths other than tubercle appeared in the agar. The test-tubes were divided into sets of three and one set of four, numbered and lettered. One tube from each set was reserved as a "control," the remaining seventeen being exposed to the x rays. To ensure an equal distribution of x rays over each inoculated surface of agar the test-tubes were laid flat upon a horizontal rotary table with their closed ends converging to the centre of the table. This arrangement placed all the test-tubes well within the focal area of the Crookes's tube which hung above them, whilst it allowed the table and its load to be shifted around from time to time. Beneath the rotary table there was a space for the admission of a sensitive plate. To demonstrate that the x ray apparatus was working well at any moment during the lengthy exposure a sensitive plate was slipped into its place, exposed, and developed at once, producing a picture of the pins and metallic trifles which had been scattered amongst the test-tubes. The apparatus used for producing the x rays consisted of an induction coil giving a 5" spark, a ten volt accumulator, and several Crookes's tubes of modern pattern. These tubes were occasionally interchanged to rest them. At the

¹ A paper read before the Bournemouth Medical Society on Nov. 10th, 1897.

² Chapteloube and Descomptes: Archives d'Electricité Médicale, vol. v., 1897. Bergonié and Mongour: Académie de Médecine, &c.

suggestion of Mr. Howlett, of Hull, damped wool was successfully used on the vacuum tubes to prevent sparking.

On May 23rd, 1897, the seventeen test-tubes containing the cultivations of tubercle bacilli were exposed to the x rays. The series of cultivations received exposures varying from half-an-hour to eleven hours. Two tubes were withdrawn from the area of the x rays at intervals of half an hour, one, two, four, six, eight, and ten hours, the remaining three tubes receiving the full exposure of eleven hours. During these eleven hours the control cultivations were taken out of the incubator and placed in a protected place at ordinary room temperature similar to that in which the experiments were carried out. At the conclusion of the experiments the whole number of cultivations was returned to the incubator.

During the first week of September, 1897, the cultivations were examined, a period of over three months having elapsed since they were exposed to the x rays. All the colonies of tubercle bacillus were found to be thriving. Differences in the rate of growth of the colonies were perceptible, both in those which had been exposed to the x rays and those which had been used as controls. These differences were only such as are usual in a series of agar cultivations of tubercle bacillus. In tube No. 16, which had been exposed to the rays for eight hours, the activity of the growth was remarkable, the colony of tubercle bacillus taking the shape of an acuminate corrugated mound with a base area somewhat larger than a threepenny piece. From this largest growth the colonies graduated downwards in size to that of a pin's head. The development of the colonies during the three months between the exposures and the final examinations was in accord with that of any large series of tubercle bacillus cultivations.

A comparison of the colonies exposed to the x rays with those used as controls showed no variation in colour, size, or manner of development which could be attributed to the different treatments which the colonies had undergone. These experiments point to the conclusion that x rays do not affect the tubercle bacillus, and lead us to believe that the improved condition of tuberculous patients who have been submitted to the influence of x rays was due to causes other than the action of the rays.

Bournemouth.

Clinical Notes :

MEDICAL, SURGICAL, OBSTETRICAL, AND THERAPEUTICAL.

A CASE OF TETANUS SUCCESSFULLY TREATED BY TETANUS ANTITOXIN.

By W. H. SMART, M.A., M.B. CANTAB., M.R.C.S. ENG.

A MAN, aged about forty years, came to me on July 4th, 1897, with the last phalanx of one finger crushed; the nail was removed, but the bone was uninjured. The wound was cleansed and dressed with cold water applications. All went well until July 13th, when his jaw felt stiff. During the night of the 14th he had pain in the legs, and the next day he sent for me in the afternoon, when I found him suffering from tetanic spasms of the legs occurring, I was told, about every half-hour. The jaws would open about an inch with pain, the corners of the mouth were drawn up, the eyebrows were raised, and the forehead was wrinkled transversely. There were no spasms of the arms or opisthotonos. The bowels had not been opened for four days. He was given five grains of calomel and a mixture containing two drachms of bromide of potassium and one drachm of chloral hydrate, an eighth part of which was taken every three hours. He slept during the night, avoiding spasm of the legs by keeping them drawn up, but the spasm came on again immediately any attempt was made to straighten the legs. On the 16th the jaw appeared to be a little less stiff, but the spasms were still very severe. I amputated the injured joint under chloroform and injected 10 c.c. of antitoxin at 12 mid-day. At 6 P.M. the spasms were less frequent, the jaw was still stiff, and the finger was painful. He could put the legs down and draw them up again, but it caused trembling and

