ordinary remedies, including prolonged rest in bed (the most important of all), should receive a fair trial, but in view of the injurious effect produced on the cortical cells by prolonged soaking in superfluous fluid, operative measures should not be unduly delayed. I would suggest three months as a fair probationary period.

Region Chosen for Decompression.

The temporal region offers the most suitable site for decompression. The operation is carried out over a silent area of the brain; drainage is conducted at the most dependent part of the brain; the scar is hidden subsequently by the hairy scalp; the bone defect is in a reasonably safe situation, and the operation involves no special risk when carried out by one possessing reasonable skill in head operations. The right or left side is chosen according to the distribution of the headache, but if there is no such localization the right side should be selected to avoid any possibility of disturbing the functions of the motor speech area.

The Opening in the Skull.

The trephine opening should be made low down, immediately above the ear, in the angle between the anterior and posterior branches of the middle meningeal artery. The opening is enlarged mainly in the anterior and posterior directions and downwards towards the base of the cerebral fossa. The bone is cut away so as to leave an aperture not less than two inches in the antero-posterior direction, one and a half in the vertical. The size, however, varies—the more severe the symptoms the larger the opening, and vice versa.

The dura is opened in every case by crucial or other incision. The intradural tension is *plus*, and in consequence the dural incision must be carried out with caution to avoid damage to the underlying cerebral vessels. The temporal muscle, turned down previous to trephining, is sewn into position at the end of the operation. Drainage to the surface should never be employed.

After-Treatment.

The patients should be sat up in bed as soon as possible. I advise small doses of morphine for one or two days following the operation, then bromides for a week or two; they should be gradually discontinued. Patients should be kept quiet in hospital for one month and then sent for prolonged convalescence at some quiet place with open-air treatment and no worries.

Plating the Gap in the Skull.

The situation of the opening, its muscular covering and subsequent protection with the fibrous tissue that develops later, usually render subsequent plating unnecessary. In some cases, however, especially when an extra large opening has been made, protection with a plate may be required. This can be done after the lapse of six months or so.

RESULTS OF SUBTEMPORAL DECOMPRESSION FOR CEREBRAL OEDEMA.

Immediate.

In the seven cases submitted to operation immediate benefit resulted. In some the patients were quite free from headache the day after the operation, the first time for many months. In other cases two or three days elapsed before real improvement occurred. In all cases, however, headache of any severity was a thing of the past. Minor attacks occurred now and then, but nothing compared to the previous severity. As regards the epileptiform convulsions, in spite of the fact that in some cases the fits had been not only numerous and severe but also dated back for some months, and even longer, there were no further fits of any sort (except in Case III) from the time of the operation till the discharge of the patient from hospital, an average period of two months. The mental condition improved in direct ratio; patients previously miserable and depressed became bright and cheerful, eager to get home. All other pressure symptoms disappeared in direct proportion.

Remote.

The later histories of these seven men confirm, with certain modifications, the early results as expressed above. All seven cases arrived home, and communications have

been received carrying on the history of the case down to eighteen months subsequent to the operation, thus giving a reasonable guide as to the result of the measures carried out.

CASE I.—“I am glad to say that I am fairly all right so long as I keep quiet. I often get a head, but nothing like the old days in India. Have only had about four attacks since arriving home.”

CASE II.—“Sometimes I am well in my head and sometimes I am so bad that I cannot do anything. The fits I have not had any more.”

CASE III.—“I am very well sometimes, at others I cannot do anything. I have had no more fits.”

CASE IV.—“I am getting on quite well, and my master is very pleased with my work. I hope you are in the best of health, as it leaves me at present.”

CASE V.—“I am thankful I am able to give you a good report. My head gives me no trouble whatever beyond an occasional headache, which all of us are liable to at times.”

CASE VI.—“I am keeping fairly well. I am getting pains and sickness now and then in dull weather. I get dull headaches, but nothing to worry about.”

CASE VII.—“Up to the time of writing I have had one or two attacks, the last in August of last year, since when I have been in the best of health.”

The first three cases are less satisfactory than Cases IV to VII. This, I believe, is due in the main to the experience gained in the earlier cases, as to points in the operative method, more especially in reference to the size and position of the decompression opening in the bone. But, taking all things into consideration, these results may be regarded as highly satisfactory.

