

Results of Control Operations.

In the endemic districts of Queensland and New South Wales a treatment campaign and some efforts towards sanitary improvement went hand in hand with the original survey. The permanent control plan gave the opportunity to measure the results of this work. Table V. compares the last hookworm index of the districts re-surveyed before this paper was written with the index of the original survey made by the Australian Hookworm Campaign.

Twenty places had been completely re-surveyed and of these twenty only four failed to show a lower hookworm index on re-survey than on the original survey.

Continuation of Hookworm Control Work.

The Hookworm Campaign recommends that the Commonwealth of Australia and the States of Queensland and New South Wales cooperate to continue the control measures which have shown such promise in the hands of the present organization. The new work could be based on the Commonwealth Health Department's diagnostic laboratories which are being established at strategic points throughout the area to be covered. With the two medical units and a sanitary unit, three more years of work should put the control of hookworm disease in such an advanced place that further changes in staff and budget could be made.

No disease is subject to control by sporadic or intermittent measures. The control of hookworm disease in Australia and its dependencies has been well begun and it is now essential that no opportunity for loss of control be given. Continued effort will greatly reduce the incidence of hookworm disease, the most important of the tropical diseases of Australia and will afford a shining example of what can be accomplished by intelligent, well-organized cooperation in making tropical countries healthy places in which to live.¹

References.

- (1) J. H. Waite, "Preliminary Report on Anchylostomiasis in Papua," *THE MEDICAL JOURNAL OF AUSTRALIA*, September 15, 1917.
- (2) J. H. Waite, "The Queensland Hookworm Campaign," *THE MEDICAL JOURNAL OF AUSTRALIA*, December 21, 1918.
- (3) W. A. Sawyer, "Hookworm in Australia," *THE MEDICAL JOURNAL OF AUSTRALIA*, February 19, 1921.
- (4) W. C. Sweet, "The Australian Hookworm Campaign," *Health*, Volume I, No. 6, June, 1923.
- (5) Sawyer, W. A., "Some Directions in which Advances in Preventive Medicine Could be Made in Queensland," *THE MEDICAL JOURNAL OF AUSTRALIA*, February 11, 1922.

¹ The complete article will appear in author's reprints.

SOME NOTES ON UNCLASSIFIED FEVERS
OCCURRING IN THE NORTH QUEENSLAND
COASTAL REGIONS.

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In various places along the coast of north Queensland fevers occur, which up to the present time have not been classified. It is with the object of drawing attention to these that the following notes are written.

Coastal Fever.

In 1910, Smithson (1) first called attention to a specific fever occurring in the neighbourhood of a small town called Mossman, situated a few miles from Port Douglas in north Queensland.

In a report to the Commissioner of Public Health, Queensland, in 1913, Clarke (2) gave a very full and detailed account of his observations on a large number of cases of this fever. This report has largely been made use of in the compilation of these notes.

Smithson and Clarke both describe the fever under the name "Mossman Fever."

In 1914, Breinl, Priestley and Fielding (3), making use of Clarke's report, describe it under the name of "Endemic Glandular Fever."

The fever is not confined to the Mossman district. A similar disease occurs in several of the coastal towns in North Queensland. The disease will be referred to in this paper by the name by which it is usually spoken of in the affected district, namely Coastal Fever.

Definition.

Coastal fever is an acute endemic disease characterized by continued fever of about twenty-one days' duration, with pain in the head, back and legs, accompanied usually by the painless enlargement of certain groups of lymphatic glands and in some cases by a rash which may be macular or occasionally vesicular.

Actiology.

The disease may attack persons of any age or of either sex. Clarke's youngest patient was aged three months and his oldest patient seventy-six years.

A very great majority of the patients are men working in the fields, especially those engaged in timber cutting and clearing land and cane cutting.

There is no racial immunity.

The fever may occur at any time of the year, but the period of maximum incidence is from about June to August.

The disease is not infectious, as people living in the same house as coastal fever patients, do not get the disease and nurses and hospital attendants looking after patients are never affected.

Considering that the disease occurs practically only amongst those working in the scrub where insects abound, that it is not infectious and that it is probably not water or food borne, it seems very probable that it is conveyed by an insect. There is no evidence to show what this insect is. Mosquitoes, sand flies and a small red mite which causes a condition known as "scrub itch," are all common in the scrub in the district in which the fever occurs.

Symptomatology.

