quarter off, and $\frac{3}{8}$ with great difficulty; the central corneal opacity was small, with a delicate haze around which was diminishing. There was little or no injection, and the patient stated she was more comfortable than she had been for years. An artificial pupil may be required at a later date.

The cauteries, which I have used and recommend, are of different shapes. Those for conical cornea are modifications of Wordsworth's needle, with the end like a stop-needle used in the division of cataract, the stop varying from one-twelfth to one-eighth of an inch from the point, so as to prevent a sudden thrust in any sudden movement of the patient; others, for pushing into cavities, or forming different sized sloughs, are rounded at the end, like shot of different sizes at the end of a piece of wire; whilst, for touching large surfaces, a pyriform or fusiform end seems more useful.

The galvanic cautery I have tried; and, aided with the rheostat, the batteries, from the power of producing instantaneous heat, seem indicated; but my experience, thus far, has shown that most batteries are too variable in their action, that the wire connection with the instruments renders the free use of the latter more difficult in such delicate operations. Hence I have fallen back on the ordinary instrument, heated with a spirit-lamp, which may be aided by a blow-pipe.

Objections, I know, may be easily urged to many of the propositions in this paper. It may be said that ordinary burns cause severe pain, suppuration, and ulcers difficult to heal; that patients, especially women, in spite of the assurance of their medical man, will dread a red hot instrument applied to their eyes, unless aided by an anæsthetic; that the exact heat required is not easily obtained; that its application to the cornea must be limited, from the opacity which follows.

But I would answer, that the bad effects of ordinary burns are due to extensive destruction of the cuticle, and exposure of the sensitive true cutis to the air; that such effects are not seen after the actual cautery; that ease rather than pain, and a healing slough, if I may use such a term, rather than suppuration, are more the rule; that many patients object to any operation; that the heat may be easily regulated, by simply testing with a piece of moist leather; that a slowly healing ulcer will generally leave a worse scar than that produced by the cautery; and, most important, if the experience of others corresponds with mine, a burnt wound rarely produces sympathetic inflammation.

A CASE OF ATROPHY OF THE OPTIC NERVES TREATED BY HYPODERMIC INJECTIONS OF NITRATE OF PILOCARPINE.

Read in the Section of Ophthalmology.

By DAVID MCKEOWN, B.A., M.D., MANCHESTER.

THE case to which these notes refer is interesting from two points of view—the treatment and its results.

On May 30th, 1882, I was consulted at the Ulster Eye, Ear, and Throat Hospital, by a well built, well developed man, A. H., aged 26, a marine engineer. He stated that his general health was good, and that the only complaint he had to make was in regard to his sight.

He required a guide; with difficulty, he could, with either eye, see fingers at the distance of a few inches. The vision was very peripheral; the eyes were always rotated upwards for objects straight before them. The ophthalmoscope revealed an atrophic condition (almost complete) of both discs. There was no history of syphilis, rheumatism, excessive smoking, or sexual excesses; the patellar tendon-reflex was present, and there was nothing pointing to a tabetic condition.

I made minute inquiries with the object of ascertaining the cause (which appears to be rather obscure), and elicited the following. In July 1880, the patient sailed from Hong Kong for Sydney, in a steamer which primed; that is, water passed from the boiler into the cylinder, whence (accompanied by steam) it was carried by a pipe into the "bilge." The "bilge" (the lowest part of the vessel) was separated from the engine-room by an iron floor, which, however, allowed the entrance of a large quantity of moisture. The vessel had been built for the home trade, and her ventilating arrangements were insufficient for such a voyage as the one mentioned. The patient spent eight out of the twenty-four hours in the engine-room (charged with vapour), whose temperature ranged from 110° to 120° . During the voyage, he felt a disinclination for work, took no interest in anything, and ate but little. He had no pain in the head, no diplopia, was not sick, did not

vomit, and did not experience loss of power or sensation in any part of the body. Three days after landing at Sydney, he observed a dimness coming over his sight, and consulted an oculist, but without benefit. His sight gradually failed to such a degree that, in about six weeks, he could not go about alone. In Sydney, an iridectomy was performed on the left eye. The patient came to England in the summer of 1881, and was under the care of three distinguished ophthalmic surgeons in London, one of whom prescribed tincture of the perchloride of iron, and tincture of nux vomica; and the other two a mixture of tincture of nux vomica, dilute phosphoric acid, and compound infusion of gentian, and friction on the forehead, with compound camphor-liniment.

