CASE II.

P. A., air mechanic R.A.F., aged 28, was admitted to hospital on April 19th, 1918, complaining of pain in the left side of his chest and in his back. He stated that he had felt quite well up to two days before admission. Some impairment of resonance was found over the base of the left lung, and small crepitations were audible over the lower lobes of both lungs. It was noted that the physical signs in the lungs varied considerably from day to day. On April 25th at 11 a.m. he, for the first time, complained of stiffness in his legs. He had walked into the ward, and nothing had previously occurred to draw attention to his limbs. It was now found that there was great loss of power in both legs, the patient was delirious at times, and the skin over the lower limbs was insensitive to cotton-wool touch and pin-prick.

At 7.30 p.m. he was more sensible. Both lower limbs were now completely paralysed, and there was absence of sensation to cotton-wool and pin-prick up to the level of the ninth thoracic nerve. Tendon reflexes and abdominal reflex were absent. By lumbar puncture clear cerebro-spinal fluid was obtained, which was found to contain no cells when centrifuged, except an occasional epithelial element. There was now retention of urine, and the bladder had to be emptied twice a day by catheter. The sputum was examined for tubercle bacilli, with negative result. The paralysis spread, and on April 29th the level of anaesthesia had reached the level of the sixth dorsal nerve area, and on May 1st to the area of the fourth dorsal. Lumbar puncture now yielded thick grumous pus, which passed with difficulty through the needle. A definite bulging, due apparently to a collection of pus, had appeared over the left side of the back. On May 3rd he was quite conscious, but the anaesthesia had extended up to the level of the third thoracic nerve, the abdomen was distended from flatus, and there was paralysis of the abdominal muscles. He became weaker and died on May 4th at 11 p.m., in the act of taking a drink.

Post-mortem Examination (by Captain Horsburgh, R.A.M.C., Pathologist to the Hospital).

The body is of a well-developed man. On incising the muscles of the back large quantities of thick pus escaped from the substance of the muscles. The spinal cord was exposed throughout its length, and was found to be in a bath of the same type of pus. When the theca was opened only a little pus was found round the cord itself. The consistence of the cord was soft and flabby, suggesting to the naked eye considerable degeneration. The brain was removed and the meninges carefully examined, but no sign of meningitis was found.

When the thorax was opened considerable adhesions were present on both sides of the chest, between the lungs and the chest wall. The left lung showed a tuberculous cavity about the size of a walnut, situated in the apex of the upper lobe, and a few smaller and more superficial caseous nodules. On the left side, where the lung was in relation to the fourth dorsal vertebra, it was covered with a thick layer of lymph. Underneath the lymph the lung showed no disease. The body of the fourth dorsal vertebra was stripped of its covering, and advanced caries of the body was revealed. Rarefaction and destruction of bone had taken place, and apparently the meningitis had resulted from the caries of the vertebra. In the abdomen a large calcareous tuberculous gland was present in the mesentery, otherwise nothing abnormal was found.

CASE III.

Spr. G. S., aged 38, was admitted to hospital on September 7th, 1918, complaining of pain in his back. He stated that he had suffered with pains in his back for several years, on account of which he had been in the habit of wearing a body belt. He was in the inland water transport, and gave a history of having received a blow on the back six months previously during a collision between two barges, but the injury was not severe enough to make him report sick. When admitted, he walked into the ward and made no complaint of any loss of power in his legs.

On September 10th, when asked to sit up in bed, he complained that his legs were weak, and he was unable to get up without assistance. Both legs were now completely paralysed. The knee jerks and ankle jerks and the abdominal reflexes were absent, the plantar reflexes flexor. There was loss of sensation to cotton-wool and pin-prick and to heat and cold to half way between the umbilicus and ensiform (eighth thoracic nerve area). There was also absence of bone vibration sense in both legs. There was retention of urine. Lumbar puncture yielded a cerebro-spinal fluid clear but tinged a straw colour. When it was centrifuged no cells were found in the deposit. Rachicentesis was repeated on September 13th, and the same straw-coloured fluid was obtained, in which no cellular elements were found; but, on standing, it became solid from coagulation of the contained protein. The patient was quite clear mentally, and discussed intelligently whether his wife would be able to get out to France to see him before he died. In this he was unfortunately disappointed. On September 14th the zone of anaesthesia had ascended as high as the nipples, and his arms were becoming paretic. He died the following morning at 5 o'clock.