Finally I would add that I have carried out the same operative procedures on three cases recently for chronic headache the result of slight gunshot wounds, being blown up, buried, etc. Two of these men were operated on very recently. In both the early result is eminently satisfactory. One man, the last case, said to me this morning: “My headache is all gone, and I feel a treat.” This man had been blown up and buried, and had suffered from headache for five months.

REMOVAL OF WORM (FILARIA LOA) FROM THE EYE.

BY LIEUT.-COLONEL R. H. ELLIOT, I.M.S.(RET.).

MR. T. W., of the West African Civil Service, was sent to me by Dr. C. W. Daniels on April 2nd, 1918, suffering from a worm under the conjunctiva of the right eye. The patient is highly intelligent and educated. In addition he is an excellent observer, and has taken a very close interest in the evolution of his case, with the result that he has been able to contribute some new and interesting items of information on the subject of this form of filariasis.

History.

He believes that he contracted the disease in Benin City, where he was resident for eleven months (from June, 1909, to May, 1910). He knows of two other Europeans who contracted it whilst there with him, and he considers the district the commonest endemic centre of the disease in West Africa. He has discussed the disease with Sir Patrick Manson, Dr. Daniels, and other well-known authorities, and has taken considerable interest in the flies responsible. He recognized *Chrysops dimidiata*, figured on page 783 of Manson's *Tropical Diseases* (sixth edition), as a very common pest there; he states that this fly is of a yellow colour, and that it settles on its victim “in a very sly and unobtrusive manner, in this resembling the tsetse fly.”

The first signs of infection he exhibited were calabar swellings in the hands and feet; these began ten months after his arrival in Benin district, and have continued off and on up to the present time, but latterly they have only attacked the hands. He describes them as very painful, and complains bitterly of “the tightness of the skin over them.” The first really bad one of these attacks was thirteen months after his arrival in Benin; the previous ones had been quite slight.

His next trouble was the appearance of the worms in and about the eyes. This commenced very shortly after he first noticed the swellings, and has continued off and

on throughout the whole of the past eight years. Although he has felt the worms moving about in various parts of his body, they have occasioned him comparatively little inconvenience, except when they have invaded the neighbourhood of the eye and ear. In the former situation they cause great irritation, which becomes intense when they find their way under the conjunctiva. The combination of itching, pain, and irritation caused by their movements he describes as "simply maddening." He has learnt to obtain sleep during these attacks by instilling cocaine into the eye, and he believes that, apart from the anaesthesia of the conjunctiva, an important accessory action is the toxic influence of the drug on the parasite, causing it to become sluggish and abate its movements.

In this connexion he quotes an interesting and suggestive experience, which might possibly be followed up with advantage by surgeons. On one occasion, on embarking for England on leave, he consulted the ship's surgeon on account of a *Filaria loa* in his upper lid; full of enthusiasm, the surgeon gave a subcutaneous injection of cocaine, and completely lost the worm in the resulting oedema, though he cut down upon it. When the swelling subsided the patient felt a hard linear mass lying in the position the worm had occupied at the time. Subsequently, while he was home on leave, "a cyst developed at this spot, and was incised and scraped out by a surgeon." He does not think any effort was made to ascertain the contents of the cyst, but he is absolutely satisfied in his own mind that the hard linear mass he felt was the dead worm, and that it had been killed by the cocaine injection. The suggestion seems likely to be correct, and is supported by the writer's experience with cocaine to be mentioned later in the paper. Mr. T. W. has had worms removed from his eyes on four previous occasions—namely, once in 1911, twice in 1914, and once in 1917.

FIG. 1.—Adult female *Filaria loa*, 36.5 mm. long; the mouth end is to the left; magnified ($\times 2$).

FIG. 2.—The mouth end of the worm ($\times 10$).

The present, therefore, makes his fifth experience of the kind. All the others were, however, extracted from his lids. This was not because the worms did not pass under the conjunctiva, but for other reasons. Thus, he had several times travelled long distances to consult a doctor, only to find the worm had gone deep again when he arrived. On other occasions medical men, who were willing to remove the visitor from skin areas, declined to interfere with it on the eyeball. He has had a variety of experiences, owing to the fact that some of his surgeons were ignorant of the habits of this parasite. Thus, one seized the worm in a pair of forceps and cut down on it, but released his grip of the animal before he had captured it with a fresh pair of forceps, and to his chagrin saw it disappear from his sight. Another tried to cut down on it without first fixing the worm, and was naturally disappointed with the result of his operation.