On my recommending strychnine hypodermically, he told me that he had had an extensive experience of the strychnine treatment, in Sydney, hypodermically, and in Belfast, for about six months, both hypodermically and by the mouth. I did not think much more could be done; and, rather to avoid discouraging the patient than from any expected good, I ordered phosphorus and nux vomica pills. The patient reported that he was not conscious of any improvement during the twenty-one months of treatment.

At this time, I was treating by hypodermic injections of pilocarpine some cases of neuritis, and of atrophy of the optic nerve following neuritis, and the satisfactory results obtained led me to think of using it in the present instance. It is true there was no evidence of, and no reason for supposing, an antecedent neuritis; but I thought that there might be a pathological condition capable of amelioration, or that the nutrition of the parts involved might be improved, by the action of this powerful medicine on the intracranial circulation. Accordingly, on July 15th, 1882, $\frac{1}{8}$ of a grain of the nitrate of pilocarpine were injected hypodermically, and the injections were continued daily (the dose being gradually increased to double the first) for nearly three months, a steady and very marked improvement being reported as taking place. Iodide of potassium was taken for some weeks in five-grain doses, thrice daily, but without benefit. Strychnine, hydrochloric acid, and iron were also prescribed.

The patient had frequently told me that pilocarpine was the first and only medicine which had been of any service to him since he took ill; that, by its use, he had soon made such an improvement as enabled him to go about without assistance; that, when it was commenced, a dense thick fog prevented him seeing anything at which he looked straight; that this fog had been gradually diminishing, both as regards the extent and the degree; and he requested that I would resume the hypodermic injection of pilocarpine, for which purpose he would come to town.

During the months of October, November, and December, 1883, hypodermic injections (ranging from $\frac{1}{8}$ to $\frac{1}{2}$ a grain) of the nitrate of pilocarpine were given almost daily; and, during the latter six weeks, strychnine was also administered hypodermically, at the same time, the dose being gradually increased from the $\frac{1}{8}$ to the $\frac{1}{2}$ of a grain of the acetate. When the latter dose (which was continued for several weeks) was reached, the drug began to manifest its physiological effects. The patient reported a diminution in the extent and degree of the fog. I cannot say whether the strychnine in any way contributed to this result. The pilocarpine and strychnine have been continued, in diminished doses, during five months of the present year. After the first few months' treatment by pilocarpine, the patient was able to dispense with his guide, and has, since then, been able to, as he says himself, "go alone anywhere." He can now, with either eye, spell words of No. 3 at a distance of several inches; indeed, sometimes, even words of 1.75. His acuteness of vision varies with the brightness of the day and his state of health. The left eye has recently been making marked progress, but not so the right. On several occasions, I tested the colour-perception, but found it extremely defective, but now it is very fair; blunders with well defined colours are seldom made. There is no marked change in the ophthalmoscopic appearances.

In March, I took the field of the left eye for blue, red, green, and yellow. Blue, red, and green were perceived in a small central part of the field, and also in a peripheral zone (complete for blue, but defective in about the upper quarter for green, and in the upper and outer third for red), but not in the rest of the field. Yellow was perceived in a peripheral zone merely; the boundaries varied for the different colours.

Very free salivation and perspiration were produced by the pilocarpine, without the least injurious influence upon the general health. When the large dose of strychnine was reached, the patient thought the effect of the pilocarpine was increased.