Post-mortem Examination (by Captain Horsburgh, Pathologist to the Hospital).

The body is of a well developed man, exhibiting no sign of injury or of emaciation. The brain was examined, and general

congestion over both hemispheres was noted. The vessels entering the main fissures showed a series of small lymphoid nodules suggestive of tubercle. No tubercles were detected in the interpeduncular space.

When the spinal canal was opened a considerable quantity of purulent material was present along the whole length of the cord. The pus lay outside the dura, and when the theca was opened the cord itself appeared healthy. When the cord was removed it was seen that the seventh, eighth, and ninth dorsal vertebrae were in a state of carious necrosis with rarefaction. There was no spinal curvature.

When the thorax was opened a diffuse military tuberculosis was found in the lower lobe of the left lung. Old healed calcareous foci were present in the apices of the upper lobes of both lungs.

Each of these three men appeared robust and gave a good previous health report, with the exception that the second gave a history of pains in his back. The first patient was of quite exceptionally fine physique, and said he had always enjoyed excellent health.

The illness of the first lasted six days, that of the second fifteen days, that of the third nine days. The onset in each case was swift and without warning. The first case, to his surprise, found himself unable to walk to the medical hut, the other two found one day when in hospital that they had become powerless in their legs. The first case had six months' service, the second one year and five months', and the third two years and three months'. Cases of this description might become of considerable medico-legal importance in civil life, as had there been a history of a blow or a strain, it would be difficult to prove to the satisfaction of a jury that the acute disease of the spine was not due to the injury.

THE COMPARATIVE VALUE OF NOVARSNOBILLON BY THE INTRAVENOUS AND INTRAMUSCULAR METHODS;

WITH SOME NOTES ON THE TREATMENT AND PREVENTION OF SYPHILIS.

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The following is a short account of cases of syphilis treated at New Bridge Street Military Hospital (V.D. Section), 2nd Western General Hospital, Manchester, during 1918 with novarsenobillon (novarsenobenzol) given intravenously and intramuscularly, with a comparison between the results and some conclusions which may be drawn therefrom with regard to the treatment and prevention of syphilis.

The course of novarsenobillon given in all cases was the same, pressure of work not allowing any discrimination, the course being the prescribed army course, namely:

Day of Treatment.	N.A.B. Intravenously.	or N.A.B. Intramuscularly.	with Hg Intramuscularly.
1st	0.45 gram	0.45 gram	gr. i
8th	0.45 ..	0.45 ..	gr. i
15th	0.45 ..	0.6 ..	gr. i
22nd	—	—	—
29th	0.6 gram	0.6 gram	gr. i
36th	0.6 ..	0.6 ..	gr. i
43rd	—	—	—
50th	0.6 gram	0.6 gram	gr. i
57th	0.75 ..	0.6 ..	gr. i

N.A.B. = Novarsenobillon.

If the "Wassermann" reaction was still positive, potassium iodide mixture (gr. xv ad 1 oz.) was given for a fortnight, followed by a course of two or three injections, 0.45, 0.6, 0.75 gram, at weekly intervals according to the strength of the reaction. One grain of Hg was given with each injection if well tolerated.

INTRAVENOUS OR INTRAMUSCULAR.

The intravenous injections were given direct from a 5 c.cm. Record syringe in concentrated form—namely, 0.45 gram in 5 c.cm. sterile distilled water; the same amount of water was used for 0.6 and 0.75 gram. The appearance of blood or a single air bubble (pressure of the venous blood forcing the air in the needle back into the syringe) was sufficient indication that the needle was in the vein. A hint to watch the site of injection and not, as is the natural tendency, the syringe whilst giving the injection may, perhaps, save trouble from a painful arm if the needle be not exactly in the vein or by some means moved out of it. No local trouble due to the concentration of the injection ever occurred.