The patient's observations on earache, caused by the *Filaria loa*, are the more interesting, because this would appear to be the first time that any account of the kind has been placed on record. The earache, from which he has suffered on several occasions, consists of an intense neuralgia behind, below, and in front of the ear, and is accompanied by great hyperaesthesia of the skin in these neighbourhoods. These attacks are so definite that he is able to diagnose their cause without hesitation. On the present occasion, the trouble began with earache on the night of April 1st, which led him to remark to his wife, "I am sure this is another of those beastly worms." A few hours later the pain passed away with a suddenness which he has learnt to regard as characteristic of such attacks, and he then felt the worm moving about in the neighbourhood of the orbit of the same side (the right).

The visits of the worms to the surface occur with great irregularity. Sometimes he feels nothing of them for months at a time; then he may have trouble for varying periods of from one to ten days or more. He is quite unable to say what brings on the attacks, though he thinks that some of the worst have been at the commencement of the hot weather. Questioned as to the influence of the heat of fires in drawing the worms to the surface, he had no evidence to give, but added that possibly this was because he "had seen so little of fires for many years." The rate at which the worms travel is considerable; in the loose tissue round the orbit, he has felt them pass from one side to the other in the course of a few minutes; there is always, however, the possibility that more than one worm may be present, though he does not admit this as an element of confusion, stating he can "feel the brutes travelling." He has noticed on at least two occasions before the present, that the removal of one worm from the eye has been followed by the appearance of a second

FIG. 3.—The tail end, showing the opening of the ano-genital orifice ($\times 10$).

parasite on the following day, and he suggested that probably they were a pair. On this occasion one worm was removed on April 2nd, and he was feeling a second round the opposite eye all the following morning. On several occasions previously he has felt two worms at one time, one round each eye.

Two explanations of this phenomenon suggest themselves: (1) That the conditions, atmospheric or otherwise, which attract one worm to the surface, might equally readily attract two or more, and (2) the idea, suggested by the patient, that the second worm is a male with nuptial designs following the first, a female, in the course of her peregrinations. The explanations are on all-fours with those which cover the well-known Indian experience, that if one kills one snake near one's house, one must be on the look-out for its fellow shortly afterwards.

An interesting feature and one very difficult to explain is that the worm which was removed in 1911, that is, within two years of the first possibility of infection, was 60 mm. in length, whilst this one, removed seven years later still, was 36.5 mm. long, and the others, removed in 1914 and in 1917, have all been shorter than either of these. From the commonly accepted views, one would rather have expected to find an increase in the size of the worms extracted as years passed by.

The patient was sent home from West Africa for a low form of fever, with evening temperatures of from 99° F. to 100° F., which, it has hesitatingly been suggested, might be due to filariasis.

Operation.

The patient was sent on April 2nd, 1918, by Dr. Daniels, who had seen the worm in the eye, and advised immediate extraction. On examination, the conjunctiva was congested, but no worm could be seen. The patient stated that it had just left the eye, but that he believed it might come back. He felt it moving about, and seemed to have no difficulty in localizing it. At one time he said it was in the outer part of the upper lid near the skin; shortly afterwards it was close to the conjunctiva above the inner canthus; then it had passed over again to the outer side of the eye, but this time just below the lower fornix. After waiting some time, there seemed little hope of it appearing, and so, acting on the knowledge that these worms tend to come to the surface under the influence of heat (as has been shown by their causing eye trouble when the patients sit before a warm fire), hot fomentations were applied. Very shortly afterwards the worm could be seen wriggling freely in long sinuous loops beneath the conjunctiva, below and close to the cornea. Cocaine was instilled, the patient was told to look up, and the lower lid was pulled down. The interference alarmed the worm, which quickly endeavoured to escape, its movements being extraordinarily rapid, but just as it was disappearing under the dense tissue of the lower fornix a dive was made for it with a pair of conjunctival forceps. It was difficult to say whether it had been caught or not, but a curved needle armed with a silk suture was passed through the fold of conjunctiva included in the grip of the forceps; the suture was tied tightly and the forceps removed. For some time no movement could be observed, and the patient suggested that this was due to the toxic action of the cocaine on the animal; but an elongated oedematous swelling on either side of the suture suggested that the worm had been caught. The conjunctiva was thoroughly anaesthetized, and blanched with cocaine and adrenalin, and the part was kept under careful observation by a nurse. Suspicious movements were noted from time to time. On manipulating the suture, one end of the worm was suddenly seen, freely moving to the inner side, and was at once seized through the conjunctiva with a pair of conjunctival forceps. A small incision was made with scissors, and the coils of the worm could then be recognized through the subconjunctival tissue; suddenly one end wriggled itself free, and stood right out from the wound; it was seized with a pair of forceps, and gently drawn upon. The tightness of the suture was such as to prevent the worm from getting free by its own efforts, but it added very little to the difficulty of extraction.