As a rule the onset is gradual with malaise, headache and anorexia. A patient frequently continues working for several days at this stage. The symptoms become more and more severe as the disease progresses. Vomiting and dry retching may occur.

The temperature may rise suddenly or gradually and reaches its maximum in a few days. It remains high for about ten to fourteen days and then falls slowly by lysis. The pulse rate does not increase in proportion to the temperature.

Headache is severe as a rule and is generally frontal. There may be some degree of photophobia.

Pains in the back and limbs are complained of.

Sleeplessness is a prominent and troublesome feature of these cases. Pain in the throat on swallowing may be complained of.

The bowels are usually constipated, but occasionally diarrhoea may occur. The tongue is coated with a thick fur and later becomes dry and brown.

There is usually but not always some enlargement of lymphatic glands.

The axillary, inguinal or sometimes the cervical glands become enlarged, hard and tender on deep pressure. They never suppurate and are not painful.

The liver is not enlarged and the spleen not palpable.

A blotchy macular rash may occur on the trunk arms and legs. It usually appears about the fourth day. It fades after four or five days and disappears without desquamation. Occasionally a vesicular rash may occur.

Profuse sweating occurs and there is a distinctive disagreeable odour given off from the skin.

There is no abdominal distension or tenderness.

Relapses may occur in any type of the fever.

Prognosis.

In most cases the prognosis is very good. Of 1,482 cases Clarke had a mortality of less than 1%. He states that in cases of the drowsy type and of the restless type with very severe and persistent headache the prognosis should be guarded. Patients may look extremely ill, but generally they recover.

Diagnosis.

Coastal fever has to be diagnosed from dengue, typhoid fever, bubonic plague and climatic bubo.

The severe pains in the back, bones and joints which are typical of dengue, do not occur in coastal fever. The pains which occur in the back and limbs in the latter disease are of a different and milder character.

The fever is of longer duration in coastal fever than in dengue.

Coastal fever is distinguished from typhoid fever by the absence of abdominal pain and distention. Perforation, hæmorrhage and sloughing do not occur in coastal fever and the spleen is not enlarged. Bacteriological examinations distinguish it from both typhoid fever and bubonic plague.

In climatic bubo severe constitutional symptoms are absent. Only the lymphatic glands of the groin become enlarged and may frequently suppurate.

Treatment.

The treatment is mainly symptomatic. Purgatives are necessary to combat the constipation. Early stimulation with strychnine and digitalis is strongly indicated.

Depressing drugs such as salicylates do harm.

Pathology.

Breinl, Priestley and Fielding examined the blood of a number of patients and found that the number of red blood corpuscles and the amount of hæmoglobin do not undergo any changes during the course of the disease.

They found the number of leucocytes increased during the first few days, but did not observe any extreme leu-

cocytosis. The differential count showed an increase in the percentage of leucocytes only.

They cut sections of lymphatic glands from the groin and neck of patients and found the typical picture of acute lymphadenitis. No necrotic areas were seen.

They injected two monkeys and one guinea pig with about ten cubic centimetres of the peripheral blood of two patients who showed well developed symptoms of the disease. They observed a definite rise in temperature in the monkeys on the ninth day and tenth day respectively after inoculation. The lymphatic glands of the infected monkeys became slightly enlarged at the time of the onset of the pyrexia. Two control monkeys kept under the same conditions did not show any rise in temperature. The guinea pig did not react to the inoculation in any definite way.

Coastal fever is also common in the Innisfail district, but in this district the time of maximum incidence is about December.

In addition to this fever which lasts about three weeks there is another milder form which lasts about ten days. This may be a milder form of the same disease, but the opinion generally held by medical practitioners who have seen many cases, is that it is a separate disease.

Sarina or West Plane Creek Fever.

This fever is endemic in the area surrounding West Plane Creek near the township of Sarina. This township is situated a few miles inland from Mackay. The chief industry is sugar cane growing, the cane farms lying in the country at the foot of a range of hills through which the West Plane Creek and Middle Creek run. The cane after cutting is taken to the Plane Creek Mill in Sarina for crushing.

Seasonal Distribution.

Cases occur during the wet season from November to April.

Incidence.

Cases occur principally among males who are working in the fields. Females are very rarely affected and then only those who have been working in the fields. The disease affects men engaged in clearing and ploughing new ground and ground which has been cleared and has again been covered with scrub. Cane cutters are very rarely affected. One farm was pointed out on which there had never been a case of fever. It was stated that the men working on the farm never had their "crib" in the fields, but always returned to the house for it and washed their hands before eating. The owner of another farm had never had the disease, although several cases had occurred amongst the men working for him. He never ate while out in the fields, but always returned to the house and washed his hands.

