Milk from each farm is distributed so far as is practicable to one particular round, and it was possible, therefore, to ascertain the farm from which all but one of the infected houses obtained milk. I fully expected that one farm would be implicated especially; but this was not the case, since no less than five different farms were concerned. If these are indicated by the letters A, B, C, D, and E, A supplied three houses, B one, C three, D three, and E three, whilst the fourteenth house had milk occasionally from A, occasionally from C, and occasionally from D.

Each round had a different roundsman, and infection during delivery appeared, therefore, to be out of the question. Infection at the receiving station seemed a possible solution. On inquiry I found that, as the farm churns arrived, the milk was emptied into a measuring drum, cooled (if this had not been effected at the farm), and passed through a strainer into the roundsmen's churns, the strainers consisting of four thicknesses of muslin over a metal frame. All churns and other utensils were thoroughly sterilized by steam after use. Only two men handled the milk at the dépôt. On January 11th I took swabs from the throats and noses of both, and obtained negative bacteriological results. Neither of them had recently suffered from any kind of illness, they had no families, and there had been no illness in their homes.

It is obvious, however, that if the milk from one of the farms were infected, the muslin strainer would be likely to retain some of the bacilli, which might readily infect milk from other farms when passed through the strainer subsequently, and this appeared to be the most likely solution of the problem, since it is almost inconceivable that five farms should be infected simultaneously.

Farms A, C, and D are situated in Reigate rural district, B in an adjoining rural district, and E in Kent. Inquiries at these farms yielded no information of illness resembling diphtheria among the farm hands or their families. Farms C and D are situated in a parish where there had been an outbreak of diphtheria, comprising fifteen cases in thirteen families between August 29th and December 22nd, 1921, with four further carriers in infected houses. It had been an unusually troublesome outbreak to deal with, owing principally to a concurrent epidemic of influenza, and to the omission to obtain medical advice in several instances. Although I had succeeded in identifying several "missed" cases, as well as a number of healthy carriers, I could not satisfy myself that all important sources of infection had been detected, and was left with the impression that further unrecognized attacks had occurred, probably among adults.

Early in November a schoolboy was removed to hospital whose eldest brother was a cowman at D farm. The cowman and all the other school children were examined bacteriologically, and the cowman and one girl were found to be carriers. Both were removed to hospital on November 6th, and were not discharged until February, 1922. The only other inmate of this house concerned with the farm was the father, who was bailiff. He had nothing to do with the cows, and was not examined. On January 12th I heard that the head cowman had been laid up with rheumatic fever since December 28th, and that the bailiff was doing his work. I swabbed his throat and nose that day, and obtained negative results. Negative results were also obtained at the Lister Institute a fortnight later. No cases had occurred in the neighbourhood of C farm.

So far, therefore, there was no evidence to incriminate D farm, although it appeared to be the most likely source of the Reigate outbreak. The milk from this farm is one of the earliest to arrive at the Reigate dépôt, and therefore is one of the first to pass through the strainer. I arranged that separate strainers should be used for A, C, and D farms on January 12th, and sent these to the Lister Institute for bacteriological examination, intending to await the report before taking any further action. As the public had largely adopted my suggestion of boiling their milk, there was little risk of a spread of infection. The examination was completed on January 25th, both cultural and inoculation investigations being made; diphtheroids were isolated, but no true diphtheria bacilli were found.

The problem, however, was solved on January 22nd, when another cowman, son of the head cowman from D farm, was removed to hospital with diphtheria. His faucial attack began on January 19th, but on admission to hospital he was found to have sores on both arms which had existed for nearly six weeks. Unfortunately energetic treatment was successfully applied before I had an opportunity of making

a bacteriological examination, but I was assured that the sores had the appearance typical of diphtheritic infection of the skin. The inquiries made at each of the farms A, C, and D had included the existence or otherwise of such sores, but their presence had been denied in this instance. The farm supplied about seventy gallons a day, milking being carried out by four cowmen. In the course of the next few days I took swabs from the throats and noses of nineteen persons on the farm, including all the remaining cowmen and other farm hands and their families. Seven carriers were found, one being the head cowman, who had been laid up with rheumatic fever, as already mentioned, the remainder being children, three of them in cowmen's families. All were removed to hospital. I had the teats and udders of all the cows, thirty-three in number, examined. On the udder of one was a superficial ulcer, apparently of traumatic origin. A swab from it yielded a negative result. Another cow had a cyst in a dry quarter. All the remaining cows were healthy.

On January 23rd the milk from D farm was withdrawn from the retailer's supply, was pasteurized, and made into butter. Apart from a few gallons consumed by the families employed on the farm all the milk is sent into Reigate. It is curious that none of the children on the farm contracted diphtheria; but possibly some of the carriers were accounted for in this way.

