are quite distinctive. In every case of jaundice any accompanying specific infection should be elucidated without delay by means of appropriate pathological investigations.

ETIOLOGY.

Since the causal agent of "epidemic jaundice of campaigns" is not known with certainty, the etiological factors cannot be stated with precision. It is certain that the insanitary conditions inevitably associated with military campaigns play a most important part.

Food.—The infection is almost certainly conveyed by the alimentary tract, and contamination of food with infected dust probably plays a most important part in the causation. Flies, also, as in paratyphoid and typhoid fever, may convey infection to food; but they are probably not the main cause of the spread of the disease, since, in the Dardanelles area epidemic, jaundice occurred after the flies had largely disappeared.

Water.—The infection may be conveyed by water, but cases occurred where this channel of infection could be excluded.

Carriers of the disease very probably, as in paratyphoid and typhoid fevers, are responsible for the spread of infection.

Air.—In civil practice outbreaks of epidemic jaundice have been described⁴ in which the evidence pointed to the disease being air-borne and conveyed by the respiratory tract. Thus infection was spread in day schools amongst children sitting at the same desk.

Probably in the "epidemic jaundice of campaigns" the infection is almost entirely gastro-intestinal in its mode of spread, since air-borne infection was not observed—for example, epidemic jaundice was not observed to be conveyed in hospitals from one patient to another, when isolation of the jaundice cases was not carried out.

PROPHYLAXIS.

As regards prophylaxis, careful attention to latrines, to prevent spread of infection by dust and flies, is most important. Fly and dust proof latrines are very valuable as regards prevention. Refuse destruction by means of incinerators is most important.

The greatest care possible should be paid to prevent contamination of food and water.

Patients suffering from epidemic jaundice should receive hospital treatment in order that spread of infection may be guarded against.

Notification of jaundice cases is a most important prophylactic measure in order that immediate preventive measures may be instituted.

TREATMENT.

Rest in bed in the early part of the disease should be insisted upon. Careful dieting, which will be mainly liquid, is important.

It must be remembered that on campaign the milk will, owing to its sterilization, be devoid of anti-scorbutic and anti-beri-beri vitamins, so that some articles of diet should be given to counteract that deficiency. Thus fresh lemon juice in lemon drink is important. Porridge, pea-flour in soups, mashed potato, yeast in some form—for example, dried yeast added to hot milk, or yeast cakes made into a paste with milk—are important additions to the dietary. Soups to which fresh vegetables are added are valuable.

Owing to the anorexia present, the diet must necessarily be quite light. Excess of protein should be avoided, and meat is best not given until the jaundice is clearing up.

As regards medicines the following mixture may be given with advantage:

Sod. bicarb.	...	...	...	gr. xx
Potass. citrate	...	...	...	gr. xxx
Sod. sulph.	...	...	...	gr. xxx
Syrup. aurantii	...	...	...	ʒj
Aqua	...	...	ad	ʒj
t.i.d.s.				

Urotropin gr. x t.d.s. in water, as a gastro-intestinal anti-septic seemed to do good in many cases. Calomel should not be given in repeated doses, since it appeared that patients suffering from epidemic jaundice were very susceptible to the effect of calomel thus given. In some

cases mercurial stomatitis occurred. There is, however, no objection to giving a single dose of calomel in the early stages.

The cases almost without exception progressed favourably under treatment, though, as described above, convalescence was often somewhat slow.

For valuable help in the above work my thanks are due to Captain Archibald, R.A.M.C., for placing his bacteriological results at my disposal; also to Lieutenant-Colonel Crawford and Lieutenant Collins, R.A.M.C., of No. 18 Stationary Hospital; to Major MacMunn, R.A.M.C., of No. 15 Stationary Hospital; to Major Lewis, R.A.M.C., and to Lieutenant Corbett, R.A.M.C., of No. 16 Stationary Hospital, for valuable help and co-operation.

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¹ Beri-beri, *Lancet*. ² An Outbreak of Toxic Jaundice of a New Type amongst Aeroplane Workers, *Lancet*, March 13th, 1915. ³ *Lancet*, July 24th, 1915. ⁴ Dr. Cockayne, *Lancet*, July 22nd, 1914.

THE TREATMENT OF TOXIC JAUNDICE DUE TO TETRACHLORETHANE POISONING.