It is the practice for men to take their drinking water out into the fields and not to drink the creek water, although in some cases men do the latter.

The land in the affected district, like that in surrounding districts, is thickly covered with lantana. There are very few birds' nests in the scrub. Rats and field mice appear to be plentiful in some parts, but not common in others. Rats are fairly common in the cane fields. Many

of the men working in the fields suffer from "scrub itch" caused by a small red mite, just visible to the naked eye. The prevalence of this scrub itch appears to bear no relation to the prevalence of the fever.

Definition.

Sarina fever is a continuous fever running a course of about the length of typhoid fever, but if anything somewhat shorter.

Symptoms.

The onset is more sudden than that of typhoid fever. There may be tiredness and malaise for a day or two. Sometimes the onset is sudden like dengue and with shivers.

Shivers may occur from time to time through the attack of fever. Mild cases present no very definite symptoms beyond fever and headache at the start. Headache is an early symptom and it hangs on longer than it does in typhoid fever. It may be very severe. It occurs behind the eyes.

The type of fever resembles that of typhoid with a gradual decline. Some cases show periods of greater remissions.

Delirium of a severe and noisy type frequently occurs.

Severe toxæmia with delirium, cyanosis, septic rashes and diarrhœa occurs in bad cases. These are fatal from heart failure earlier than in typhoid fever, sometimes in the second week. The heart seems not to respond to any stimulation.

Mild cases run an easy course to convalescence without much discomfort to the patient. The tongue is red and coated and becomes dry and brown.

Distension is not a common symptom. The spleen is seldom palpable. The rash is mottled, all over the body, but more marked on the chest and abdomen. A typical rose spot rash in crops is not observed.

The bowels are usually normal. In severe cases the patients sometimes get diarrhœa. They generally die. The stools are not like those of typhoid fever and may be brown and soft formed throughout.

Sloughs and hæmorrhage are very rare. Perforation has not been observed.

The lymphatic glands may or may not be enlarged. Some men who have treated patients with sarina fever state that they usually become enlarged early. Most often the inguinal glands are affected, but the cervical or axillary glands may also be enlarged. Other men say that they have never noticed any enlargement of the lymphatic glands.

No complications occur as a rule. Neuritis, periostitis or abscess formation do not occur.

Relapses do not occur. Second and third attacks may occur in succeeding years. These are generally milder in type. The mortality is about 20-30%.

Coastal Fever.

Onset gradual;
Rigors uncommon;
Constipation the rule;
May get relapses;
Heart responds to stimulation;
Mortality less than 1%.

Sarina Fever.

Onset sudden;
Rigors common;
Bowels usually normal, but may get diarrhœa;
No relapses;
Heart does not respond to stimulation;
Mortality 20-30%.

Conclusions.

There are two, probably more, unclassified fevers which occur in the coastal regions of north Queensland.

These fevers affect almost solely men working in amongst timber and scrub.

They are not infectious and are probably not water or food borne.

They are in all probability insect transmitted.

TAKE in References—9pt Solid

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- (3) A. Breinl, H. Priestley and J. W. Fielding, "On the occurrence and pathology of Endemic Glandular Fever, a specific fever occurring in the Mossman district of North Queensland," *THE MEDICAL JOURNAL OF AUSTRALIA*, October 24, 1914, page 391.

BOWEL PARASITES OF AUSTRALIA AND HER DEPENDENCIES. THEIR RELATION TO DISEASE AND THEIR FREQUENCY OF OCCURRENCE.

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Bowel parasites may be considered under two headings: (i.) Helminthological parasites and (ii.) protozoological parasites.

Helminths.

The helminths infecting Australian inhabitants are as follows:

(1) Trematoda:

Schistosomum haematobium.

Affected soldiers have been treated with marked success, the majority being completely freed of infection while the remainder are still under observation. In north Australia a number of the Chinese and Japanese population have possibly brought with them the Oriental variety, *Schistosomum japonicum*.

Representatives of the molluscan hosts are found in Australia and there is no doubt that schistosomes can adapt themselves to the local species.

Clonorchis sinensis.

The Japanese liver fluke has been reported five times in Orientals in Australia, but there is little doubt they were infected before arrival, and its transmission to Europeans is highly improbable.

(2) Cestoda.