Owing to the impossibility of confirming the nature of the sores on the young cowman's arms bacteriologically it cannot be asserted definitely that he was the actual infecting agent, though this is by far the most likely explanation. The illness which laid up his father was undoubtedly rheumatic fever, which may or may not have been associated with an attack of diphtheria; but in any case he was not engaged in milking at the time the outbreak was at its height. Although carriers were found in the family of another cowman he himself appeared to be free.

This outbreak differed from the usual textbook description in the absence of any marked suddenness in its appearance, and in the occurrence of only one instance of multiple attacks in the same household. It is also somewhat remarkable that so few cases should have occurred among the 8,000 or more consumers of the supply. This, however, may largely be accounted for by the practice of allocating the milk from each farm to a particular round.

The character of the attacks was mild. There were no deaths, but in many instances the infective period was a very long one.

THE ACTION OF CARBON TETRACHLORIDE ON THE LIVER.

BY

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IN view of the report by Dr. W. G. Smillie and Dr. S. Pessoa¹ to the effect that carbon tetrachloride in small doses produced a definite fatty degeneration of the liver and kidneys of dogs it was deemed advisable, before using this drug generally in Ceylon as a vermifuge, to ascertain whether or not these lesions were produced in man, using the maximum dose of 5 c.cm. as defined by Hampton and Nicholls.² Leach³ reports from autopsy that no macroscopical change was noted in the liver or kidney following a 12 c.cm. dose; apparently no microscopical examination was made.

With the approval of the superintendent of prisons and the personal consent of the prisoners, two condemned men were treated with 5 c.cm. of carbon tetrachloride and one with 8 c.cm. in two doses of 5 and 3 c.cm. The anthelmintic was given on an empty stomach, followed by tiffin of rice at the hours mentioned, and, as indicated, No. 1 received a post-purge of 1 oz. of saturated magnesium sulphate solution three and a half hours later; No. 2 received the same eight hours after treatment; while No. 3 received none, having vomited the first and declined the second.

Autopsies were performed on dates mentioned, when the entire intestinal tract from the pylorus to, but not including, the rectum was removed after being double ligatured in

order to keep the contents for examination. The liver and left kidney were removed in each case and examined macroscopically and microscopically. The following is a report of the examination and findings:

	Prisoner 1.	Prisoner 2.	Prisoner 3.
Date examined ...	July 15	July 31	July 31
Heart rate ...	82	82	72
Heart sounds ...	Normal	Normal	Normal
Systolic pressure ...	(?)	118	116
Diastolic pressure ...	(?)	82	79
Urinalyses:			
Albumin ...	Trace	Negative	Negative
Specific gravity ...	1.016	1.014	1.012
Sugar ...	Negative	Negative	Negative
Microscopic ...	Negative	Negative	Negative
Faecal examination:			
Anky. duod. ...	Positive	Positive	Positive
Ascaris lumb. ...	(?)	Positive	Negative
Trichuris trich. ...	Positive	Positive	Positive
Oxyuris verm. ...	Negative	Positive (heavy)	Positive
Date of 1st treatment	July 16	August 1	August 1
Breakfast ...	Tea only	Nothing	Nothing
Hour treated ...	9 a.m.	8 a.m.	8 a.m.
Amount CCl ₄ given	5 c.cm.	5 c.cm.	5 c.cm.
Tiffin ...	10.30 a.m.	10.30 a.m.	Declined
Condition of patient	11 a.m., dizzy	10 a.m., dizzy	10 a.m., dizzy, nauseated
Heart rate ...	86	80	88
Purge ...	12.30 p.m.	4 p.m.	4 p.m.; vomited at once
Worm count in 24-hour collection:			
Anky. duod. ...	241	33	No movement in 24 hours
Ascaris lumb. ...	Negative	2	
Trichuris trich. ...	Negative	Negative	8
Oxyuris verm. ...	1		
Post-treatment examination of faeces:			
Anky. duod. ...	No examination	Negative	Negative
Ascaris ...	—	Negative	Negative
Trichuris ...	—	Positive	Positive
Oxyuris ...	—	Positive	Negative
Date of 2nd treatment	None given	None given	August 14
Breakfast ...	—	—	Tea only
Amount CCl ₄ given	—	—	3 c.cm.
Hour treated ...	—	—	8 a.m.
Tiffin ...	—	—	10.30 a.m.
Condition ...	—	—	No complaints
Pulse rate ...	—	—	84
Purge ...	—	—	None given
Date of autopsy ...	July 22	August 15	August 19
Examination of bowel contents:			
Anky. duod. ...	Negative	Negative	Negative
Ascaris ...	Negative	Negative	Negative
Trichuris ...	9	12	Negative
Oxyuris ...	Negative	17	14
Liver:			
Macroscopically ...	No change evident	Slightly friable	Very friable
Microscopically ...	No well-defined change	Granular degeneration of liver cells Leucocytic infiltration	Fatty degeneration of liver cells Diffuse leucocytic infiltration
Kidney:			
Macroscopically ...	No change evident	No change evident	No change evident
Microscopically ...	No change evident	No definite change	Cloudy swelling of proximal tubes