The doses for intramuscular injection were first dissolved in 10 to 15 minims of sterile distilled water and then thoroughly shaken with creo-camph. cream (B. W. and Co.) melted at 15° C. and made up to 2 c.cm. Vigorous shaking is required, or a perfect emulsion will not be obtained, and a badly mixed emulsion will be more painful. The mixing was done directly in the sterile syringe. The injections were made:

1. *Subcutaneous*—into the loose tissue overlying the gluteus medius at a point three fingerbreadths from the crest of the ilium on a line drawn from the tuber ischii to a point on the crest of the ilium which is vertically above the trochanter.

2. *Intramuscular*—directly into the substance of the gluteus medius, lower down, but of course avoiding the middle line. I discarded the first method, after a thorough trial, as being more painful than the second.

Just previous to the injection morphine gr. $\frac{1}{4}$ was given hypodermically in the back, the most convenient place.

The cases are arranged according to Harrison's classification:

1. Early Primary: *Spirochaeta pallida* found. "Wassermann" reaction negative before and after the first injection.

2. Medium Primary: *S. pallida* found. "Wassermann" reaction negative before but positive after first or second injection.

3. Late Primary: "Wassermann" reaction positive, but no secondary lesions.

4. Early Secondary. "Wassermann" reaction positive and commencing secondary lesions.

5. Later Secondary. "Wassermann" reaction positive or double positive with well marked secondary lesions.

6. Tertiary.

Of the 428 primary and secondary cases taken together, 260 were given intravenous injections and 168 were given intramuscular injections. Of the 83 tertiary cases, 66 were given intravenous injections and 17 were given intramuscular injections; 511 cases in all stages were treated. Other cases admitted to hospital—about an equal number—were given kharsivan intravenously.

Result of the "Wassermann" Test after Treatment.

Stage of Disease.	Method.	No. of Cases.	Actuals.	Percentages.
(1) Early and (2) medium primary	Intramuscular	26	+ 0 26	+ 0 100
	Intravenous	53	0 53	0 100
(3) Late primary ... {	Intramuscular	37	2 35	5.5 94.6
	Intravenous	51	5 46	9.9 90.2
(4) Early secondary ... {	Intramuscular	30	0 30	0 100
	Intravenous	42	4 38	9.6 90.5
(5) Later secondary ... {	Intramuscular	75	7 68	9.4 90.7
	Intravenous	114	21 93	18.5 81.6
Summary ... {	Intramuscular	168	9 159	5.35 95
	Intravenous	260	30 230	12.0 88.5
Combined total		428	39 389	9.2 90.9

Of the later secondary cases, 65 per cent. gave a strong positive "Wassermann" reaction; thus both methods had a severe test, for, as is well known, such cases are more difficult to influence from the point of view of the reaction than the earlier ones.

The above figures and percentages warrant three conclusions:

1. Good Results with Both Methods.

The good results of both methods; 389 negative "Wassermann" reactions in 428 cases treated thus give a percentage of 90.9 negative results.

2. Better Results with the Intramuscular Method.

The better results of the intramuscular treatment, due no doubt to its slower and more certain absorption with consequent slower excretion. The intramuscular cases had 95 per cent. negative reactions and the intravenous 88.5 per cent.

In the 9 intramuscular cases with positive reaction after treatment, 5 had histories of old sores, and it was probable that they were very late secondary or early tertiary cases. If these 5 "borderland" cases were left out and only the 4 remaining cases known to be true secondaries reckoned, the percentage of negative results in the intramuscular cases would be 97.6—very striking evidence of the efficiency of this method. In these last 4 cases an interval of four to six months elapsed between the development of the sore and the commencement of treatment.