Taenia solium and *Taenia saginata* occur rarely, but no accurate details are available.

Diphyllobothrium latum has been recorded, but always

in persons previously resident in a known endemic country.

Hymenolepis nana occurs relatively frequently (0.2%) and may heavily infect aborigines, especially on mission stations.

Hymenolepis diminuta is much rarer.

Cestodes rarely infect and still more rarely cause disease in Australia.

(3) *Nematoda*.

Ascaris lumbricoides is relatively infrequent in Australia, but Papua and New Guinea showed an incidence rate as high as 12%.

It may give rise to peritonitis, pleurisy and pneumonia.

Ankylostomum duodenale and *Necator americanus* occur relatively frequently (average 9% to 10%) from the northern rivers of New South Wales to Cape York, especially predominating along the coast. The average low number of worms harboured is in conformity with the infrequency of obvious clinical signs and symptoms.

Strongyloides stercoralis has a uniform incidence although a small one (0.25%). It is doubtful, however, whether this parasite can cause symptoms of any clinical importance.

Haemonchus contortus occurs in sheep and goats and probably in man on occasions.

Trichuris trichiura occurs infrequently in Southern Australia. The rate is up to 1% among whites in sub-tropical and tropical areas, up to 16% in asylums and aboriginal settlements, and 12.7% and 17.9% in Papua and New Guinea.

Enterobius vermicularis (*Oxyuris vermicularis*).

The vast majority of Australian children are infected at some stage of their existence, though often without causing definite pathological conditions.

Oxyuris incognita.

So far the parent worm has not been discovered. Evidence exists of a seasonal incidence, ova being most commonly found during the first quarter of the year.

Syphacea obvelata.

This is a common mouse oxyurid which occasionally infests man in other countries and may later be found in Australia.

Tyroglyphus longior, a common flour and cheese mite, is frequently found in stool examinations in Australia but is not known to cause any bowel condition of importance.

Protozoa.

Protozoological parasites are similar in variety to those found in the bowel of inhabitants of much more temperate countries.

Entamoeba histolytica.

Shearman's investigation points to endemic infection by this parasite.

The scarcity of outbreaks of amoebic dysentery is probably due to the lack of a suitable soil rather than to the absence of the causal agent.

Entamoeba coli occurs relatively frequently, but is of course non-pathogenic.

Endolimax nana, *Iodamoeba bitschlii*, *Chilomastix mesnili* and *Blastocystis hominis* have each been observed, but are non-pathogenic.

Lambli (*Giardia*) *intestinalis* has been found, but opinion differs as to its pathogenicity. It may cause severe dysenteric symptoms.

Balantidium coli has been reported, but there are no authentic records. The parasite occurs in bowel of pigs in other countries.

One can readily conclude that *Entamoeba histolytica* is the one protozoological bowel parasite of importance yet discovered in Australia, which is of interest to the epidemiologist.

FILARIASIS IN AUSTRALIA.

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In the section of tropical diseases it is particularly suitable that some reference should be made to filariasis and its distribution in Australia, since it was in Queensland (1876) that Dr. Joseph Bancroft first discovered the mature worm which Cobbold subsequently (1877) named in his honour *Filaria bancrofti*.

A review of the accessible literature offers little assistance in the attempt to map the distribution of filariasis in Australia. It has been long known in a more or less general way that the coastal areas of Queensland were affected and that in some places the endemicity rate reached a relatively high percentage. During the last twelve months, however, a filarial survey has been carried out in conjunction with the Australian Hookworm Campaign (representing the Commonwealth of Australia, the State of Queensland and the International Health Board) with a view to determining more fully those areas in which filariasis is constantly to be found, and certain interesting figures have been obtained which will be dealt with later in the paper.

The early history of filariasis in Australia, in so far as it appears in the literature accessible to the writers, consists almost entirely of reports of the cases and certain articles contributed to the *Australasian Medical Gazette* by Joseph Bancroft, T. L. Bancroft, Peter Bancroft, E. S. Jackson, Flynn, McLean and Croll. The Brisbane Hospital records which have been kept from the very early days of Queensland, naturally give no prominence to the records of elephantiasis and filariasis until subsequent to the date of Bancroft's discovery. From 1883 onwards, however, they are included under the heading "parasitic diseases" and in some areas a considerable number of cases are recorded.

In 1884 Scot Skirving described a successful operation for *elephantiasis scroti* from Camden, near Sydney, New South Wales, 33° S. The case is interesting and the his-