From the above it is quite evident that the anthelmintic, in the quantities mentioned, produced lesions in the liver in two cases, as Smillie anticipated; on this account it seems in advisable to prescribe even a 5 c.cm. dose with purgation, let alone without. It is apparent also that this dose as a maximum borders on the danger line. A safe maximum seems to be 3 c.cm., since it has been given to a number of patients in Ceylon without producing any feeling of discomfort, though so far no autopsy has been performed on any individual so treated to ascertain whether or not the kidney or liver was injured.

From its action as a vermifuge we agree with both Leach's¹ and Hampton and Nicholls's² report that it seems to be practically specific for ankylostomes, fairly efficient in the removal of *Ascaris lumbricoides* and *Oxyuris vermicularis*, and of little value in the elimination of *Trichuris trichiura*.

We wish to thank Mr. A. F. G. Walker, Superintendent of Prisons for Ceylon, for his assistance and the interest shown in the experiments, and Dr. S. Chelliah, M.B., C.M., assistant pathologist of the General Hospital, for his confirmation of the pathological findings.

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NINETIETH ANNUAL MEETING

OF THE

British Medical Association.

Held at Glasgow, July, 1922.

PROCEEDINGS OF SECTIONS.

SECTION OF MEDICINE.

Professor T. K. MONRO, M.D., F.R.F.P.S., President.

PRESIDENT'S INTRODUCTORY REMARKS.

PROFESSOR T. K. MONRO, in offering to the members of the Section a very hearty welcome to the city and to the classroom in which they met, remarked that in the regulations drawn up by the Council of the Association there was a merciful provision that the President of a Section should not deliver a presidential address. He, therefore, in a few words described the arrangements which had been made for the three days' work of the Section.

DISCUSSION ON EXOPHTHALMIC GOITRE.

OPENING PAPER

BY

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IN arranging a discussion on exophthalmic goitre it is important to select certain aspects of this subject for consideration so as to elicit definite information or opinions upon them from those taking part in the discussion. Although much attention has been paid to the pathology, symptoms, and treatment of this malady, too little consideration has been given to its prevention, and it will be useful to consider what is known of its causation so as to discuss what measures can be taken to prevent the onset of the disease or to check its development in the early stages, even if this is possible in only a small number of cases. It will be advisable, in the first place, to allude to the pathology of the condition and, incidentally, to the cause of one puzzling symptom—the exophthalmos. Prevention and a few indications as to treatment will then be considered.

At the Annual Meeting of this Association in 1896 I opened a discussion¹ on the pathology of exophthalmic goitre and briefly reviewed the current views of the day, adducing evidence which led to the conclusion "that in exophthalmic goitre there is an excessive formation and absorption of thyroid secretion which may or may not be normal in character and that the symptoms of the disease are due to the presence of this excess of secretion in the blood, and to its action upon the tissues and especially upon the nerve centres in the medulla." This view of the essential nature of the malady is still generally accepted and the term "hyperthyroidism" is used to denote the various degrees of thyroidal overactivity. In a recent British Medical Association lecture² I have indicated a convenient clinical classification of the main types of hyperthyroidism, but on this occasion it is advisable to discuss only exophthalmic goitre and not the minor degrees of hyperthyroidism.

The acceptance of the view that exophthalmic goitre is due to a thyroidal toxæmia has directed attention to the importance of treating the thyroid gland, and experience has shown that when, as the result of either medical or surgical treatment or in consequence of spontaneous atrophy, the secretion is reduced to normal amounts, recovery from the malady takes place. This sequence of events appears to be a strong indication that the thyroid alone of the endocrine glands is primarily at fault in this disease. It has been suggested that one or more of the other endocrine glands may play a primary part in the production of symptoms, but no clear evidence has been brought forward to support this view. The thyroidal hormones certainly play a part in stimulating the activity of other endocrine glands, just as they increase the activity of the sweat glands, but this appears to be entirely a secondary result of a primary hyperthyroidism. The symptoms can almost all be accounted for