The great objection to this method is the pain and stiffness complained of after the injection, and I am convinced that unless some device can be found to counteract these, it is a method that is impracticable for routine work in private practice or even in clinics. Patients will prefer the least pain possible; if they know, as they now do, that they can have treatment painlessly into the vein, they will have it, so that it is useless to advocate a method which, although giving better results, yet gives some inconvenience.

In no single case was it impossible to carry out the full course, but persuasion was needed in some cases. The men seemed quite tolerant to doses of 0.3 or 0.45 gram, complaints starting about the fifth injection. Some would go through a whole course with no swelling or pain, others would have a little swelling and some pain; others again would have marked pain, or swelling, or both. The reason for this is hard to find, as all injections were given with the same technique. Of course some men can stand pain better than others, and this may to a certain extent explain it, but as one cannot tell beforehand which cases are likely to have discomfort, the patient might not see you again after the first two or three injections—unless to revile you. Plenty of exercise and efficient daily massage have proved to be the best antidotes to severe local reaction. Latterly I have been using alternate intramuscular and intravenous injections; this method is much better tolerated, but is open to the objection that before the last intramuscular injection is absorbed the next intravenous may have to be given, and so toxic symptoms produced from overdose. I have never had any toxic results yet, but this must be considered a defect.

3. Treatment should be Started at the Earliest Moment.

With both methods, each one of the 79 early primary cases obtained a negative result (100 per cent.). In the 88 late primary, 81 obtained a negative result (92 per cent.). In the early secondary 68 out of 72 became negative (95 per cent.). These figures speak for themselves. It is in the late secondaries where the percentage of positive reactions becomes higher—161 negatives out of 189 cases (86 per cent.), as against 96 per cent. in the earlier classes. The difference, 10 per cent., is large.

The 100 per cent. negative results obtained condemn the practice, which I believe holds in some clinics and private work, of not examining for *S. pallida* in the sore, but waiting for a positive "Wassermann" reaction or the appearance of secondary lesions. At this hospital the sore was examined as soon as possible for the *S. pallida* with the dark ground. If not found, saline or sulphur dressings were applied, and the examination repeated in two days. If for any reason, such as non-retractable prepuce, a sore healed or had been treated with antiseptics, serum obtained by gland puncture was examined, or the prepuce slit (dorsal), and the sore exposed and examined. Blood tests were done at once, and if the case was at all suspicious, a provocative dose—0.45 gram—of novarsenobillon was given, and the "Wassermann" test four days later to obtain the Jarisch-Herxheimer reaction if possible.

Unfortunately, a large proportion of the men arrived too late to be treated as primary cases, many having been treated or supplied with ointment or lotions by chemists, herbalists, well meaning but misguided dressing orderlies, and a few, I regret to say, by their regimental medical officers contrary to Army Orders. Others concealed their disease until compelled by secondaries to report sick.

Tertiary or Congenital Cases.

In these cases the intravenous method gave somewhat better results, but as men had to be discharged as fit for duty as soon as possible, the course could not be prolonged sufficiently to try to obtain negative results. The reaction changed from strongly positive to either positive or negative after this single course in 36 out of 66, or over 50 per cent. The symptoms presented by these cases consisted of glossitis (many), leucoplakia, gummata of various regions, iritis, cutaneous syphilides (ulcerating, nodular, and rupial), laryngitis, myositis, periostitis, jaundice, and nerve syphilis. In all without exception lesions healed rapidly, and all symptoms disappeared or improved considerably. It was quite common for a tertiary case, after the third or fourth injection, voluntarily to declare how much better his health was since starting treatment. Potassium iodide was not given in conjunction with the novarsenobillon, but mercury intramuscularly was.

Tertiary or Congenital Cases.

"Strength of Wassermann."	Method.	No. of Cases.	Reaction Result after Treatment.
Strongly positive Wassermann	Intramuscular	11	6 strongly positive; 5 positive.
Positive Wassermann	Intramuscular	6	6 positive.
Strongly positive Wassermann	Intravenous	41	22 strongly positive; 19 positive.
Positive Wassermann	Intravenous	25	19 positive; 6 negative.