The specimen was placed in 5 per cent. formalin, and was photographed shortly afterwards. On removing it, what looked like another small worm was found lying imbedded in mucus in the lower cul de sac of the conjunctiva. This presented a curled-up end, and distinctly was either part of a small worm or was the macerated end of a larger one. This small mass was unfortunately lost, owing to an accident. The larger worm was a well-grown female *Filaria loa*, showing some embryos in its uterus. When fresh it measured 36.5 mm. It is shown in Fig. 1, double the actual size. Figs. 2 and 3 show the head and tail ends of the worm respectively, under a magnification of 10 diameters.

Unfortunately no examination of the blood was made.

A VACCINE for the treatment of dysentery, prepared in Hamburg, and called "Ruhrheilstoff-Boehncke," has been recommended in a Government order of December 15th, 1917. It is said to differ from an earlier preparation with the same name in containing no free dysentery toxin. The therapeutic results are said to be good.

THE PROGNOSIS IN WAR NEPHRITIS.

AN ANALYSIS OF 171 CASES.

BY

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TEMPORARY CAPTAIN R.A.M.C.

WITH the aid of the Medical Research Committee the subsequent history has been investigated in an unselected series of 171 cases of war nephritis.

During their initial stage the cases had been under my care in a base hospital in France, to which they were admitted between April, 1915, and February, 1916, inclusive. Their after-histories have been traced until November, 1917—that is, for periods varying from twenty-one to thirty-two months. The symptomatology of the cases has been previously fully detailed.¹ Their initial stage was an acute illness, exhibiting albuminuria with oedema.

Mortality.

Six deaths occurred: one in France, three in English hospitals, and two after discharge from hospital in England.

Results of First Period of Home Treatment.

From France the cases were evacuated to English hospitals, from which they were discharged direct, or transferred to convalescent hospitals or command dépôts. Taken together, this comprised the first period of home treatment; the results of it were as follows:

32 men were invalided as permanently unfit on account of nephritis (23 being invalided from hospital, 3 from convalescent hospital, 4 from command dépôt, 2 from Canadian Casualty Assembly Centre).

131 were discharged to some form of duty.

1 was discharged from command dépôt for rheumatism.

1 was discharged on termination of engagement.

3 died in hospital.

1 died after having been discharged to light duty.

1 died after having been invalided.

The last two cases have been included only amongst the deaths. In the case of seven men who had been discharged from hospital to duty, the subsequent history could not be traced for various reasons; these seven men have therefore been altogether excluded from the series.

Subsequent History.

Of the 131 cases discharged to duty, 22 subsequently either relapsed or showed chronic renal symptoms, and were ultimately invalided for nephritis; the remaining 109 showed no further history of the disease.

Table giving Percentages of Results in the whole Series.

	No. of Cases.	Percentage of whole Series.
Died	6	3.5
Invalided for nephritis during first period of home treatment	32	18.7
Returned to duty, but subsequently invalided for nephritis	22	12.8
Showing no further history of nephritis ...	109	63.7
Variously accounted for... ..	2	1.3
	171	100.0

Adding together the deaths, the number invalided during the first period of home treatment, and those invalided after return to duty, the total loss was 60 men, or 35 per cent. of the whole number.

The average stay in hospital and convalescent hospital (excluding command dépôts) during the first period of home treatment was for all cases 89 days; for the cases invalided during the first period of home treatment, 130 days; for those invalided after return to duty, 107 days; for those returned to duty and showing no further nephritic history, 72 days.

With regard to the 22 cases returned to duty but subsequently invalided, the average interval between discharge from hospital and final invaliding was six months. Of these cases 12 were readmitted to hospital; 10 were invalided by medical boards without readmission to hospital; the final breakdown must therefore frequently have been due to gradually developed renal symptoms rather than to definite relapse. Since cases are also invalided from command dépôts without readmission to hospital, it is evident that the study of hospital readmissions affords