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THE subject of toxic jaundice from tetrachlorethane poisoning was fully dealt with in a paper read before the Medical Society of London, March 1st, 1915.¹

It was pointed out that this type of toxic jaundice was of frequent occurrence amongst the workers in aeroplane factories, who were exposed to the vapour of the "dope" or cellulose varnish used for the wings of aeroplanes. One of the constituents of the dope or cellulose solution is tetrachlorethane. It was shown that the vapour of the tetrachlorethane in the dope, if inhaled for long periods, as occurred in the case of aeroplane workers, was likely to give rise to malaise and jaundice, and that this jaundice was of a serious type, and in severe cases often terminated fatally. The pathology of the condition showed that the jaundice was due to a cholangitis set up in the smaller bile ducts, causing an obstruction to the flow of bile from the liver, and also there was present marked fatty degeneration of the liver cells.

In severe cases this fatty degeneration was followed by necrosis of the liver cells and symptoms of autointoxication identical with those of acute yellow atrophy of the liver.

Did the patient survive the effect of necrosis of some portion of the liver, then the affected area became replaced by fibrous tissue; that is, a replacement fibrosis occurred and symptoms of portal obstruction—for example, ascites, etc.—resulted.

The jaundice of tetrachlorethane poisoning was found to be "hepatogenous" in type. It was not associated with haemolysis or anaemia, and no changes in the red blood corpuscles were observed.

The kidneys in severe cases showed degenerative changes—for example, fatty degeneration.

Pathology.

It is important that the pathology of this type of jaundice be thoroughly understood in order that the treatment of cases can be carried out on right lines.

Early Symptoms.

Obviously the first indication of the treatment of an early case is the removal of the patient from all influence of the poison. The presence of anorexia, drowsiness, general malaise, constipation, headache, and occasional vomiting, are quite sufficient indications for this step to be at once taken in the case of aeroplane workers.

The above early symptoms are the first indications of the poisoning, and treatment should be at once commenced. Unless at this stage the patient is removed entirely from the toxic action of tetrachlorethane, jaundice is almost certain to supervene and render the prognosis much more serious.

It is thus seen how important is the periodical medical inspection of factories where tetrachlorethane is used.

Classification of Cases.

From the point of view of treatment cases may be divided up into—

- I. Early cases with little or no jaundice (pre-jaundice stage).
- II. Cases with jaundice but not marked toxæmia.
- III. Cases with jaundice and marked toxæmia (acute yellow atrophy or icterus gravis type).
- IV. Cases with signs of hepatic fibrosis (replacement fibrosis) and portal obstruction.

In all cases of toxic jaundice of the type described, since the liver is profoundly affected and as the kidney may likewise be affected, it is important to relieve these organs as much as possible by giving a diet which is easily digestible and in which the protein and extractives are reduced as much as possible. Also all toxic drugs should be avoided.

I. Early (Pre-jaundice) Cases.

These patients should have light diet—for example, milk, fruit, vegetables, milk puddings, toast or bread. Meat, meat extracts, soups, and alcohol should be avoided. Tea or coffee may be given owing to their diuretic action, and the effect of the theine or caffeine present is to relieve the headache.

The bowels should be kept open by an initial suitable aperient—for example, aloes and cascara, to which podophyllin or colocynth may be added. A single dose of calomel, say 2 or 3 grains, may be given, but it must be remembered that in toxic jaundice cases of all kinds repeated small doses of calomel are to be avoided. These patients are very susceptible to their influence, and there is serious risk of mercurial stomatitis resulting.

Lemon drink, or the imperial drink used in hospitals, may be freely taken:

Potassii tartratis acidi	...	...	...	3j
Syrup. limonis	...	...	...	3jss
Aquam	...	...	...	ad Oj

For medicine—

Sod. sulphate	...	...	...	3ss to 3j
Potass. citrate	...	...	...	gr. xl
Sod. bicarb.	...	...	...	gr. xx
Syrup. aurantii	...	...	...	3j
Aq.	...	...	...	ad 3j

t.d.s.

should be given so that the bowels may be kept open. Rest and fresh air are advisable, and the patient should be kept free from toxic influences of all kinds. Rest in bed is not essential. The room occupied by the patient should be well ventilated and the air kept fresh and pure.

II. Cases with Jaundice but not Marked Toxæmia.

The treatment should be on the general lines, as described under I. Rest in bed is essential.