The great majority of these men had been given a course of mercury when the disease was contracted and some had been given isolated doses of "606."

Comparing the reactions after the two methods it appears that, excepting a case of severe dermatitis and another of jaundice, the intramuscular method appeared to have the greater number of side-effects, especially headache and vomiting. But I feel that these symptoms were produced by the hypodermic injection of morphine. Lieut.-Colonel Wilson, after one of his daily ward inspections, remarked to me it was curious the intramuscular cases were lying about on their beds and seemed drowsy, and suggested that it was probably due to the morphine. This was confirmed by after-experience—injections with and without the hypodermic. One man developed an abscess, which cleared up after several aspirations and did not need incision. Herpes occurred in one case on the lips and ears and was moderately severe; it was, no doubt, due to the injections. It may be of interest to note that when stationed at Rochester Row I gave two intramuscular injections of 0.45 gram of novarsenobillon to one man, and on each occasion within a few hours a crop of very severe herpes developed at the site of injection and rapidly spread over both buttocks. There was one case of severe dermatitis of the exfoliative type; it developed after the fifth injection suddenly without any warning. It cleared up completely with lead and calamine lotions, and later, soothing ointments. The one case of jaundice was treated on general principles and made a good recovery.

Chancroids.

Contrary to the experience of Mr. Mills of Rochester Row, sublimed sulphur has given disappointing results. This is not because it has not been applied properly, as I have taken care that it has been well applied. Of course *S. pallida* examinations can be done if this powder is used, and this is an advantage; but I have not found healing to be so quick as under eusol, black wash, iodoform, or mercury perchloride. In several very indolent chancroids which obstinately resisted all kinds of treatment I tried intramine intramuscularly, 2.5 c.cm. once a week; the sores improved greatly and finally healed. In the treatment of buboes I have found, as recommended by Colonel Harrison, early aspiration and the injection of tincture of iodine (1 in 20) much quicker than incision. This is true of a bubo which is actually pointing and over which the skin is red and shiny.

CAUSES OF DISSEMINATION OF SYPHILIS.

1. *Syphilis Contracted Abroad.*

Statistics of New Bridge Street Military Hospital show that the first great increase of this disease since the war

broke out occurred at the end of 1915 and the early part of 1916. A consideration of the following facts will prove this and also that it was due in a large measure to infection brought into this country by troops from overseas.

For the first year of the war, 1914 to late 1915, a large camp near this hospital was used solely as a training centre for men who had not yet "gone out." During this period cases of primary and secondary syphilis were comparatively rare, only isolated cases occurring.

At the end of 1915 part of this camp was made into a dépôt for troops on leave or invalidated home—from the East, Egypt and the Dardanelles principally. At this time and early in 1916 large drafts of men from these theatres of war arrived, and it was found that many were suffering from syphilis in various stages contracted abroad. Some still had a primary sore which was being or had been treated casually with caustics, etc., others had well-developed secondary lesions; both classes of cases were at the height of infection. For example, of 75 cases admitted to this hospital during one week early in 1916 at least 72 proved to be syphilis.

It was unavoidable in many cases that delay occurred—some few days at least—between their arrival in England and their admission to hospital, and the men on leave were of course at large. This was the time when the harm was done, for when admitted to hospital and questioned as to whether or not they had had sexual intercourse with girls in this interval of time the answer was almost invariably "Yes," and not with only one girl but several. Thus numbers of girls previously healthy may have become infected with syphilis. At the same time, early in 1916, large drafts were coming home on leave or invalidated from France. These men and also those in training at home went with these infected girls only to become infected themselves. In this way a vicious circle was established terrible in its effects, for in those pre-conscription days, when patriotism ran high, promiscuous intercourse was rampant, girls influenced by patriotic motives indiscriminately giving their "all" to men in khaki. Unfortunately the men had no scruples in taking what was too freely given. It is reasonable to assume that what took place in this command in all probability occurred in others also.