It is useless to speculate upon the future of this patient. A sufficient time, however, has elapsed to warrant me in exhibiting him to

you (which I have now pleasure in doing), and in stating briefly the course of the affection.

This seemingly hopeless case, which has, by what is certainly not a recognised method of treatment, given a most gratifying result, suggests the following conclusions. 1. There are probably some cases of atrophy of the optic nerve in which the hypodermic injection of pilocarpine would prove a valuable addition to the recognised methods of treatment. 2. These injections may, in suitable cases, be continued daily, for a long time, without lowering the patient's health. 3. Strychnine and pilocarpine may be administered subcutaneously at the same time.

CASES ILLUSTRATING THE VALUE OF THE BACILLUS-SEARCH.

By ARTHUR RANSOME, M.D., MANCHESTER.

CASE I.—A boy, aged 8, seen with Dr. Mules, had suffered for several weeks from high temperature (101° to 103°) with wasting and shortness of breath. The upper lobe of the left lung was consolidated, and gave moist sounds on auscultation. The expectoration was abundant, mucopurulent. Both bases were clear. No bacilli were discovered in the sputum after careful search; and, although negative evidence on this point is of much less value than positive evidence, it was considered probable that the case was one of apical pneumonia, and not phthisis. This opinion was justified several weeks later by complete recovery.

CASE II.—Also seen with Dr. Mules, was a man, aged 30, who had suffered from pleurisy, with effusion on the right side, for which aspiration had to be employed. He remained in bad health for several weeks afterwards, and his temperature continued high (100° to 102°). There was dullness at the right base, with moist crepitation, and the expectoration was mucopurulent and abundant. There was also slight dullness at both apices. It was difficult to say how far his condition was to be explained by the previous pleurisy until the sputum was examined, and found to contain abundant bacilli. He subsequently became insane, and died, a few months afterwards, of phthisis.

CASE III.—A woman attending the Hospital for Consumption, Manchester, suffering from constant cough, abundant expectoration, and night-sweats, was rapidly emaciating. Although no physical signs of phthisis were discoverable, the sputum was examined; no bacilli were found, and a favourable prognosis was given. She afterwards recovered, after several months' illness.

This case may serve as an example of several others of a similar character.

CASE IV.—A gentleman, residing at Alderley, had suffered from an occasional hæmoptysis for two years. He was rather thin, and had constant slight cough, but had not lost weight of late. There was slight dullness at the right apex, and harsh breathing; no moist sounds. He had been pronounced free from tubercular disease by two eminent London physicians. An examination of some blood-stained sputum on his handkerchief gave several bacilli, and he was advised to winter in the Riviera.

CASE V.—A married lady, aged 30, had suffered for three years from symptoms of phthisis, and it had become a question whether she might prudently winter at Davos. She had occasional hæmoptysis, and there were vomicae at the bases of both lungs; but her weight, under the use of iodoform, had increased during the last few months, and her expectoration had diminished. Examination of the sputum showed comparatively few bacilli. It was, therefore, considered probable that the disease had assumed a chronic form; and that she might go to the Engadine in September. When there, she had a sharp attack of rheumatic fever; but, in spite of this, I learn that she has gained weight, and that the lung-disease seems to have made some improvement.

CASE VI.—A youth, aged 17, had pneumonia at the base of the left lung, and afterwards pleurisy, ending in empyema. His family-history was unfavourable; but no physical signs of tubercle could be detected, and he had very little cough and expectoration. A small portion of rusty pneumonic sputum was secured, and a few bacilli were found. The empyema was treated by free incision, drainage, and antiseptic irrigation, etc., and the cavity is closing up; but he remains still in a precarious condition.