some stiffness. There was no spasm of the back, and the muscles of the face and forehead were in the same condition; 10 c.c. of antitoxin were injected. On the 17th I was told he had had a quiet night, but that the spasms had come on again at 10.30 A.M. The finger was dressed with chlorinated soda lotion, 10 c.c. of antitoxin were injected, and five grains of calomel were administered; the mixture to be taken as before. At 9 P.M. the patient was better, but the jaw was stiff. The spasms commenced when I came, perhaps owing to nervousness; 10 c.c. of antitoxin were injected. On the 19th he complained that he could not micturate except when out of bed, while he had pain in the right side and leg. I made him straighten and draw up the leg, which caused much trembling, but the spasms were evidently much less, and so he was reassured. On the 20th he felt better; he could open the jaws wider, and could lie with the legs stretched out. On the 26th the mouth could be opened wide; the legs were weak and inclined to get hard in the calves, but were otherwise much better. This day a carbuncle was found to be developing in the neck; this ran its normal course and the patient made a complete recovery. In all, 50 c.c. of antitoxin were injected; and though the sedatives may have assisted in the successful treatment (the bromide was continued almost until the man went to his work), I think that the symptoms were much alleviated after each dose of the serum was injected.

Polesworth, near Tamworth.

NOTE ON AN UNUSUAL ATTACHMENT OF THE FUNIS.

By W. F. GARDENER, M.R.C.S. ENG., L.R.C.P. LOND.

ON Oct. 25th last I attended a primipara who was within a fortnight of her full time. The labour was normal and she was delivered of a small foetus. The cord was then seen to be expanded at its foetal attachment into a keel-shaped mass, with long diameter running from above downwards in the foetus. The "fault" in the abdomen measured $3\frac{1}{4}$ in. in length, $2\frac{1}{4}$ in. in breadth, and stood up from the abdominal surface $1\frac{1}{2}$ in. The mass consisted entirely of Wharton's jelly. The foetus lived thirty-six hours.

I was unable to obtain permission to make a full post-mortem examination, but an incision into the tumour revealed beneath a layer of Wharton's jelly an inch and a quarter in depth the liver and transverse colon, so that a very large umbilical hernia would have resulted if the child had lived. I believe this to be a very uncommon condition.

Sydenham.

ARTERIAL OBSTRUCTION IN AN OLD MAN; EMBOLISM; ENDOCARDITIS; RECOVERY.

By ERNEST MABERLY, M.R.C.S. ENG.

THE patient, a man over seventy years of age, who, with the exception of an attack of influenza, had as far as he could remember always enjoyed the best of health, came under my care on April 9th, 1897. Just two months previously he had received a severe bite from a dog on the left leg. No medical man was at first called in to the case, the patient treating the wound himself with an ointment of soap and honey and eventually applying sticking plaster. The wound appears to have partially scabbed over under this treatment, but it became very offensive and there was great congestion and swelling around it. When seen by his medical man nine days later a Goulard lotion was applied four times a day for a week. On Feb. 25th the wound was dressed with zinc ointment and bathed with warm water four times a day for a week and the leg was bandaged; the patient remained in bed most of the time. Before he left home on April 5th he began to walk about a little. On April 9th I was called in for the first time. He complained then of great constipation and flatulence and of considerable pain over the hepatic region. On examination I found the liver very congested; the tongue was white and thickly furred; the motions were clay-coloured; hardly any action of the bowels had taken place for a week. One tablespoonful of castor oil was given, and a mustard leaf was applied over the hepatic region. No action of the bowels was obtained until five grain