To sum up: The fact that before the influx of infected troops from the East only a few cases of early syphilis occurred at this dépôt, and that immediately after this influx syphilis increased enormously—this, coupled with a knowledge of the type of case, must be considered a significant factor. The vicious circle is easily understood after inquiry into the source of infection and a little thought.

2. *Alcohol.*

Alcohol is undoubtedly a powerful cause of the spread of venereal disease, in that it is stimulating to the sexual organs, and has weakening effects on the inhibitory influences which ordinarily help to keep people under control. I have personally inquired into the history of these cases, and times without number the reply has been: "Oh, we got drinking together at a public-house and I got too much beer." A few "port wines" soon have effect on girls—too often the desired effect. "Treating" is undoubtedly a great evil, many more drinks being taken in consequence of this practice.

3. *Unskilled Treatment of Venereal Sores, Discharges, Sore Throats, etc.*

Unqualified persons look at a throat over the counter, having no idea whether it is simple tonsillitis, diphtheria, scarlet fever, or secondary syphilis, and treat it, thus enabling infection to be spread wholesale. Rashes are diagnosed as "the blood out of order," etc., and so it goes on. These people look very wise but unfortunately they are not so wise as they look.

4. *Amateur Prostitution.*

The large number of girls and young women, mostly of the ages 16 to 20, who swarm the streets of any large town at night. These are not professionals in the strict sense of the word, but "for the price of a drink," for which they ask from 2s. 6d. to 10s., will go with almost any man, especially if he is in khaki. I have asked many soldiers whether they paid anything or not, and a very usual fee was 2s. to 10s. These are very prolific carriers. The real professional who takes care of herself is comparatively innocuous.

PREVENTION.

Alcohol cannot be adequately dealt with, for total prohibition would never be tolerated by the British public, especially the working classes.

Much severer measures could and ought to be taken (nothing short of imprisonment will stop them) with druggists and herbalists who treat venereal disease. The recent Act making it illegal to treat venereal disease certainly had a steadying effect, but it is wearing off to some extent. In 1917 a soldier told me of one druggist with a business near a large camp who treated *hundreds* of cases of gonorrhoea a day. He paraded a microscope, down which he looked, and then sold his capsules at a preposterous price. All this should be stopped. Compulsory notification would only lead to concealment with spread of quackery and would be a failure.

Army statistics show that prophylactic treatment has decreased venereal disease in the army. Especially is this true of the American army, because if a man contracts venereal disease, beyond losing his pay during disablement, he is not punished if he has used the treatment provided after exposure. If he gets venereal disease and has not used preventive treatment according to regulations he is court-martialled and punished if convicted. This might do good in the British army. On the other hand, prophylactic treatment is by no means infallible and gives a false sense of security. Many men, and youths especially, are kept from indulging in promiscuous intercourse by one thing only—namely, the fear of catching venereal disease. Remove this fear and immorality will increase.

CONCLUSIONS.

The conclusions reached from the facts set out in this article are:

1. The excellent result of intramuscular novarsenobillon clinically; there is, therefore, scope for the discovery of a combination which will render it painless.
2. The best means for preventing the spread of venereal disease at the present time lies in early diagnosis and early treatment, and, as regards the army, periodical "short arm" inspections of troops, as at present carried out. This, of course, cannot be applied to the civil population.
3. Quackery—advertised "remedies" and counter prescribing—should be more rigorously dealt with in order to prevent serious delay in commencing proper treatment.

All the "Wassermann" tests for these cases were done by Major Dean, R.A.M.C.(T.F.), at the Manchester University Laboratory—a sufficient guarantee of their accuracy.

I beg to thank Lieut.-Colonel Wilson, Officer Commanding 2nd Western General Hospital, for kindly giving permission for the publication of this paper; to his energy and zeal, working under great disadvantages, is due in a great measure the success attained at New Bridge Street Military Hospital:

SOME EXPERIENCES OF DISORDERED ACTION OF THE HEART WITH THE MESOPOTAMIAN FORCE.