Diet should be liquid if there is any tendency to vomiting—for example, whey, citrated milk (2 grains of sodium citrate to the ounce), raisin tea (made by boiling up $\frac{1}{4}$ lb. of broken raisins with 1 pint of water and straining), Benger's food; tea and coffee may be taken. The bowels should be kept loose by means of aperients and the sodium sulphate mixture given above. All toxic drugs should be avoided—for example, all forms of opium or its preparations and alkaloids are particularly harmful, since these patients are extremely susceptible to their influence. Chloroform—for example, chloroform water or spirits of chloroform—should not be given.

As a rule these cases improve and the jaundice gradually clears up. It is remarkable how long in even mild cases the jaundice persists. The cases do well unless toxic symptoms develop, and then further special treatment is necessary.

Cases of this type should not be allowed to return to work until at least a month has elapsed after the complete clearing up of the jaundice, and the work should not necessitate any further exposure whatever to the vapour of tetrachlorethane.

III. Jaundice with Marked Toxic Symptoms.

The symptoms which indicate toxæmia are vomiting, wandering or delirium, stupor, drowsiness, twitchings, or coma. The urine may become diminished in quantity, and the presence of albumin or casts are grave signs. Leucin or tyrosin in severe cases may be found in the deposit, and there may be acetoneuria.

C

In cases of jaundice with toxic symptoms of any kind the bowels should be kept well open. The following mixture should be given every three hours:

S. d. citrate	...	...	...	3j
Sod. bicarb.	...	...	...	gr. xxx
Potass. citrate	...	...	...	3ss
Caffeine citrate	...	...	...	gr. iiij
Syr. aurant.	...	...	...	3j
Aq.	...	...	...	ad 3j

Infusion of normal saline Oj into a vein should be given once or twice a day until the toxic symptoms improve.

Subcutaneous injections of normal saline Oj to Oij may be given instead of the intravenous injections.

Rectal injection of sodium bicarbonate 3ij, normal saline Oj, should be given every eight hours.

The diet should be on the lines of that for cases Type II. In cases in which there is suppression of urine, cupping over the lumbar region and electric light baths given in bed, or hot-air baths, may be employed with advantage.

The prognosis in cases of this type is always grave. The elimination of toxins should be aimed at as far as possible, and saline infusion into a vein subcutaneously and rectal salines should be given early with this object.

Alkali producing drugs such as citrates and bicarbonates are given to counteract the tendency to acid intoxication.

In cases of toxic jaundice I, II, or III the symptoms due to the jaundice *per se*—that is, pruritus, skin symptoms, etc.—are not sufficiently marked to call for any special treatment.

IV. Cases showing Signs of Portal Obstruction.

These cases are rare. Rest in bed and light diet, as indicated under Type II, are important. Aperients should be given and the sodium sulphate mixture given above should be taken. Potassium iodide gr. x may be added with advantage to the mixture.

Where ascites is marked and is causing dyspnoea or distress paracentesis should be performed. A convenient indication for resort to this measure is afforded by observing the level of the ascitic fluid with the patient propped up in bed. If the dullness due to the fluid reaches above the umbilical level then artificial removal of the ascitic fluid should be carried out.

One case of this type after paracentesis had been performed twice, over 20 pints being removed on each occasion, made a complete recovery.

REFERENCE.

¹ An Outbreak of Toxic Jaundice due to Tetrachlorethane Poisoning: a New Type amongst Aeroplane Workers. *Transactions of the Medical Society of London*, vol. xxxviii, 1915; *Lancet*, March 13th, 1915.

THE TREATMENT OF KALA-AZAR (INDIAN FORM) BY TARTAR EMETIC INTRAVENOUSLY AND BY INUNCTIONS OF METALLIC ANTIMONY.

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ONE of us (L. R.) early in 1915¹ commenced the use of tartar emetic intravenously in the treatment of kala-azar on the strength of its previous use in sleeping sickness, and independently of any other worker, although, as he subsequently learnt, Drs. Cristana and Caronia had previously given it successfully in the African form of kala-azar in Sicily, and he has already reported favourable results from its use in the Medical College Hospital.² Owing to difficulties in following up Indian patients, the European General Hospital presents better opportunities for determining the ultimate results of the new treatment, so during the last seven months we have been treating a consecutive series of cases of kala-azar among Europeans with tartar emetic, and are now able to form definite ideas of its value. All the intravenous injections have been given by one of us (N. H. H.), while the microscopical examinations of the specimens obtained by spleen puncture and the blood counts have been made by the other. The following