CASE VII.—A girl, aged 15, was seized three months ago with enteric fever, the result of impure milk. After a lapse of three weeks, she had a second rigor, which ushered in a second attack of fever, with diarrhoea and rose-spots at the due interval. In rather more than three weeks from the commencement of her illness, the fever subsided

for a week, and then began a third time. A third crop of rose-spots appeared a few days afterwards, and continued to show themselves for ten days. She had suffered from cough throughout the illness, and there was congestion of the left base. She was greatly emaciated; and, although the third outbreak of the rash made it pretty certain that we had to do with the extraordinary occurrence of a second relapse into fever, it was thought desirable to discover whether tubercular disease was also present. The sputum was, therefore, carefully examined; and, no bacilli being found, our anxiety on this score was relieved. The case is now convalescent.

CASE VIII.—A farmer, aged 40, had pulmonary pneumonia, with effusion on the left side. After a month or two, the fluid diminished without aspiration, and he improved in general health; but there remained some dullness at the base of the lung. Four months after his first seizure, he began to lose weight, and was feverish, the evening temperature being 103° ; and had aphthæ in the throat and mouth. Being badly housed and badly nursed, he was persuaded to come into the Altrincham Hospital. An exploratory aspiration was made, in search of any possible limited collection of pus, but without success. His sputum was then examined; and, although no bacilli were found, there was an abundance of a minute micrococcus, and it became evident that we had to do with destructive pneumonic suppuration. He died shortly afterwards.

THERAPEUTIC MEMORANDA.

THE TREATMENT OF TUBERCULOSIS.

DR. G. HUNTER MACKENZIE, in the JOURNAL of October 11th, page 711, comments on the absence of any records of the effect of treatment upon the bacilli of tubercle; and he remarks that, in the reports of my paper read at the Copenhagen meeting of the International Congress, no reference is made to the effect of iodoform upon the bacilli in the sputum. When the paper was called for, the time of the meeting was so limited that only a small portion was read, and only a small fraction of this was reported. Accordingly, Dr. Mackenzie is not yet in a position to state what evidence is contained in the paper; and he will, no doubt, read with interest the details therein contained, when the paper has been published in the *Transactions* of the Congress. In the meantime, I may be allowed to state that the action of iodoform on the bacilli in the sputum was a point to which I had given special attention; and many of my cases appear to show that the bacilli diminish in number, and disappear from the sputum, under the influence of this drug. In several of the cases, all active symptoms had subsided, and expectoration ceased, so that no sputum could be obtained for examination. The following case is the most striking and satisfactory one in its results.

The patient was a female, aged 39. Her husband died of consumption two years ago; a son was now ill with tubercular phthisis (sputum containing bacilli). She formerly weighed 8 st. 13 lb.; her present weight was 6 st. 13 lb. She had had cough for five months; the sputum contained numerous typical bacilli. She had hectic temperature; highest, 101° . There was dullness and crepitation at the left apex. She commenced iodoform on September 8th, 1883, one grain every four hours, increased gradually up to five grains on September 22nd. Steady improvement ensued, and on October 16th she had gained strength; no crepitation could be heard, there was little expectoration, and the temperature was normal. On November 27th, the weight was 8 stone, and her general health good. The iodoform was then discontinued. On December 11th, her weight was 8 st. 4 lb. No expectoration could be obtained, as she had long ceased to expectorate, and she considered herself quite well. There was no dullness at the apex of the lung, and no other evidence of disease.

Another case was as follows.

A male patient, aged 29, had had cough for five years, and hæmoptysis and wasting for three weeks; his weight was 11 st. 2 lbs. on March 28th, 1883. There were evidences of disease at the apex of the right lung. Temperature, 98° . His sputum contained numerous tuberculous bacilli. He commenced iodoform on April 10th, one grain every four hours. On April 23rd, there was little cough and slight expectoration, the latter containing only a very few bacilli. The iodoform was increased to two grains, and was continued till June 4th. The weight had steadily increased up to 12 st. 3 lbs. on June 26th, when the patient appeared to be well, and had no cough or expectoration, although there was still some dullness, and coarse breath-sounds could be heard at the right apex.

A third case was that of William M., aged 34, who, after fourteen weeks' cough, had lost two stone in weight; he had pneumothorax at the