BY

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THE following experiences of the various types of cases which have passed under my own care, previously diagnosed as disordered action of the heart (D.A.H.), may not be without interest to many who have had charge of similar cases. The diagnosis—for so it is used—of "disordered action of the heart" includes anything from auricular fibrillation to isolated extrasystoles, and is no more final than such a term as "disease of the arteries," which includes anything from aneurysm or atheroma to malformations.

A clinical analysis of the observed cases of disordered action leads immediately to their division into (a) those with symptoms, (b) those without symptoms.

D.A.H. with Symptoms.

In the first group come the large number of cases with tachycardia. The rhythm is nearly always regular, and

the condition frequently follows an acute illness, or there is a rheumatic history, but there may be no obvious association with any acute infection. The symptoms are mainly shortness of breath and palpitation or pain, and are the result of an approach to the exhaustion of the reserve force of the heart in response to effort. Men on field service suffering from this disability are able to do light camp duties, but are unfit for full military duties. A severe case, with a regular pulse rate of over 120 on frequent examinations, remained continuously on light camp duties for a period of six months, with the exception of three days. When, however, he was subsequently put on sentry duty he had to be readmitted to hospital and invalided, as the reserve force of his heart had been temporarily overtaxed. Drugs are of little avail, and, if the case is unaccompanied by other physical signs, rest in bed is unnecessary, and may even be harmful. Milder cases may be given three parades daily, not exceeding half an hour each, and when on examination once a week the pulse rate is under 100 after lying down for five minutes they may be advanced to a higher category involving parades of three-quarters of an hour each. An examination each week will decide on those fit for duty.

Though cases suspected of malingering are so rare as to be negligible, yet the symptoms present may be exaggerated by one man, whereas the next will lay very little stress on them. When, as on service, the soldier thinks his disposal depends much on his replies, it would be more than human nature to expect him to detail them without bias. These are the difficulties which many others must have experienced, but by fair treatment and careful examination, which are appreciated, a fairly accurate judgement may be made. By such methods many cases of tachycardia will be returned to their units without being invalided, and afterwards carry out full duties, even with a pulse rate above the normal.

The treatment of these cases lies in the removal of any infection, and later graduated work, keeping the symptoms from response to effort within the bounds of those experienced by a healthy man during heavy exertion, for then the reserve force will not be exceeded.

A rarer type of tachycardia giving rise to symptoms has a continuously irregular rhythm and is due to auricular fibrillation. The condition may be transient and determined by an acute infection. A case of bacillary dysentery came under my care with slight fever. On the third day of treatment in hospital the heart changed from a regular to a continuously irregular rhythm at 120. A few hours later it was still irregular and had risen to 160, as counted by the stethoscope, though the temperature had fallen to normal. He was given tincture of digitalis *mxv* every six hours, and after forty-eight hours his pulse dropped to 70 and became regular. After prolonged convalescence from the dysentery, he returned to his former duties and was still carrying them out twelve months later. The auricular fibrillation was due to old myocardial disease (as a child he had chorea for six months), but was determined probably by the absorption of toxins from the intestinal infection. The association of regular tachycardia with amoebic dysentery is not uncommon, and by some clinicians the emetine is stopped, as it is held that the emetine gives rise to the tachycardia. In my own cases the emetine was never withheld for this reason, and I have never regretted carrying out the full course—that is, 1 grain hypodermically daily for twelve days (repeated if necessary)—as the increased pulse rate is believed to be due to the absorption of toxins and drops as a result of the elimination of the infection and not as a result of the cessation of the administration of emetine. Emetine, moreover, is frequently administered without any effect on the pulse rate. Another man with auricular fibrillation, but without tachycardia, is known to have carried out his duties for eighteen months after he first came under my notice, and without any treatment, but the pulse rate, as shown by polygraphic records, always remained between 70 and 80. It is mentioned as being a rare type of auricular fibrillation, for almost all cases have a rapid rhythm unless controlled by digitalis. From his history it appeared that he had had this condition for over twenty years and yet was still leading a moderately active life.

Paroxysmal tachycardia, auricular flutter, and even heart-block, except in influenza, are rare in soldiers.